INSTRUCTIONS

1. This Test Booklet contains one hundred and fifty (20 Part 'A' + 50 Part 'B' + 80 Part 'C') Multiple Choice Questions (MCQs). You are required to answer a maximum of 15, 35 and 25 questions from Part 'A', 'B' and 'C' respectively. In case more than required number of questions are answered, only first 15, 35 and 25 questions in Parts 'A', 'B' and 'C' respectively, will be taken up for evaluation.

2. OMR answer sheet has been provided separately. Before you start filling up your particulars, please ensure that the booklet contains requisite number of pages and that these are not torn or mutilated. If it is so, you may request the invigilator to change the booklet of the same code. Likewise, check the OMR answer sheet also. Sheets for rough work have been appended to the test booklet.

3. Write your Roll No., Name and Serial Number of this Test Booklet on the OMR answer sheet in the space provided. Also put your signatures in the space earmarked.

4. You must darken the appropriate circles with a black ball pen related to Roll Number, Subject Code, Booklet Code and Centre Code on the OMR answer sheet. It is the sole responsibility of the candidate to meticulously follow the instructions given on the Answer Sheet, failing which the computer shall not be able to decipher the correct details which may ultimately result in loss, including rejection of the OMR answer sheet.

5. Each question in Part 'A' and 'B' carry 2 marks and Part 'C' questions carry 4 marks each, respectively. There will be negative marking @ 0.50 marks for each wrong answer in Part 'A' and 'B' and 1.50 marks for Part 'C'.

6. Below each question in Part 'A', 'B' and 'C' four alternatives or response are given. Only one of these alternatives is the 'correct' option to the question. You have to find, for each question, the correct or the best answer.

7. Candidates found copying or repeating to any unfair means are liable to be disqualified from this and future examinations.

8. Candidate should not write anything anywhere except on answer sheet or sheets for rough work.

9. Use of calculator is NOT permitted.

10. After the test is over, at the perforation point, tear the OMR answer sheet, hand over the original OMR answer sheet to the invigilator and retain the carbonless copy for your record.

11. Candidates who sit for the entire duration of the exam will only be permitted to carry their Test booklet.
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**Table 1:** Four Place Common Logarithms

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2-C-H
### TABLE 2
FOUR PLACE COMMON ANTILOGARITHMS

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**Table 3**

**NATURAL OR NAPIERIAN LOGARITHMS**

log x or ln x
भाग/PART - A

1. तथ्यानुसार में एक स्वर्ण के तीन खंजार (A, B और C) के मुल्क की प्रतिशत को दिखाया गया है। X, Y और Z के दर्शाने वाले त्रिकोण आकार दिखाया गया है। कौन सा दस्तावेज जीता?

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1. Y
2. X
3. Z
4. X और Y में बराबर हुई

2. एक विशेष केस्टर्स (किस्टेंस) की, जिसमें एक वायर मिश्रण व दो तारों का वायरशियार है, दो तारों (दो 8 गिने) दिखाई गई है। क्या इस केस्टर्स (किस्टेंस) का आयाम (cm² में) यह है?

3. एक बालक ने एक शूट कर रहा है और नमूने में वायर मिश्रण दिखाया गया है। बालक ने अपने दो तारों का वायरशियार दिखाया गया है। बालक ने अपने दो तारों का वायरशियार दिखाया गया है। बालक ने अपने दो तारों का वायरशियार दिखाया गया है।

4. A boy throws a ball with a speed $v$ at a vehicle that is approaching him with a speed $V$. After bouncing from the vehicle, the ball hits the boy with a speed $v$. $v + V$

1. $v + V$
2. $v + V$
3. $v + 2V$
4. $v + 4V$

3. Four friends were sharing a pizza. They decided that the oldest friend will get an extra piece of pizza. Balu is two months older than Kartikeya, who in turn is three months younger than Bhel. Doreena is one
6. After 6 g of carbon is completely burnt in an atmosphere of 40 g of oxygen, the percentage oxygen left is:
1. 80  
2. 60  
3. 40  
4. 20

7. What fraction of the equilateral triangle shown below with three identical sectors of a circle is shaded?
1. $1 - \frac{\pi}{2\sqrt{3}}$  
2. $\frac{\pi}{2\sqrt{3}}$  
3. $1 - \frac{\pi}{3\sqrt{3}}$  
4. $1 - \frac{\sqrt{3}}{2}$

8. How many different vegetables can be made from cauliflower, tomatoes, onions, potatoes, and carrots?
1. 16  
2. 28  
3. 31  
4. 32
9. A bottle of perfume is opened and a person is at a distance of 10 m gets the smell after 10 seconds. The time taken for a person 20 m away to get the smell is about

1. 20s
2. 40s
3. 14s
4. 80s

10. Marks (out of 30) of seven students in an examination are 4, 15, 6, 7, 5, 8 and 14, where 4 and 8 are a pair of prime numbers. What is the maximum possible value of the difference between the maximum and minimum marks?

1. 25
2. 26
3. 37
4. 29

11. Two persons A and B start walking in opposite directions from a point. A travels twice as fast as B. The speed at which A travels is 1 km/h. If A travels 2 km and turns back and starts walking towards B, at what distance from the starting point will A cross B?

1. 2 km
2. 4 km
3. 6 km
4. 8 km

12. A person wanted to travel from Chartbag to Alambag with an average speed of 60 km/h by car. The distance between Chartbag and Alambag is 2 km. Due to heavy traffic, he could travel at 30 km/h for the first kilometre of his journey. What should his speed be for the remaining journey to achieve his average speed target of 60 km/h?

1. Cannot achieve his target with any finite speed.
2. 60 km/h
3. 90 km/h
4. 120 km/h

13. The average rainfall over a given place during the three-year period of 2003-2005 was 65 cm. During the three-year period 2002-2004 the average rainfall was 60 cm. The actual rainfall during 2005 was 60 cm. What was the rainfall in 2002?

1. 55 cm
2. 60 cm
3. 54 cm
4. 53 cm
14. In a four consecutive day schedule, four pilots flew flights each on a different day. Mr. A was scheduled to work on Monday, but he traded with Ms. B who was originally scheduled to work on Wednesday. Ms. C traded with Mr. D, who was originally scheduled to work on Thursday. After all the switching was done, who worked on Tuesday?

15. A miner contains a cubic and a spherical cavity. The length of the side of the cube is the same as the diameter of the sphere. If the cubic cavity is half filled with a liquid and the spherical cavity is completely filled with liquid, what is the approximate ratio of the volume of liquid in the cubic cavity to that in the spherical cavity?
1. 2:1 2. 1:2 3. 1:4 4. 4:1

16. Out of 6 unbiased coins, 5 are tossed independently and they all result in heads. If the 6th is now independently tossed, the probability of getting head is
1. 2/3 2. 0 3. 1/2 4. 1/6

17. What could the fourth figure in the sequence be?

18. The average age of A, B and C, whose ages are integers x, y and z respectively (x ≤ y ≤ z), is 30. If the age of B is exactly 5 more than that of A, what is the minimum possible value of z?
1. 31 2. 33 3. 35 4. 37
19. The distribution of students in a university is given in the pie-diagram. The bar chart shows the distribution of physics students in different sub-areas. Where a student takes one and only one sub-area. What is the percentage of the total science students is girls studying quantum mechanics?

