



**International Earth Science Olympiad
National Entrance Test 19th January 2019**

Maximum Marks: 100 Time: 10.30 a.m. to 12.00 noon.
Answer all questions with a blue ball point pen and fill the circle/square
All questions carry equal marks.

Q1. Identify the massive volcanic eruptions of Cretaceous to Eocene times from western India

- (a) Panjal Traps
- (b) Sylhette Traps
- (c) Deccan Traps
- (d) Nidar volcanic

Q2. What type of rocks result from volcanic eruptions?

- (a) Granites
- (b) Syenites
- (c) Basalts
- (d) Sandstone

Q 3. Ore deposits of aluminium are known as:

- (a) Bauxite deposits
- (b) Bastite deposits
- (c) Barite deposits
- (d) Emery deposits

Q 4. Which of the following minerals is known as the heavy spar

- (a) Bauxite
- (b) Barite
- (c) Garnet
- (d) Diamond

Q 5. Boundaries where plates move away from each other are known as

- (a) Convergent boundaries
- (b) Transcurrent boundaries
- (c) Transform boundaries
- (d) Divergent boundaries

Q 6. Identify the most common igneous rock of the ocean floor

- (a) Granite
- (b) Basalt
- (c) Limestone
- (d) Peridotite

Q7. Orthoclase is:

- (a) Softer than quartz and harder than apatite
- (b) Softer than fluorite and harder than apatite
- (c) Softer than quartz and harder than topaz
- (d) Harder than topaz and softer than quartz

Q 8. What type of metamorphism is involved in the formation of rocks at the contact with a high temperature magmatic body?

- (a) Cataclastic metamorphism
- (b) Dynamothermal metamorphism
- (c) Contact/thermal metamorphism
- (d) Metasomatism

Q 9. Ruby is type of

- (a) Garnet
- (b) Feldspar
- (c) Pyroxene
- (d) Corundum

Q.10. A Mid-Oceanic Ridge present in the Bay of Bengal is known as

- (a) 90° East Ridge
- (b) 45 ° East Ridge
- (c) Bay of Bengal Ridge
- (d) East Indian Ocean Ridge

Q 11. Maximum ozone is found in which region of the Earth's atmosphere?

- (a) Troposphere
- (b) Stratosphere
- (c) Thermosphere
- (d) Mesosphere

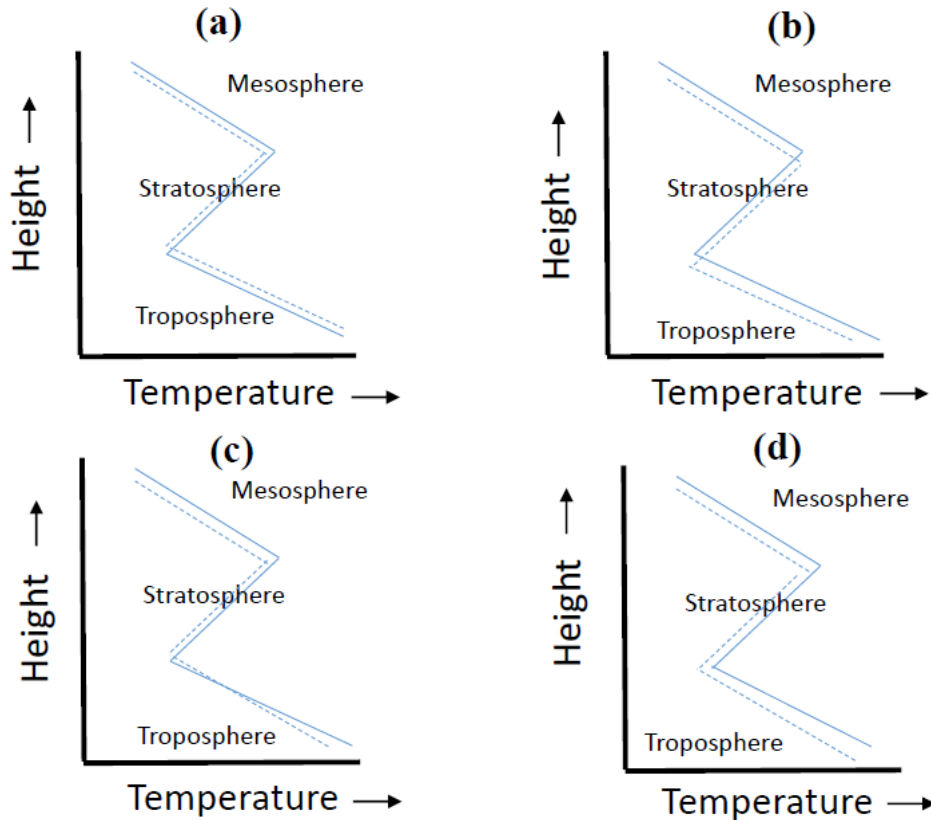
Q 12. How does air circulate around a surface high pressure area in southern hemisphere?