- Physics: 20%
- Maths: 15%
- Chemistry: 15%
- Earth Sciences: 20%

Bar chart:
- Total: 150 girls
- Boys: 250
- Physics: 180 girls
- Quantum Mechanics: 110 girls
- Optics: 170 girls
- Others: 190 girls

1. 10
2. 1
3. 10
4. 2

20. What is the total number of parallelograms in the given diagram?

- 27
- 24
- 22
- 14

21. What is the total number of parallelograms in the given diagram?

- 27
- 24
- 22
- 14
21. A sediment core collected off Oman is best suited for studying palaeomonsoon because that is the region...
1. from which the monsoon moisture transport originates
2. where the descending arm of the Walker circulation originates
3. where intense oxygen minimum zone is located
4. of monsoon induced upwelling

22. The Arabian Sea, pressure gradient force is from the South to the North. Therefore, the geostrophic flow is...
1. Eastward
2. Westward
3. Northward
4. Southward

23. Which of the following gases is the Henry's law constant the highest?
1. CO (Carbon monoxide)
2. N₂O (Nitrous oxide)
3. CH₄ (Methane)
4. CO₂ (Carbon dioxide)

24. Which of the following will NOT be caused in the surface seawater by upwelling?
1. Increase of pCO₂ (relative to pre-upwelling)
2. Decrease of pCO₂ (relative to pre-upwelling)
3. Decrease of dissolved oxygen (relative to pre-upwelling)
4. Increase of productivity (relative to pre-upwelling)

25. Which among the following has the least residence time in seawater?
1. Uranium
2. Molybdenum
3. Rhenium
4. Thorium

26. Oceanic conveyor belt refers to...
1. Wind-driven ocean circulation
2. Density-driven ocean circulation
3. Earth's rotation-driven ocean circulation
4. Friction-driven ocean circulation
27. **Antarctic intermediate water mass** is
   1. warm and highly saline
   2. cold and highly saline
   3. warm and less saline
   4. cold and less saline

28. **Mucilaginous film** on a lake
    1. absorbs solar energy
    2. reflects solar energy
    3. transmits solar energy
    4. absorbs and reflects solar energy

29. **Nutritional needs of the tubeworm, Riftia pachyptila** in the vicinity of hydrothermal vents are met through
    1. chemosynthetic organotrophy
    2. phagotrophy
    3. chemolithotrophy
    4. mixotrophy

30. **In the middle stretches of most estuaries, the highly likely community of life forms is**
    1. hypohaline
    2. mesohaline
    3. stenohaline
    4. euhaline

31. Which one of the following groups of organisms *CANNOT* survive in the aphotic depth?
    1. Bivalves
    2. Foraminifera
    3. Echinoids
    4. Diatoms

32. Which one of the following methods is not used for dating ice cores?
    1. Radiocarbon method
    2. Oxygen isotope stratigraphy
    3. Lead-210 method
    4. $^{14}Rb-87Sr$ method

33. The following sequence of rocks is observed while taking a traverse across the strike direction in an area:
    1. A-B-C-D-C-B-A

    What is the most likely interpretation?
    1. The rocks are folded
    2. The rocks are faulted
    3. Presence of an unconformable sequence
    4. The rocks are jointed
34. Which one of the following would a satellite observe relatively lower outgoing long wave radiation?

35. In which of the following pairs, one of the two processes is the upper one?

36. Coral bleaching in the Indian Ocean region is intensive during

37. Compared to pyrite, galena and sphalerite are
1. both denser 2. denser and lighter, respectively 3. lighter and denser, respectively 4. both lighter

38. Which one of the following was NOT a crucial factor in the development of early life on the Earth?

39. The Earth's surface is made up of

40. Which of the following statements is NOT true about the Earth?
1. The Earth is the third planet from the Sun 2. The Earth is the largest planet in the solar system 3. The Earth is the only planet with liquid water 4. The Earth is the second largest object in the solar system
40. Which one of the following statements correctly depicts the variation of the gravity field inside the Earth?
   1. Increases in the lower mantle, but decreases sharply in the outer core
   2. Increases in the lower mantle as well as in the outer core
   3. Decreases in the lower mantle as well as in the outer core
   4. Decreases in the lower mantle, but increases sharply in the outer core

41. इनमें से कौन सा शास्त्रीय उत्तर है?
   राजगृही की साहित्य रेखा --- से खंड में अतिक्रमित होती है --- .
   1. गोलाप धुःत, एवं पुस्तिः के केंद्र से पूर्वति होते हैं
   2. गोलाप धुःत, पश्चिम पुस्तिः के केंद्र से नहीं पूर्वति होते हैं
   3. मुख्य धुःत, एवं पुस्तिः के केंद्र से पूर्वति होते हैं
   4. मुख्य धुःत, पश्चिम पुस्तिः के केंद्र से नहीं पूर्वति होते हैं

42. Which one of the following is CORRECT?
The plumb line used by a mason gers oriented perpendicular to the...
   1. spheroidal surface and passes through the Earth's centre
   2. spheroidal surface, but does not pass through the Earth's centre
   3. geoidal surface, and passes through the Earth's centre
   4. geoidal surface, but does not pass through the Earth's centre

43. Oceans in the subtropical region are characterized by
   1. high evaporation and high precipitation
   2. low evaporation and low precipitation
   3. high evaporation but low precipitation
   4. low evaporation and high precipitation

44. The atmospheric lapse rate is less than the moist adiabatic lapse rate, the atmosphere is...
   1. absolutely stable
   2. neutrally stable
   3. absolutely unstable
   4. conditionally unstable
45. एक उच्च रेत मौसम घाटे पर, हवा—
1. गहरी।
2. 15 एकुण 30 दिनों के बीच कोण पर
3. समग्र रेखाओं के समानांतर
4. समर रेखाओं के लंब कोण पर

46. ताप-शक्ति की आत्महत्या-समाप्ति पर
आयामित होता है जो चार तापमान एक-का समान है।
1. तेज जलयोग
2. अच्छा धर
3. आपूर्वक आत्महत्या
4. धीर व्यवहार

47. इस प्रकार के गैसों में से कौन एक गैस 'पीडब्लू' ज्ञात नहीं?
1. क्विनूजियन (CH₃)
2. कार्बन डायोजनिक (CO₂)
3. जलवायु (H₂O)
4. ऑक्सीजन (O₂)

48. उसी एयर के बारे में उसका पर्याय से गुणकक्षा की अवधिकार पुत्रित होती है अब यह—
1. उत्तर, स्वाधीत
2. मध्य, जलाशय
3. उत्तर, क्षेत्र
4. गर्म, क्षेत्र

49. The maximum amount of latent heat is released in a rising saturated parcel of
air when it is ______ and at ______ altitude.
1. cold, high
2. warm, high
3. cold, low
4. warm, low

49. उपयोगी और बढ़ती हुई आत्महत्या का उपयोग जलवायु वर्गों का विवरण
का कारण होता है
1. संतुलन संरक्षण
2. जलवायु संरक्षण
3. जलवायु की अपनी अवधि
4. गुणकारोपण वर्ग की जानकारी से साधन

49. Amplification of the upward propagating internal atmospheric
gravity waves is due to
1. conservation of momentum
2. conservation of energy
3. incompressibility of the atmosphere
4. decrease of gravitational force with
height

50. युक्ति के माध्यम से किन बौंधों में
सार्वजनिक अभियान की सहभागीता
करता है?
1. राष्ट्रीय बौंध कमांडर
2. नगर बौंध कमांडर
3. खेती-पील बौंध कमांडर
4. सार्वजनिक नगर सहभागीता

50. In the Earth's atmosphere, which
regions have the temperature profile
that supports convection?
1. Troposphere and Stratosphere
2. Mesosphere and Thermosphere
3. Troposphere and Mesosphere
4. Stratosphere and Thermosphere

51. दिनों गर्म बने हुए भारत के उत्तर सतहों में गर्मी की आपूर्ति
को दर्शाता है जिसका मानकरण वर्णन करके
भारत में अन्य चीजें बनते हैं
1. मरीज — लक्षित
2. गर्मी — केंद्रीय
3. खेती-पील — विशाल
4. ऊपर — पूर्ण
51. Identify from the following, the homogenous region in India, the summer monsoon rainfall of which is poorly correlated with that of all other regions.
1. North-west
2. West-central
3. Peninsula
4. North-east

52. Which one of the following does not undergo photo-dissociation in the troposphere but occurs in the stratosphere?
1. Formaldehyde
2. Water vapour
3. Nitrous oxide
4. Nitric oxide

53. The Moon's surface receives cosmic rays and solar wind everywhere unlike the Earth's surface. This is because the Moon:
1. Is closer to the Sun
2. Lacks an atmosphere
3. Has a smaller gravity
4. Does not have a significant magnetic field

54. What is the Earth's normal gravity and magnetic fields respectively, then along a geographic latitude:
1. Both $g$ and $F$ remain constant
2. $g$ remains constant, but $F$ varies
3. $F$ remains constant, but $g$ varies
4. Both $g$ and $F$ vary

55. Which of the following statements is correct regarding the Earth's normal gravity and magnetic fields:
1. Both $g$ and $F$ remain constant
2. $g$ remains constant, but $F$ varies
3. $F$ remains constant, but $g$ varies
4. Both $g$ and $F$ vary

56. Which one of the following boundaries represents the most devastating mass extinction in geological history?
1. Cretaceous – Paleogene
2. Ordovician – Silurian
3. Devonian – Carboniferous
4. Permian – Triassic
57. At which of the following places would one see the Sun directly overhead at local noon?
1. The Tropic of Cancer on 22 December
2. The Tropic of Capricorn on 21 June
3. The Tropic of Cancer on 21 June
4. The Arctic circle on 22 December

58. In which of the following places would one see the Sun directly overhead at local noon?
1. Plagioclase
2. Garnet
3. Olivine
4. Quartz

59. Which of the following minerals is likely to be altered to serpentine?
1. Plagioclase
2. Garnet
3. Olivine
4. Quartz

60. Which of the following minerals is likely to be altered to serpentine?
1. Plagioclase
2. Garnet
3. Olivine
4. Quartz

61. Which of the following is a characteristic feature at the centre of a large pluton?
1. Randomly oriented & interpenetrating large grains
2. Preferred orientation of phyllosilicates
3. Phenocrysts embedded in a fine grained ground mass
4. Alternating bands of mafic and felsic minerals

62. The velocity of a tsunami wave is dependent on
1. the focal depth and epicentre distance from the shore
2. the focal depth, but not the epicentre distance from the shore
3. the epicentre distance from the shore, but not the focal depth
4. neither the epicentre distance nor the focal depth
62. For a paramagnetic material, susceptibility is:
1. positive and increases with temperature
2. positive and decreases with temperature
3. negative and increases with temperature
4. negative and decreases with temperature

63. यदि कोई वस्तु में कोई अन्य तत्त्व का समान रूप से होना होता है, तो होना होता है?
1. एक घटना के लिए प्रत्येक एक प्रमाण वस्तु
2. दूसरे दृष्टांक के लिए प्रत्येक दृष्टांक दृष्टिकोण में लगभग होता है।
3. एक घटना में दूसरी घटना के बावजूद होता है?
4. दो घटना के बावजूद कोई भी समान रूप से होता है?

64. Assuming that two atoms of a radioactive isotope with a half-life of 2 hours can be isolated, which of the following statements is CORRECT?
1. Only one of these atoms will remain after 1 hour
2. Both these atoms would definitely decay into their daughter isotopes in 2 hours
3. Half of each of these atoms would decay in 1 hour
4. The decay of both these atoms cannot be predicted precisely

65. What is the shear strain along AB?
1. 0.5
2. 1.0
3. 1.5
4. 2.0

65. Keeping the grain size constant, which one of the following represents the CORRECT sequence of development of bed forms with increasing flow velocity?
1. Ripples → Antidunes → Flutes → Dunes
2. Ripples → Dunes → Antidunes → Flutes
3. Dunes → Antidunes → Ripples → Flutes
4. Dunes → Ripples → Antidunes → Flutes

66. कुछ जलवायु के प्रभाव के लिए विकट किए जा सकते हैं?
1. गर्मी-लेंदन जलवायु
2. बर्फ भरोसा जलवायु
3. गर्मी-लेंदन जलवायु
4. गर्मी-लेंदन जलवायु

66. Which one of the following faults DOES NOT cut the Himalayan mountain chain?
1. Main Central Thrust
2. Main Boundary Fault
3. Great Boundary Fault
4. Himalayan Frontal Fault

67. कुछ जलवायु के प्रभाव के लिए विकट किए जा सकते हैं?
1. रिकोटिक जलवायु के लिए विकट किए जा सकते हैं?
2. गर्मी-लेंदन जलवायु के लिए विकट किए जा सकते हैं?
3. गर्मी-लेंदन जलवायु के लिए विकट किए जा सकते हैं?
4. गर्मी-लेंदन जलवायु के लिए विकट किए जा सकते हैं?

67. Some volcanoes are explosive whereas others are not. One of the reasons is related to
1. the larger heat content in the source of explosive volcanoes
2. the larger content of volatiles in the melt producing explosive volcanoes
3. the presence of network of faults in the crust overlying the source of explosive volcanoes
4. the larger depth of the source of explosive volcanoes

68. वही जल जो किसी कीट प्रयुक्त किया जाता है?
1. कार्बनयुक्त कीटों का प्रयोग
2. कार्बनयुक्त कीटों का प्रयोग
3. कार्बनयुक्त कीटों का प्रयोग
4. गाज़ा को2 की उत्पादन

68. What is the major source of alkalinity in the river water?
1. weathering of carbonate minerals
2. precipitation of carbonate minerals
3. weathering of silicate minerals
4. dissolution of atmospheric CO2

69. इसमें से कौन सा कारक जलवायु के निर्देश की जा सकता है?
1. विद्युत थर्म सर्फेस
2. विद्युत थर्म सर्फेस
3. विद्युत थर्म सर्फेस
4. विद्युत थर्म सर्फेस

69. Which one of the following does NOT favour the formation of yardangs?
1. Severe arid conditions
2. Strong multi-directional winds
3. Laxity of sand
4. Dearth of vegetation

70. जलवायु का प्रभाव दर्ज करता है?
1. लंबाई और लंबाई निर्देश
2. लंबाई और लंबाई निर्देश
3. लंबाई और लंबाई निर्देश
4. लंबाई और लंबाई निर्देश

70. The widest shore platforms are generally associated with
1. highly resistant rocks
2. steeply dipping rocks
3. least resistant rocks striking parallel to the shoreline
4. least resistant rocks striking perpendicular to the shoreline
भाग/PART - C

71. इन वस्तुओं को कैसे एवं शह सारं दूर करें?
विविधता A: नदी परिवहन के बहरहारी पूराना नदी के पत्तन के कारण होने का कारण बने, फल से नदी पूरा अपर्यय होता है।
विविधता B: उच्च दिशा वहां वर्तमान भूतात्विक पूर्तियोग करता है।
1. A एक B दोनों सही है
2. A एक B दोनों गलत है
3. A गलत है वरन् B सही है
4. A सही है वरन् B गलत है