- (a) Counter clockwise
- (b) Clockwise spiral.
- (c) Linear
- (d) Clockwise linear

Q 13. Which type of aerosols cause heating?

- (a) Sulphate rich aerosols
- (b) Black carbon poor aerosols
- (c) Black carbon rich aerosols
- (d) All of the above

Q14. How global warming will modulate the Earth's atmospheric thermal structure (full line represents normal thermal structure and dotted line represent modulated thermal structure)? a, b, c, d.



Q15. Which region of the Earth's atmosphere is having minimum turbulence?

- (a) The ionosphere
- (b) The troposphere
- (c) The stratosphere
- (d) The mesosphere

Q16. Tropical cyclones are formed with what minimum ocean water temperature?

- (a) 50 deg C
- (b) 26 deg C
- (c) 10 deg C
- (d) 90 deg C

Q17. Which type of scattering takes place from clouds?

- (a) Rayleigh scattering
- (b) Raman scattering
- (c) Resonance scattering
- (d) Mie scattering

Q18. At an altitude of 5 km percentage of N₂ in the air is about 78% (in the Earth's Atmosphere). What will be the percentage of N₂ in the air (in the Earth's Atmosphere) at an altitude of ~50 km?

- (a) 90 %
- (b) 60 %
- (c) 78 %
- (d) 70 %

Q 19. What form of heat transfer is responsible for creating a thunderstorm?

- (a) Conduction
- (b) Convection
- (c) Advection
- (d) Radiation

Q 20. Which region of the atmosphere plays important role in radio communications?

- (a) Troposphere
- (b) Stratosphere
- (c) Ionosphere
- (d) Mesosphere

Q 21. During which period the Sun does not rise at the South Pole?

- (a) September 21 - March 21
- (b) March 21 - September 21
- (c) December 21 - June 21
- (d) June 21 - December 21

Q 22. A RADAR (Radio Detection and Ranging) is operating at 50 MHz and receives an echo after 2 milli seconds. From which altitude this echo coming?

- (a) 150 km
- (b) 350 km
- (c) 300 km
- (d) 200 km

Q 23. What is Tropopause height in the Equatorial regions and in the High Latitude regions, respectively?

- (a) ~18 km and ~10 km
- (b) ~10 km and ~18 km
- (c) ~12 km and ~12 km
- (d) ~8 km and ~18 km

Q 24. Meteorological satellites measures which properties?

- (a) IR images
- (b) Visible images
- (c) Water vapor images
- (d) All of the above

Q 25. A meteorite of mass 700 gm fell on earth from a height of 1000 km from the earth surface. How much energy is expelled on impact considering that all the energy is transferred to the earth. ($g=9.8 \text{ m/s}^2$). (Ignore Air resistance)

- (a) 6860 J
- (b) 6370 J
- (c) 6086 J
- (d) 700 J

Q 26. Two ball A and B of diameter 60 cm & 90 cm respectively with A having greater mass than B are dropped from a height of 100 km from the earth. Considering no atmosphere, which ball will reach earlier to the surface.

- (a) Ball B
- (b) Ball A
- (c) Both will reach at same time
- (d) Both will escape in deep space

Q 27. Two ball A and B of diameter 50 cm & 100 cm respectively with both having similar mass are dropped from a height of 100 km from the earth. Considering there is atmosphere, which ball will reach earlier to the surface.