72. निम्नलिखित करें

73. मान विकास प्रक्रिया की परंपरा X-अक्सर पर फल निकलता एवं Y-अक्सर पर भगावत है

72. Match the following

<table>
<thead>
<tr>
<th>A</th>
<th>Sub-aerial residual or exhumation features</th>
<th>E</th>
<th>Pediplanet</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Selective transport by wind</td>
<td>F</td>
<td>Yardangs</td>
</tr>
<tr>
<td>C</td>
<td>Coalescence of pediments</td>
<td>G</td>
<td>Desert pavements</td>
</tr>
<tr>
<td>D</td>
<td>Deflation and abrasion by unidirectional wind</td>
<td>H</td>
<td>Inscibergs</td>
</tr>
</tbody>
</table>

73. Identify the soil development processes. X-axis is water input and Y-axis is drainage.

1. A - निर्माण, B - वीट वृद्धि, C - क्रौडस्टेक, D - वातावरणीय वनस्पति
2. A - वीट वृद्धि, B - निर्माण, C - लोकधर्मीवाति, D - गुरुगुटीकरण
3. A - निर्माण, B - वातावरणीय वनस्पति, C - वेयरोनिकाकरण, D - वीट वृद्धि
4. A - गुरुगुटीकरण, B - लोकधर्मीवाति, C - वातावरणीय वनस्पति, D - वीट वृद्धि
75. Which of the following is characteristic of a typical hurricane?
1. Strong winds with heavy rainfall, and warm core
2. Strong winds with no rainfall, and cold core
3. Calm winds with heavy rainfall, and warm core
4. Strong winds with heavy rainfall, and cold core

76. Which of the following is a MISMATCH?

<table>
<thead>
<tr>
<th>Wavelength (µm)</th>
<th>Description</th>
<th>Examples of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 0.58 – 0.68</td>
<td>Visible</td>
<td>Human identification</td>
</tr>
<tr>
<td>B 0.725 – 1.10</td>
<td>Near Infrared</td>
<td>Land, Water differences, temperature, fluorescence, gas emissions</td>
</tr>
<tr>
<td>C 3.55 – 3.93</td>
<td>Infrared</td>
<td>Temperature differences, cloud heights</td>
</tr>
<tr>
<td>D 10.30 – 11.30</td>
<td>Infrared</td>
<td>Thermal mapping, water vapor content</td>
</tr>
</tbody>
</table>

1. A 2. B
3. C 4. D
77. इनमें से कौन एक आधुनिक प्राणीय प्रभावित समुद्रतट रेखा का परिचय नहीं है?
1. सोमपटल रेखा से चौंचे गोल पत्तियाएं वार
2. समुद्रतट रेखा के अलावा सामग्री से वार
3. दवार करणी में घोड़े पर पहाड़ा हिजाज़िद उठे
4. पुलस्स्याम शाखाओं की समय वापसी

77. Which one is NOT a character of a tide-dominated shoreline?
1. Bars making high angle to shoreline
2. Bars almost parallel to shoreline
3. Double mud drapes layers within cross-stratification
4. Common occurrence of reactivation surfaces

78. दिये गये पृष्ठिक समुदायों में से कौन एक भूमि का रेखा से लगभग 1500 mm के ऊपरी गड्ढे वाले क्षेत्र के आधुनिक जीवन वास्तव के लिए अनुकूल नहीं है?
1. इलाइट-क्लॉयल-विल्वाइट
2. क्लॉयल-विल्वाइट-विल्वाइट-विल्वाइट
3. क्लॉयल-विल्वाइट-विल्वाइट-विल्वाइट
4. इलाइट-प्लाज्मिक एवं आपर इलाइट

78. Which one of the following clay combinations is best suited for the weathering product of a granitic rock under the mean annual precipitation of around 1500 mm?
1. smectite - kaolinite - illite
2. kaolinite - illite - vermiculite - gibbsite
3. smectite - kaolinite - vermiculite
4. illite - aluminium and iron hydroxides

79. तात्त्विक ईंधन रूप में दिये गये नीचे जल स्थापना (हुल धोतियाँ और) एवं दोनों आवाह लेगी

79. Which one of the matches is correct for the river water chemistry (Total Dissolved Solids) and rock weathering in their catchment, given in the following table?

<table>
<thead>
<tr>
<th>Predominant rock type</th>
<th>Total Dissolved Solids (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Regolith</td>
<td>E. &gt; 250</td>
</tr>
<tr>
<td>B. Silaceous sedimentary rocks</td>
<td>F. 40 – 250</td>
</tr>
<tr>
<td>C. Limestone</td>
<td>G. 20 – 40</td>
</tr>
<tr>
<td>D. Evaporites</td>
<td>H. &lt; 20</td>
</tr>
</tbody>
</table>

79. Which one of the matches is correct for the river water chemistry (Total Dissolved Solids) and rock weathering in their catchment, given in the following table?

80. दिये गये पृष्ठिक श्रेणी के पारिशिष्टिक क्षेत्र A, B एवं C में

<table>
<thead>
<tr>
<th>पारिशिष्टिक (कुल)</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>तात्त्विक ईंधन</td>
<td>कम</td>
<td>मध्यम</td>
<td>अधिक</td>
</tr>
<tr>
<td>शेष प्रदान</td>
<td>कम</td>
<td>मध्यम</td>
<td>अधिक</td>
</tr>
<tr>
<td>अन्तरिक्ष</td>
<td>कम</td>
<td>मध्यम</td>
<td>अधिक</td>
</tr>
</tbody>
</table>

2-C-41
80. From the given table, identify ecozones A, B, and C.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phytocenosis</td>
<td>very small</td>
<td>medium</td>
<td>very high</td>
</tr>
<tr>
<td>Life-form</td>
<td>very small</td>
<td>medium</td>
<td>very high</td>
</tr>
<tr>
<td>Climate</td>
<td>very high</td>
<td>small</td>
<td>very small</td>
</tr>
</tbody>
</table>

1. A – Humid mid-latitude, B – Grass steppe, C – Humid subtropics
2. A – Polar, B – Arid-latitude, C – Seasonal tropics
3. A – Arid-latitude, B – Polar, C – Humid subtropics
4. A – Polar, B – Seasonal tropics, C – Humid subtropics

82. Read the following statements and identify the correct answer.
I: Tropical deserts are less common on the east side of the landmass because trade winds carry considerable amounts of moisture onshore.
II: On the west side of the continents in mid-latitude, higher average precipitation occurs due to convergence of maritime air and orographic intensification.
1. I is correct and II is incorrect
2. I is incorrect and II is correct
3. Both I and II are correct
4. Both I and II are incorrect

83. The maximum extent of glaciers in a valley is best indicated by
1. Firnfields and tarns
2. Glacial trough, arêtes, and hanging valley
3. Firnfields and terminal moraines
4. Cirques, end moraines and tarns
83. The Fourier transform of a function is a pair of transforms. Then its
1. amplitude and phase spectra are both independent of \( a \).
2. amplitude spectrum is independent of \( a \), while the phase spectrum is directly proportional to \( a \).
3. amplitude spectrum is directly proportional to \( a \), while the phase spectrum is independent of \( a \).
4. amplitude and phase spectra are both directly proportional to \( a \).

84. A closed surface \( S \) of volume \( V \) enclosing a
distribution of matter. \( n \) is the outward normal to \( S \) and \( r \) is the distance from a
point \( P \) outside \( S \) to any point on \( S \) or inside \( S \). Then the gravity potential at \( P \) is
\[
1. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) - \frac{n}{r^2} \right] dv
\]
\[
2. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) - \frac{n}{r^2} \right] ds
\]
\[
3. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) + \frac{n}{r^2} \right] dv
\]
\[
4. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) + \frac{n}{r^2} \right] ds
\]

85. The difference in the Earth's gravity fields at the poles and the equator is at present 5.186 gals. If the velocity of the Earth's rotation is reduced by 25% of its present value, then the difference in the gravity fields would be around (in gals)
1. 2.54
2. 3.71
3. 3.81
4. 4.30

86. A closed surface \( S \) of volume \( V \) enclosing a distribution of matter. \( n \) is the outward normal to \( S \) and \( r \) is the distance from a point \( P \) outside \( S \) to any point on \( S \) or inside \( S \). Then the gravity potential at \( P \) is
\[
1. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) - \frac{n}{r^2} \right] dv
\]
\[
2. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) - \frac{n}{r^2} \right] ds
\]
\[
3. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) + \frac{n}{r^2} \right] dv
\]
\[
4. \frac{1}{4 \pi} \int_{S} \left[ \frac{\partial n}{\partial r} \left( \frac{1}{r} \right) + \frac{n}{r^2} \right] ds
\]

87. Gravity anomaly values of 1.2, 2.4 and 3.6 in mags are located at distance coordinates 20, 24 and 28 km, respectively, along a gravity profile across a faulted basement of limited throw. The depth to the basement (in km) is
1. 2
2. 2\( \sqrt{2} \)
3. 2\( \sqrt{3} \)
4. 4
87. A 2.0 km thick elevated land mass of density 2.7 g/cc is associated with a Bouguer anomaly of -176 mgal. The free air anomaly is (assume that \(2\pi G = 42 \text{ mgal/km}^2\text{g/cc}\))
   1. -51 mgal
   2. 51 mgal
   3. -88 mgal
   4. 88 mgal

88. A planet of 70,000 km radius exhibits a magnetic field of 4.2 \(\text{Oe}\) at its equator. What is the rate of decrease of its magnetic field (in \(\text{gauss/m}\)) on its surface at the location of magnetic latitude \(\cos^{-1}(\sqrt{3}/4)\)?
   1. 20.5
   2. 4.50
   3. 0.125
   4. 0.0225

89. The magnetic field of the Earth is generally stronger near the poles than at the equator. The strength of the field decreases as one moves away from the equator. This is because the Earth's magnetic field is generated by the motion of its core. The magnetic field at any point on the Earth's surface can be represented by a vector that points from the Earth's center to the point on the surface. The magnitude of this vector is given by the formula:

   \[ B = \frac{GM_e}{r^3} \]
92. The existence of the tropical easterly jet stream over the Channal latitudes during the Indian summer monsoon is due to
1. poleward decrease of air temperature at 850 hPa over the Indian region.
2. the presence of the eastern ghats along the east coast of India.
3. the anticyclonic outflow from the Tibetan high pressure.
4. the northward migration of the subtropical westerly jet stream in the northern hemisphere.

93. At a latitude of 45° in the northern hemisphere, the solar zenith angle at noon on the winter solstice is
1. 45°
2. 21.5°
3. 68.5°
4. 0°

94. These statements are incorrect because
1. the pressure system that causes the monsoon is not due to the Earth's rotation but to the global wind pattern.
2. the pressure system is not due to the Earth's rotation but to the global wind pattern.
3. the pressure system is not due to the Earth's rotation but to the global wind pattern.
4. the pressure system is not due to the Earth's rotation but to the global wind pattern.

95. Tropical cyclones of the severe category are not observed over the Indian seas during the Indian summer monsoon season because
1. The CISK mechanism does not operate.
2. The observed sea surface temperatures over the Indian seas are not conducive.
3. There exists a very strong vertical shear of the horizontal winds.
4. Excessive humidity is observed over the Indian seas.

96. एक 35°C तापमान एवं 20g वर्षावन्ध 

| मिश्रित भाग में खुश ताप 

| वर्षावन्ध का तापमान का क्षेत्र तापमान का होगा?
| 1. 39.5°C | 2. 40.5°C |
| 3. 41.7°C | 4. 38.9°C |

96. What is the virtual temperature of an unsaturated air parcel with temperature of 35°C and mixing ratio of 30g water vapour kg⁻¹ dry air?

| 1. 39.5°C | 2. 40.5°C |
| 3. 41.7°C | 4. 38.9°C |

97. एक 15°C के वातावरण में 20°C पर 

| वर्षावन्ध वाले उष्णकटिबंधीय हवा 

| प्रवाह वायु गति पर आर्ग कर से उपस्थित हवा का बनाये 

| 1. 0.07 m s⁻² | 2. 0.17 m s⁻² |
| 3. 0.27 m s⁻² | 4. 0.37 m s⁻² |

98. उष्णकटिबंधीय वातावरण में एक गाय 

| वेदों वाली वायुवाष्प (MCC) वायुवाष्प 

| 1. एक भारी वातावरण के अंदर एक 

| तेली के पूर्ण मात्रा दोल में बनाया हुआ है। 

| 2. छोटी वातावरण वाला आकार में 

| बनाए हैं। पूर्ण वेदों दो सीमा से बनाए है। 

99. जाने का बादल की सफ़ाई है। रेन 

| वातावरण की तरक का बादल का 

| रहेगा, जबकि 

| जाने का वातावरण की तरफ़ का बादल 

| रहेगा। वह देखने हुए आग निकालने 

| निकालते हैं कि अंधामें तथा वायु में 

| है एक पूर्ण वातावरण के बीच —— 

| जाने का हो रहा है। 

99. There are two cloud layers above you. 

| The lower cloud layer is moving 

| westward, while the upper cloud layer 

| is moving north-westward. From this 

| observation you conclude that the wind 

| is __ with height and __ advection is 

| occurring between the cloud layers 

| 1. veering, warm 

| 2. veering, cold 

| 3. backing, warm 

| 4. backing, cold 

100. समानान्तर वातावरण के बादल 

| के अंतर्गत 

| अंतर्यांतर एक गाय दोनों विद्युत 

| गाय —— अग्रेयतागत के लिए विद्युत 

| गाय —— अनुप्रस्ता होता है। 

| 1. अग्रेयता, अनुप्रस्तात 

| 2. अग्रेयता, अनुप्रस्तात
100. The upper part of a thunderstorm cloud is normally ____ charged, and the middle and lower parts are ____ charged
1. negatively, negatively
2. positively, negatively
3. positively, positively
4. negatively, positively

101. Statement I : PKP phase is refraction twice at the mantle core boundary, while the PKIKP phase is refraction twice at the inner-outer core boundary as well
Statement II : Both the PKP and PKIKP phases are not recorded in the shadow zone
1. Statements I and II are true
2. Statement I is true, but II is false
3. Statement I is false, but II is true
4. Statements I and II are false

102. Statement I : PKP phase of a seismic wave is refraction twice at the mantle core boundary, while the PKIKP phase is refraction twice at the inner-outer core boundary as well
Statement II : Both the PKP and PKIKP phases are not recorded in the shadow zone
1. Statements I and II are true
2. Statement I is true, but II is false
3. Statement I is false, but II is true
4. Statements I and II are false

103. Which one of the following Vertical Electrical Sounding (VES) curves is possible over a 5-layered horizontally stratified Earth? Assume each layer to be isotropic and homogeneous.
1. KQK
2. HAH
3. KHK
4. QHH

103. What will be the thickness of a moving oceanic lithosphere at a distance of 100 km from the mid-oceanic ridge, given the average plate velocity of 1 cm/year?
1. less than 50 km
2. between 50 and 100 km
3. between 100 and 150 km
4. more than 150 km

104. Which one of the following represents the sound of a clap of thunder that is observed at 500 km away from the lightning stroke?
1. KQK
2. HAH
3. KHK
4. QHH