- (a) Ball B
- (b) Ball A
- (c) Both will reach at same time
- (d) Both will escape in deep space

Q 28. Neil Standing on a cliff on Moon fired two bullets. Both bullets B1 and B2 were fired with speed of 20 m/s, one directly downwards and other upward from same initial position. What will be their velocity just before touching the surface of the moon. (Acceleration due to gravity of moon = 1.62 m/s^2)

- (a) B1 will have greater velocity than B2
- (b) B2 will have greater velocity than B1
- (c) Both B1 & B2 will have same velocity
- (d) B1 will have no velocity

Q 29. Which of these planets while seeing from surface of Mars will show phases which look similar to the phases of moon.

- (a) Mercury, Earth, Jupiter
- (b) Mercury, Venus, Earth
- (c) Venus, Jupiter, Saturn
- (d) Earth, Uranus, Neptune

Q 30. What is acceleration due to gravity at surface of promixa centauri, the closest star to earth after sun if its mass is around $0.2 \times 10^{30} \text{ kg}$ and radius of 2000 km. ($G = 6.67 \times 10^{-11} \frac{\text{Nm}^2}{\text{kg}^2}$).

- (a) $3.335 \times 10^6 \text{ m/s}^2$
- (b) $2.335 \times 10^6 \text{ m/s}^2$
- (c) $4.335 \times 10^6 \text{ m/s}^2$
- (d) $5.335 \times 10^6 \text{ m/s}^2$

- Q 31. If pole star is seen at an altitude of 25° in the sky, then what is the latitude of that place.
- 20°
 - 23.3°
 - 35.3°
 - 25°
- Q 32. Which of these are biggest natural satellite of Jupiter?
- Europa, Ganymede, Callisto, Io
 - Europa, Phobos, Deimos, Titan
 - Phobos, Deimos, Puck, Mimas
 - Miranda, Oberon, Callisto, Tethys
- Q 33. Choose the incorrect statement
- During total lunar eclipse moon is in earth's umbra
 - Lunar eclipse usually occurs during New moon
 - Solar eclipse occurs when moon is between sun and earth
 - Danjon scale measures moons darkness of lunar eclipse
- Q 34. We do not see Lunar/Solar eclipse during every Full/New moon day in a year because,
- Moons orbit is tilted by around 87° to orbit of Earth.
 - Moons orbit is tilted by around 5° to orbit of Earth.
 - Precession of earth's axis
 - Earth's spin axis is tilted 5° with respect to its orbit around the sun.
- Q 35. The supergiant star Nimo has an absolute temperature of about 3000 K and emits a radiant power of approximately $5 \times 10^{30} \text{ W}$. Assuming that Nimo is a perfect emitter (emissivity $e = 1$) and spherical, what will happen if absolute temperature doubles?
- Radiated power increases by a factor of 4
 - Radiated power increases by a factor of 8
 - Radiated power increases by a factor of 12
 - Radiated power increases by a factor of 16
- Q 36. 1 kg of liquid water at 273 Kelvin is placed outside on day when temperature is 250 Kelvin. In which case will it take longer for water to freeze? (A) When surface area is smaller (B) When Surface area is larger
- Case A
 - Case B
 - In both cases it will take same time
 - Water will never freeze in both cases
- Q 37. In which zodiacal constellation will the Sun be on 26th December 2018?
- Leo
 - Virgo
 - Libra
 - Sagittarius