104. Which one of the following Vertical Electrical Sounding (VES) curves is possible over a 5-layered horizontally stratified Earth? Assume each layer to be isotropic and homogeneous.
1. KQK
2. HAH
3. KHK
4. QHH

104. A 2-D seismic reflection survey is carried out over a two layered medium with a dipping interface between them. The dipping interface in the migrated section appears
1. shallower and steeper
2. deeper and steeper
3. shorter and deeper
4. longer and deeper
105. A $P$ wave is incident at an angle of 30° upon a horizontal interface separating two media which are both Poisson's solids. If the $P$ wave velocity of the first layer is 3 km/sec and the critical angle is 60°, then the angle of refraction of the shear wave is

\[ \sin^{-1}(1/6) \quad \text{and} \quad \sin^{-1}(1/2) \]

106. Statement I: A sandstone has a porosity of 10% which is filled with water. The velocity of the $P$ wave in the matrix of the sand grain is 4 km/s. The average $P$ wave velocity in the rock is

\[ \begin{align*}
1 &\quad 3.22 \text{ km/s} \\
2 &\quad 3.42 \text{ km/s} \\
3 &\quad 3.62 \text{ km/s} \\
4 &\quad 3.82 \text{ km/s}
\end{align*} \]

107. It is required to measure daily variations of electric field at the surface of the Earth. Considering the thermal diffusivity $= 10^{-6} \text{ m}^2/\text{s}$, the top of the electrodes should be buried at

\[ \begin{align*}
1 &\quad 5 \text{ cm} \\
2 &\quad 15 \text{ cm} \\
3 &\quad 25 \text{ cm} \\
4 &\quad 35 \text{ cm}
\end{align*} \]
109. In a cooling tower of a power plant, water flows in a pipe of inner diameter 0.2 m with a velocity of 0.1 m/s. Assume water’s coefficient of viscosity and density are $8 \times 10^{-3}$ Pa s and $1000$ kg m$^{-3}$, respectively. The flow will be characterized as
1. critical/transitional flow
2. laminar flow
3. turbulent flow
4. eddy flow

110. Which of the above represents the temperature inversion condition and lofting behavior of the plume from a stake (s)?

111. Which of the above represents the temperature inversion condition and lofting behavior of the plume from a stake (s)?

112. Consider the following picture of a dry adiabatic lapse rate (dashed line) and vertical temperature structure in the ambient atmosphere:

1. Sedimentation rate was initially high and slowed down at the end in section-2.
2. Sedimentation rate was initially low and increased at the end in section-1.
3. There is a hiatus in section-1.
4. There is a hiatus in section-2.

113. In this graphic correlation, section-1 has the maximum thickness. Using the first and last appearance of all fossil species present, a line of correlation has been drawn. Using this graph, identify the correct statement.

114. Which one of the following combination of metamorphic facies, metamorphic facies series and idealized tectonics settings of a metamorphic terrain is correct?
115. प्राप्त होने वाला हमें एक निम्न स्तर पता लगाने की बजाय उपनिवेश दर्शाओं को प्रदर्शित करता है?
1. समुद्र का निम्न नाश एवं पृथक प्रारंभिक पत्ता के मध्य संतरण
2. प्रारंभिक पत्ता-लिप्त विलियम सुस्त
3. समुद्र का निम्न नाश के समय निरास
4. निरास पत्ता-विलियम सुस्त

115. Which one of the following represents a suitable condition for the formation of lowstand wedge?
1. Deposition during sea level lowstand and early rise
2. Early falling stage system tract
3. Deposition during sea level lowstand
4. Late falling stage system tract

116. The above figure shows pelagic sediments deposited over an oceanic plate at a particular site. Which of the following interpretations is the correct explanation for the sequence?
During the Cenozoic, an oceanic plate in the pelagic realm successively moves from
1. cool subtropical to equatorial latitudes.
2. tropical to cool subtropical latitudes.
3. east to west along a particular latitude.
4. west to east along a particular latitude.
117. ऊपर के निर्देश में नीचे दिए गए एक सिरों के जोड़ दिशानुसार विद्युत रचना के मुख्य वालों को प्रतिस्थापित करते हैं?

118. यदि $\sigma_1 \geq \sigma_2 \geq \sigma_3$ मुख्य रूप से है, तब नीचे दिए गए एक गतिविधि का एक-गतिविधि अवरोध प्रतिस्थापित करता है?
1. $\sigma_1 \geq \sigma_2 \geq \sigma_3 > 0$
2. $\sigma_1 < 0$, $\sigma_2 < 0$, $\sigma_3 = 0$
3. $\sigma_1 < 0$, $\sigma_2 > 0$, $\sigma_3 = 0$
4. $\sigma_1 = \sigma_2 = \sigma_3 = 0$

119. विविधता A, B एवं C मुख्य गतिविधियों के चीगे किस प्रदर्शन के दिशानुसार विद्युत रचना को प्रतिस्थापित करते हैं?

119. Stereograms A, B & C show three different orientations of the principal stresses, $\sigma_1, \sigma_2$ and $\sigma_3$

Which one of the following is the correct match of stress orientations in A, B, C with the nature of faulting?
1. A - Normal faulting, B - Strike-slip faulting, C - Thrust faulting
2. A - Strike-slip faulting, B - Normal faulting, C - Thrust faulting
3. A - Thrust faulting, B - Strike-slip faulting, C - Normal faulting
4. A - Strike-slip faulting, B - Thrust faulting, C - Normal faulting

120. तालि अनुसार विद्युत रचना (BSR) का वर्गीकरण की खोज के लिये एक बीजगणितीय दृष्टि का आधार है?
1. धाती तैल  2. तेल पैल  3. तेल बालु  4. खेत दही
120. Bottom Simulating Reflectors (BSR) are investigated for the exploration of
1. Heavy oil
2. Shale gas
3. Oil sand
4. Gas hydrate

121. भारी तरह एक्सप्लोर खंडहर में दो स्तर प्रवाहक सूचना का प्रवाहक किया गया। उन
दोनों सूचना से किये गए अनुमान: प्राचीन तरह ग्रासमार (Sγ) एवं नवीन तरह ग्रासमार (P)
से दोनों हिस्से को जोड़ा।
1. उद्धरण Sγ, प्राचीन ग्रासमार (P) से निम्न Sγ, प्राचीन ग्रासमार (P)
2. निम्न Sγ, प्राचीन ग्रासमार (P) से उपर Sγ, प्राचीन ग्रासमार (P)
3. उद्धरण Sγ, प्राचीन ग्रासमार (P) से निम्न Sγ, प्राचीन ग्रासमार (P)
4. निम्न Sγ, प्राचीन ग्रासमार (P) से उपर Sγ, प्राचीन ग्रासमार (P)

122. Two oil production wells were drilled in Bombay High and Cambay Basin. Choose
the correct combinations of initial oil saturation (Sγ) and production decline rate (P) for
these two wells respectively:
1. High Sγ, rapid decline (P) - Low Sγ, rapid decline (P)
2. Low Sγ, slow decline (P) - High Sγ, rapid decline (P)
3. High Sγ, steady (P) - Low Sγ, slow decline (P)
4. Low Sγ, slow decline (P) - Low Sγ, rapid decline (P)

123. दिनु पवेल के प्राचीन खंडहर में ग्रासमार का प्रवाहक चर 5 cm/10^2 से एक
120 cm/10^2 का एक्सप्लोर होता है। प्राचीन (H) एवं नवीन (LGM) के
दोनों सूचना का प्रवाहक चर। प्राचीन खंडहर कुछ का अनुमान द्वारा आता है।
1. विलोम प्राचीन : H में उद्धरण एक्सप्लोर
2. नवीन खंडहर : H में उद्धरण एक्सप्लोर