- Q 38. Today Moonrise time is 7 p.m. At what approx. time will moon rise next day?
- (a) 7:52 pm
 - (b) 8:13 pm
 - (c) 8.47 pm
 - (d) 6.17 pm
- Q 39. 21st June, 2019 is the longest day in Northern Hemisphere which is also called as,
- (a) Spring Equinox
 - (b) Full moon day
 - (c) Autumnal Equinox
 - (d) Summer Solstice
- Q 40. On 30th April 2019, Sun is in constellation of Aries, Which is the correct order of the constellation sun will travel in next four months?
- (a) Taurus, Cancer, Gemini, Leo
 - (b) Taurus, Leo, Gemini, Cancer
 - (c) Taurus, Gemini, Cancer, Leo
 - (d) Gemini, Taurus, Cancer, Leo
- Q 41. This year Equinox is on 20th March 2019, when will be the succeeding equinox.
- (a) 30th June 2019
 - (b) 23rd September 2019
 - (c) 20th March 2020
 - (d) 22nd December 2019
- Q 42. Where is Asteroid belt situated?
- (a) Between Earth and Venus
 - (b) Between Earth and Mars
 - (c) Between Mars and Jupiter
 - (d) Between Jupiter and Saturn
- Q 43. Temperature of a star increased from 5000 K to 8000 K, what would happen to its wavelength and frequency.
- (a) Wavelength Increases Frequency Decreases
 - (b) Wavelength Decreases Frequency Increases
 - (c) Both will Increase
 - (d) Both will Decrease
- Q 44. Which of the following planet will not show retrograde motion?
- (a) Venus
 - (b) Mars
 - (c) Jupiter
 - (d) Saturn
- Q 45. Telescope has Focal length of 1200 mm and eyepiece used is 6 mm. What will be the magnification obtained by this combination?
- (a) 7200
 - (b) 720
 - (c) 200
 - (d) 400

- Q 46. Arrange the following from increasing order of grain size
a. Sand b. Boulder c. Pebble d. Silt
(a) a,c,d,b
(b) b,c,a,d
(c) d,a,c,b
(d) d,a,b,c
- Q 47. A right side up sedimentary sequence will have
(a) Coarse grains at the top
(b) Mixed grain size throughout the sequence
(c) Finest at the top
(d) None
- Q 48. Which of the following is the largest lithospheric plate by area
(a) African plate
(b) Pacific plate
(c) North American plate
(d) Nazca plate
- Q 49. Ichno fossils are
(a) Casts
(b) Moulds
(c) Trace fossils
(d) None
- Q 50. $S30^{\circ}W$ may also be represented as
(a) 30°
(b) 210°
(c) 140°
(d) 180°
- Q 51. Ganga basin is
(a) Back arc basin
(b) Peripheral foreland basin
(c) Retro arc basin
(d) None
- Q 52. Bird foot deltas are formed by
(a) Tidal processes
(b) Waves
(c) Rivers
(d) None of the above
- Q 53. Which of the following is not associated with glaciers?
(a) Drumlins
(b) Varves
(c) Eskers
(d) Braid bars

- Q 54. Goethite is an ore for
- (a) Iron
 - (b) Copper
 - (c) Manganese
 - (d) Gold
- Q 55. Greywacke is a type of
- (a) Limestone
 - (b) Shale
 - (c) Sandstone
 - (d) Granite
- Q 56. Halite and sylvite are
- (a) Similar in internal structure and occurrence
 - (b) Similar in internal structure but different in composition
 - (c) Different in internal structure but similar in composition
 - (d) Different in internal structure and composition
- Q 57. Radiocarbon dating method is used for material formed
- (a) < 50,000 years
 - (b) Between 100,000-10,00,000 years
 - (c) Between 10 m.a. – 100 m.a.
 - (d) >100 m.a.
- Q 58. Most commonly used mineral as a weighing agent in rotary well- drilling fluid is-
- (a) Quartz
 - (b) Mica
 - (c) Barite
 - (d) Halite
- Q 59. The first land plants appeared in
- (a) Ordovician
 - (b) Silurian
 - (c) Devonian
 - (d) Carboniferous
- Q 60. The exoskeleton of sponges is made up of-
- (a) Silica
 - (b) Calcite
 - (c) Aragonite
 - (d) Calcium phosphate
- Q 61. A flow, which is a balance of pressure gradient and Coriolis force, is called
- (a) Gradient Flow
 - (b) Geostrophic flow
 - (c) Inertial flow
 - (d) Coriolis flow

Q 62. Which current is NOT a part of global ocean thermohaline circulation

- (a) North Atlantic Deep water
- (b) Indonesia Through Flow
- (c) East India Coastal Current
- (d) Gulf stream

Q 63. Ocean western boundary currents are

- (a) Warm, slow and narrow currents in both hemisphere
- (b) Warm in northern hemisphere but cold in southern hemisphere
- (c) Cold, Fast, Shallow currents
- (d) Warm, fast and narrow currents in both hemisphere