123. Measured sedimentation rates in drilled cores in the Indus fan are 5 cm/10^2 yrs and
120 cm/10^2 yrs during the Holocene (H) and Last Glacial Maximum (LGM), respectively. The
most plausible cause is:
1. Tectonic activity: high in H and low in LGM
2. Oceanic productivity: high in H and low in LGM
3. Biological productivity: low in H and high in LGM
4. Eustatic sea level: high in H and low in LGM

123. बहादुर मे के चर में pH –8 है, जबकि घाट के रॉकल में हीट प्रदान के चर –4 है।
वाटरमेट (आवश्यक) संचारण के इन दो प्रभावों से हिस्से रहें, कमाल: -- है।
1. CO₂⁻, HCO₃⁻
2. HCO₃⁻, CO₃²⁻
3. HCO₃⁻, H₂CO₃
4. H₂CO₃, CO₃²⁻

123. pH of water in the Bahama Bay is ~8 while that in a peat bog in the Ganges Delta is ~4. The carbonate (ionic)
species that would be stable in these
two environments, respectively, are:
1. CO₃²⁻, HCO₃⁻
2. HCO₃⁻, CO₃²⁻
3. HCO₃⁻, H₂CO₃
4. H₂CO₃, CO₃²⁻
124. एक क्रमान्वयन क्रिया क्वार्ज + कैल्सिट + 
= वॉलस्टेनोइट + CO₂ के लिए हम से 
कैसे विकसित नहीं होता है?
1. क्रिया बहुत दिन के लिए निर्भर का विकास प्रभाव नहीं होता है।
2. CO₂ के लिए दिन का प्रभाव का विकास प्रभाव नहीं होता है।
3. वॉलस्टेनोइट + कैल्सिट की उज्ज्वलता 
होती है जब CO₂ तरल अवस्था में 
एक्शन नहीं होता है।
4. इस क्रिया के लिए दिन का प्रभाव 
कैसे विकसित करते हैं?

125. For a metamorphic reaction Quartz + 
Calcite = Wollastonite + CO₂, which of 
the following statements is NOT true?
1. At any given pressure, temperature of 
formation of Wollastonite depends on the activity of CO₂ in 
the fluid phase.
2. With lower activity of CO₂, the 
reaction can take place at a lower 
temperature.
3. The maximum stability of Quartz + 
Calcite is when CO₂ is almost nil in 
the fluid phase.
4. There could be a wide range of 
pressure and temperature for this 
reaction.

126. निम्नलिखित परामर्शों का प्रांत में कैसे 
धार्मिक उद्देश्य के लिए उपयोग 
किया जा सकता है?
A CaCO₃ से बहुत स्थान से बनी विभिन्न 
फूल
B विभिन्न विभिन्न विभिन्न विश्वास है।
C आदित्य से ज्योतिष देवता तथा एक जुड़े 
स्थान के
1. राजस्थानी एक बादम
2. पंजाबी जीवन एक और गुरु
3. अरुणाचल प्रदेश ब्रह्मोस्पॉर्क
4. बांग्लादेश एक गैरियापार

125. Which of the following pairs satisfies 
the conditions A, B, C?
A. Skeletons made of polymorphs of 
CaCO₃
B. Found in Palaeozoic benthic 
ecosystem.
C. Morphological planes of symmetry 
are perpendicular to each other.
1. Radiolarians and Diatoms
2. Foraminifera and Ostracods
3. Bivalves and Brachiopods
4. Bivalves and Gastropods

126. निम्न दृष्टिकोण के लिए इन्हें 
सम्बंधित पर्यावरणों का पार्श्व में 
कैसे बनाये जा सकते हैं?

<table>
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<th>II</th>
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<td>तिरंगेश्वरी सरलता</td>
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<td>पुनर्नवीनता</td>
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<td>गुण- संपर्करुक्मिणी</td>
</tr>
<tr>
<td>पुनर्नवीनता रुख में</td>
<td>हिमालय</td>
</tr>
</tbody>
</table>

1. A = a, B = b, C = d, D = d
2. A = b, B = c, C = d, D = d
3. A = c, B = a, C = d, D = c
4. A = a, B = c, C = b, D = d
128. Given the following statements (A, B), choose the correct option.
A. The sediment size progressively decreases downstream in spite of the increase in channel size and discharge.
B. The cause of this fining is due to gradual attrition of the clasts and selective entrainment.
1. Both A and B are correct
2. Both A and B are incorrect
3. A is correct but B is incorrect
4. A is incorrect but B is correct

129. Match the following

<table>
<thead>
<tr>
<th>Landforms</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Esker</td>
<td>E. Sub-glacial</td>
</tr>
<tr>
<td>B. Sandur</td>
<td>F. Ice-marginal</td>
</tr>
<tr>
<td>C. Kettle hole</td>
<td>G. Pro-glacial</td>
</tr>
<tr>
<td>D. Kame terrace</td>
<td></td>
</tr>
</tbody>
</table>

1. A - E, B - G, C - G, D - F
3. A - F, B - E, C - G, D - E
4. A - E, B - F, C - F, D - E
3. The flow velocity increases if the channel bed is boulder-strown.
4. The flow velocity will be minimum if the channel cross-section is wide and shallow and the bed is boulder-strown.

131. Anthropogenic activity has increased the atmospheric pCO₂ by 80 ppmv relative to the pre-industrial concentration. Calculate its increased flux by assuming that the surface pCO₂ increased by 2 mmol m⁻² and using the stagnant surface film model.

[Data]

\[ K_f(\text{CO}_2) = 30 \text{ mmol kg}^{-1} \text{ atm}^{-1} \]
\[ \text{CO}_2 \text{ diffusion coefficient} = 2 \times 10^{-5} \text{ cm}^2 \text{s}^{-1} \]
\[ \text{film thickness} = 20 \mu\text{m} \]
\[ \text{Consider} \ 1 \ 	ext{kg} = 1 \ 	ext{Litre} \]

1. \( 0.04 \ \mu\text{mol m}^2 \text{s}^{-1} \)
2. \( 0.4 \ \mu\text{mol m}^2 \text{s}^{-1} \)
3. \( 1.0 \ \mu\text{mol m}^2 \text{s}^{-1} \)
4. \( 0.1 \ \mu\text{mol m}^2 \text{s}^{-1} \)
132. Using the given information from the graphical model (below) depicting responses of corals, algal grazers (sea urchins) and fish to fishing pressure, deduce the ideal condition that enables increased coral growth/cover.

1. Abundant sea urchins and reduced fishing
2. Higher removal of sea urchins and increased fishing

3. Preponderant urchins and dominance of fishes
4. Prolonged survival of urchins without fishing pressure

133. In the figure below, in spite of the least possible number of species (S) at point C (sewage discharge point) both abundance (A) and biomass (B) are the largest around C. Given your understanding of the impact of sewage outfall, what would be the situation from the view point of rearing Sargassan sp around C?

134. Identify the correct sequence of trophic cascade from the following set of marine organisms:
1. kelps → sea urchins → killer whales → sea otters
2. killer whales → sea otters → sea urchins → kelps
3. sea urchins → sea otters → kelps → killer whales
4. sea otters → sea urchins → kelps → killer whales

135. Which one of the following sets of marine fauna best represents bacteroiery?
1. foraminifers, coccolithophores, radiolarians
2. barnacles, hyrozoans, brittle stars
3. tenticids, ciliates, heterotrophic marine-flagellates
4. larvaceans, anthozoans, anemones

136. The biogenic sediments of the seafloor are of calcite or opal. Identify the correct combination in the following regarding preservation (P) and dissolution (D) in the water column:

1. CaCO₃  P D
2. CaCO₃  P D
3. CaCO₃  P D
4. CaCO₃  P D

137. The data on A is given in the following table. Which one of the following sets of marine fauna best represents bacteroiery?