Q 64. The movement of Inter-tropical Convergence zone (ITCZ) occurs in

- (a) Tropical to polar regions in both hemisphere
- (b) Tropical region
- (c) Arctic region
- (d) Northern Indian Ocean

Q 65. Ocean's mixed layer depth (MLD) refers to

- (a) Near uniform density region
- (b) Oxygen minimum zone region
- (c) Maximum density region
- (d) Low light region

Q 66. The strong salinity range 37 - 40 in the central parts of Persian Gulf is due to the

- (a) Low rainfall
- (b) High evaporation
- (c) Strong winds
- (d) All of the above

Q 67. Seawater density of 1.02603 g/cm^3 is expressed as density sigma (σ) =

- (a) 0.2603
- (b) 2.603
- (c) 26.03
- (d) 1.02603

Q 68. Typical periodicity of MJO (Madden Julian Oscillation) is

- (a) 90-100 days
- (b) 30-60 days
- (c) 2-7 years
- (d) ~10 years

Q 69. Ionic abundance of chemical elements in sea water are in the following order

- (a) $\text{Mg} > \text{Ca} > \text{K} > \text{Sr}$
- (b) $\text{K} > \text{Ca} > \text{S} > \text{Mg}$
- (c) $\text{Ca} > \text{S} > \text{K} > \text{Mg}$
- (d) $\text{Mg} > \text{S} > \text{K} > \text{Ca}$

Q 70. El-Nino is

- (a) Warm water anomaly in the south eastern Pacific
- (b) Cold water anomaly in the south eastern Pacific
- (c) Warm water anomaly in the south western Pacific
- (d) Cold water anomaly in the south western Pacific

Q 71. In the Indian Ocean, south equatorial currents crosses the equator during

- (a) Spring
- (b) Southwest monsoon
- (c) Northeast monsoon
- (d) Western disturbance

Q 72. The difference between sea level at high tide and sea level at low tide is called the:

- (a) Tidal range
- (b) Tidal Frequency
- (c) Tidal height
- (d) Tidal wavelength

Q 73. In the depth range, where salinity changes rapidly is called

- (a) Thermocline
- (b) Pycnocline
- (c) Halocline
- (d) Nutricline

Q 74. The major light harvesting pigments in phytoplankton are:

- (a) Chlorophylls
- (b) Carotenoids
- (c) Both of the above
- (d) None of the above

Q 75. What are the major nutrients which limit the phytoplankton growth in the marine environment?

- (a) Nitrate and Phosphate
- (b) Phosphate and Iron
- (c) Iron and Molybdenum
- (d) Strontium and Sodium

Q 76. What are Nektons?

- (a) Microorganisms that drift with the ocean currents
- (b) Aquatic organisms which are able to swim and move on their own
- (c) Phytoplankton
- (d) Bacteria

Q 77. In low nutrient environment, growth advantage is shifted towards which type of following phytoplankton cells?

- (a) Diazotrophs
- (b) Big phytoplankton cells
- (c) Elongated phytoplankton cells
- (d) Small phytoplankton cells

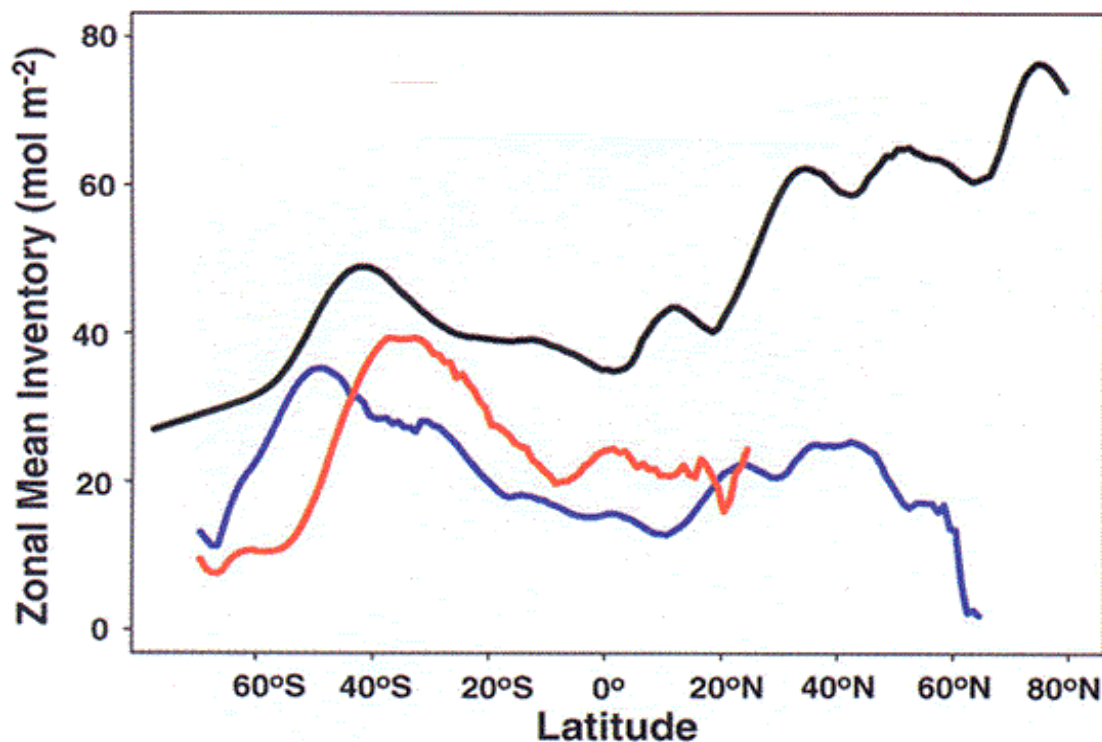
- Q 78. Which of the followings limit primary production in the Southern Ocean
- (a) Vanadium
 - (b) Molybdenum
 - (c) Iron
 - (d) All
- Q 79. Solid support structure that forms the hard base upon which corals live is composed of
- (a) Calcium Carbonate
 - (b) Silicate
 - (c) Both of the above
 - (d) None of the above
- Q 80. Which color penetrates the deepest in the open ocean?
- (a) Violet
 - (b) Blue
 - (c) Yellow
 - (d) Red
- Q 81. Which of the following statement is TRUE?
- (a) Nutrient minimum and O_2 minimum are in the northern hemisphere
 - (b) Nutrient maximum and O_2 maximum are about at the same depth
 - (c) Nutrient minimum and O_2 maximum are in the deepest ocean
 - (d) Nutrient maximum and O_2 minimum are about at the same depth
- Q 82. The major source of iron to the surface layer of the open ocean is
- (a) Dissolved sediment along continental margins
 - (b) Fluids from hydrothermal vents
 - (c) Atmospheric deposition of dust from the continents
 - (d) Ocean currents
- Q 83. Which of the followings is the most energetically expensive process?
- (a) Anammox
 - (b) Denitrification
 - (c) Nitrification
 - (d) Nitrogen fixation
- Q 84. What causes depletion of dissolved oxygen minimum in the deeper depths?
- (a) Rate of photosynthesis is greater than the rate of respiration at the these depths
 - (b) Rate of photosynthesis is lesser than the rate of respiration at the these depths
 - (c) Upwelling of deeper waters
 - (d) Less primary productivity in surface ocean water
- Q 85. Which of the following nitrogen substrates, autotrophs preferably use as a nutrient?
- (a) Nitrogen
 - (b) Ammonium
 - (c) Nitrite
 - (d) Nitrate

Q 86. Following picture is taken during a spring bloom in the eastern Arabian Sea. Which bloom does it represent?



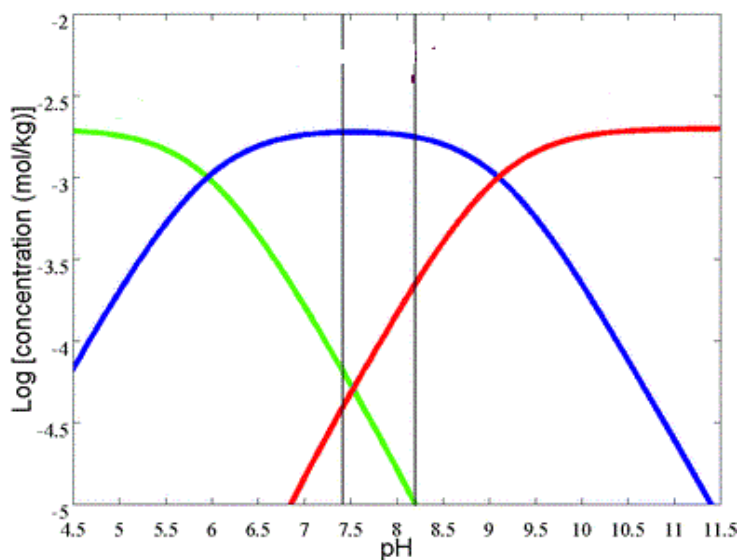
- (a) *Coccolithophore*
- (b) *Trichodesmium*
- (c) *Noctiluca*
- (d) *Dinophysis*