137. Match the appropriate deep-sea sediments types in Box A with those in Box B

<table>
<thead>
<tr>
<th>Box A</th>
<th>Box B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>N</td>
</tr>
<tr>
<td>B</td>
<td>O</td>
</tr>
<tr>
<td>C</td>
<td>P</td>
</tr>
<tr>
<td>D</td>
<td>Q</td>
</tr>
<tr>
<td>E</td>
<td>R</td>
</tr>
<tr>
<td>F</td>
<td>S</td>
</tr>
</tbody>
</table>

| A     | Chert |
| B     | Sapropelite |
| C     | Feldspar |
| D     | Radiolarian one |
| E     | Chalk |
| F     | Pelagonite |

1. $^{14}$C decay, $^{210}$Pbexcess, $^{230}$Thexcess K – Ar
2. $^{210}$Pbexcess $^{14}$C decay, $^{230}$Thexcess K – Ar
3. $^{235}$Thexcess, $^{210}$Pbexcess $^{14}$C decay, K – Ar
4. $^{14}$C decay, $^{210}$Pbexcess K – Ar, $^{230}$Thexcess

138. Four marine processes had to be dated:
(i) Particulate flux to the ocean floor;
(ii) Holocene sedimentation;
(iii) Pleistocene glaciations;
(iv) Manganese nodule growth.

What are the respective appropriate chronological methods?

1. $^{14}$C decay, $^{210}$Pbexcess, $^{230}$Thexcess, K
2. $^{210}$Pbexcess, $^{14}$C decay, $^{230}$Thexcess K – Ar
3. $^{230}$Thexcess, $^{210}$Pbexcess $^{14}$C decay, K – Ar
4. $^{14}$C decay, $^{210}$Pbexcess K – Ar, $^{230}$Thexcess

139. ग्रहणीय काल में एक गाढ़ पवसा माटी भए विषय (हेक्सागनल) को प्रज्वलित करने से निम्नलिखित अवकाश प्रदान हो सकते हैं?
(i) अभ्यन्तरीय बिंदु के अविभाज्त;
(ii) व्यापक क्षेत्रों में अवकाश;
(iii) स्ट्रीटेरी विन्यास;
(iv) बुधगार्डी ध्रुविक विकास

139. Which of the following sedimentary features can be used to identify a deep water debris flow product (debrile) in the continental slope?
1. Ripple marks and inverse grading
2. Floating clasts and massive sands
3. Normal grading and dish structure
4. Slump folds and sheets

2-CH
140. In the equation for conservation of momentum, which of the following forces CANNOT act to change the speed of the wind?
1. Pressure gradient force
2. Gravitational force
3. Coriolis force
4. Frictional force

141. How fast in m s⁻¹ would a large亚马米শuzione of water be observed below surface in the Arabian Sea, at a depth of 5 km after a sudden increase of temperature by 10°C?
1. 1.20 m s⁻¹
2. 0.90 m s⁻¹
3. 1.10 m s⁻¹
4. 1.00 m s⁻¹

142. Which combination of the following conditions applies to the positive
Indian Ocean Dipole events?
(i) colder than normal sea surface
   temperatures in the western tropical
   Indian Ocean.
(ii) These events are seen from May to
    October.
(iii) Shoaling of thermocline in the
     eastern equatorial Indian Ocean.
1. (i), (ii) and (iii)
2. Only (i) and (ii)
3. Only (i) and (iii)
4. Only (ii) and (iii)

143. The average solar radiation incident at the top of the Earth’s atmosphere is 342 Wm⁻². The global planetary albedo is 0.31 and 67 Wm⁻² of the incident radiation is absorbed by the atmosphere. On an average, 390 Wm⁻² is lost from Earth’s surface of which 83% is absorbed by the Earth’s atmosphere. If the global average sensible heat flux away from surface is 24 Wm⁻², the global latent heat flux would be
1. 275 Wm⁻²
2. 145 Wm⁻²
3. 267 Wm⁻²
4. 102 Wm⁻²
1. ~79 Wm$^{-2}$  
2. ~145 Wm$^{-2}$  
3. ~267 Wm$^{-2}$  
4. ~102 Wm$^{-2}$

144. दिये गये आलेख में किन्हीं जल स्तरों स्थिरित किये जा सकते हैं?

1. 1  
2. 2  
3. 3  
4. 4

144. How many water masses can be traced in the following graph?

1. 1  
2. 2  
3. 3  
4. 4

145. यदि एक अत्यंत अर्द्धरूप में आवरण पूर्वोत्तर द्वीप से पूर्वाञ्चल तक समुद्री पानियों का प्रवाह करते हुए एक बुध विश्व में बढ़ने की शक्ति दर्शाता है, तब नहीं का अर्द्धरूप का होगा?

1. उस्स्वरूप उत्तर अर्द्धरूप अवस्था के साथ उत्तर-पूर्वतः परिवण्ड की ओर, 
2. उस्स्वरूप उत्तर-पूर्वतः परिवण्ड की ओर, 
3. उस्स्वरूप उत्तर-पूर्वतः परिवण्ड की ओर, 
4. उस्स्वरूप उत्तर-पूर्वतः परिवण्ड की ओर, 

146. During winter, the West India Coastal Current (WICC) flows

1. towards north carrying low salinity water  
2. towards south carrying low salinity water  
3. towards north carrying high salinity water  
4. towards south carrying high salinity water
147. Which of the following combinations of coast and wind, given in the diagram, will lead to upwelling of water in the southern hemisphere?

1. (A) Coast (B) Wind
2. (C) Coast (D) Wind
3. (A) Coast (B) Wind
4. (C) Coast (D) Wind

148. Identify the correct representation for the following profiles in tropical oceans:

1. A - Oxygen, B - Nitrate, C - Chlorine, D - Thorium
2. A - Thorium, B - Nitrate, C - Chlorine, D - Oxygen
3. A - Chlorine, B - Oxygen, C - Thorium, D - Nitrate
4. A - Nitrate, B - Oxygen, C - Chlorine, D - Thorium

149. The following elements found in the ocean are known to affect the marine environment. Select the correct statements about their effects:

1. A - Oxygen
2. B - Nitrate
3. C - Chlorine
4. D - Thorium

1. All are essential for marine life.
2. B and C are toxic to marine life.
3. A and C are beneficial for marine life.
4. B and D are harmful to marine life.
149. The sulfate-chlorinity ratio, in estuaries and anoxic basins, as compared to that in the average seawater, is
1. higher
2. lower
3. higher in estuaries and lower in anoxic basins
4. lower in estuaries and higher in anoxic basins

150. The water of the oxygen minimum zone (OMZ) has dissolved oxygen (DO) of 85 μmol kg⁻¹. By assuming a surface DO concentration of 220 μmol kg⁻¹ and phytoplankton molecular formula of (CH₂O)₁₀(NH₃)₆(H₂PO₄), how much phytoplankton was mineralized and, what is the nitrate concentration by assuming that the photic layer: OMZ ventilation rate is 2:1?
1. 10 μmol C, 10 μmol kg⁻¹
2. 10 μmol C, 20 μmol kg⁻¹
3. 100 μmol C, 30 μmol kg⁻¹
4. 100 μmol C, 40 μmol kg⁻¹