Q 87. Following figure represents zonal mean anthropogenic CO_2 inventories in the different oceans across latitudes. In the figure, black, red and blue lines, respectively represent:



- (a) Pacific, Indian and Atlantic Oceans
- (b) Indian, Pacific and Atlantic Oceans
- (c) Atlantic, Pacific and Indian Oceans
- (d) Atlantic, Indian and Pacific Oceans

88. Following plot shows the variation in solubility of dissolved inorganic carbon (DIC) in water versus pH. In the plot, green, red and blue lines, respectively represent the concentration of:



- (a) CO_2 , HCO_3^- , CO_3^{2-}
- (b) CO_3^{2-} , CO_2 , HCO_3^-
- (c) HCO_3^- , CO_3^{2-} , CO_2
- (d) CO_2 , CO_3^{2-} , HCO_3^-

Q 89. Which one of the followings is NOT a thermally driven circulation?

- (a) Hadly Cell
- (b) Ferrel Cell
- (c) Polar Cell in southern hemisphere
- (d) Polar Cell in southern hemisphere

Q 90. Which of the following can be taken as an evidence to suggest that the Moon's surface is tectonically not active?

- (a) Presence of Mars basalt
- (b) Presence of water
- (c) Presence of craters of different ages
- (d) Presence of highlands

Q.91. Pegmatite, generally, contains large size minerals compared to other rocks, because

- (a) Higher number of crystal nuclei form during crystallization
- (b) The lower viscosity of parental liquid facilitates the crystal growth
- (c) It forms under high-strain zones in the collision belts.
- (d) It cools slowly compared to other plutonic rocks

Q 92. Which of the following minerals is a silicate?

- (a) Halite
- (b) Hematite
- (c) Sphalerite
- (d) Topaz

Q 93. Which one among the given minerals forms the shells of some marine organisms?

- (a) Aragonite
- (b) Barite
- (c) Augite
- (d) Beryl

Q 94. Which one of the following rocks is generally found in the island-arcs?

- (a) Granite
- (b) Pegmatite
- (c) Andesite
- (d) Limestone

Q 95. Island arcs are generally convex towards the

- (a) Subducting plate
- (b) Overriding plate
- (c) South pole
- (d) North pole

Q 96. If a lithospheric plate A moves with an absolute velocity of 5 cm/yr towards the north, and another lithospheric plate B which is in contact with the plate A along an E-W trending boundary, moves with an absolute velocity of 3 cm/yr in north, then the boundary between them would be

- (a) A spreading ridge
- (b) A subduction zone
- (c) A collision zone
- (d) A transform fault

Q 97. Explosive volcanoes differ from the non-explosive volcanoes mainly in

- (a) Their temperature
- (b) The pressure at the site of their respective magma-chambers
- (c) Volatile content in the magma
- (d) The color of their product rocks

Q 98. Transform faults, in terms of the kinematics of faulting, are similar to the

- (a) Thrust faults
- (b) Normal faults
- (c) Strike-slip faults
- (d) Oblique faults

Q 99. Traditional Water Harvesting Structures in Rajasthan are known as:

- (a) Tube Wells
- (b) Percolation Tanks
- (c) Tankas
- (d) Kattas

Q 100. Two metamorphic rocks having experienced same grade of metamorphism have developed different mineral assemblages. This may be due to:

- (a) Their being present at different tectonic setting
- (b) Their different bulk chemical composition
- (c) Their metamorphism at different depths in the crust
- (d) Their different structures
