OSWAL

High-Score Series

Objective GEOGRAPHY

Abhishek Dubey

Level 1 Questions SSC CGL, CPO, AILET, State PSC Exam, DUET, LIC, Bank PO, TET and Railway.

Level 2 Questions UPSC CS, NDA, CDS, NTA, UGC NET, ICAR, JRF, RBI and ONGC

OSWAL

High-Score Series

Objective GEOGRAPHY

Abhishek Dubey

Level 1 Questions **SSC CGL, CPO, AILET, State PSC Exam, DUET, LIC, Bank PO, TET and Railway.**

Level 2 Questions **UPSC CS, NDA, CDS, NTA, UGC NET, ICAR, JRF, RBI and ONGC**

Contents

Edition : 2021

ISBN : 978-93-90278-66-4

OSWAL PUBLISHERS

Head Office : 1/12, Sahitya Kunj, M.G. Road Agra-282 002
Phone : (0562) 2527771-4, 7534077222
E-mail : contact@oswalpublishers.com, sales@oswalpublishers.com
Website : www.oswalpublishers.com
Printed at : Upkar Printing Unit, Agra
The cover of this book has been designed using resources from Freepik.com

Preface

We feel immense pleasure in introducing the first edition of 'General Knowledge Question Bank' for competitive exams aspirants. This book covers a wide range of general knowledge in a single concise volume for exams like UPSC CS, SSC, CGL, CPO, AILET, DUET, LIC, BANK PO, TET, NDA, NTA, UGC, JRF, RBI, ONGC.

The book follows a methodical approach to help you provide an in-depth understanding of the various areas tested in the GK section such as history, polity and Indian Constitution, economics, general science, miscellany, etc.

The book is demarcated into Level 1 & 2 as per the level of difficulty presented in the different levels of competitive exams. Both the levels contain a comprehensive theory followed by the practice questions for the students to answer. The answer key to all the questions is provided with a proper explanation for the students to evaluate and analyze them.

The book has been consciously written in a reader-friendly tone, avoiding any kind of technical jargon or complex vocabulary so as to explain the concepts in a simple manner to the students to make the most of it.

In spite of our best efforts, the possibilities of some errors of omission cannot be ruled out. Constructive suggestions will be appreciated and thankfully acknowledged.

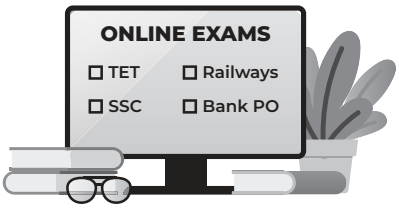
–Publisher

A COMPLETE 2-YEAR-STUDY STRATEGY FOR YOUR COMPETITIVE EXAMINATIONS!

Students, now that you have passed your Class 10th board examinations and are moving to the higher secondary, senior secondary or junior college level, this is the time to decide for those who aspire to study for competitive exams or look for opportunities in PSUs and similar avenues.

As the 12th examination nears, the duration to prepare for your competitive examination shortens. This article will suggest you the best ways for preparing the competitive exams which you will appear for, right after your 12th board examination. However, you have 2 years to prepare and study for competitive exams and we believe 2 years is enough time to prepare if you have the right strategy.

Some popular competitive exams that students opt for after school or college - SSC CGL, CPO, AILET, State PSC Exam, DUET, LIC, Bank PO, TET, Railway, UPSC - NDA, CDS, NTA UGC NET, ICAR, JRF, RBI and ONGC



So, what are the best books for competitive exams? How do you frame a complete 2-year-study strategy to study for them?

This article has all your answers. Below are 5 powerful tips to follow for the next 2 years to make your preparation effective:

» **Write down your syllabus :** The first and foremost step in your exam preparation is to get a thorough understanding of the syllabus. Look for the latest updates and marking schemes in the syllabus as it is subjected to change annually. Write it down somewhere to see it all the time to stay focused.

» **Know your resources/ books :** Most of you would opt for offline classes for preparation. But, we believe in giving self-study a chance. There are ample resources available online for self-preparation. Falling for too many books or online websites would only result in you wasting your time shuffling between them. We would suggest having a limited and reliable set of resources.

You can check out reliable study resources like Oswal Publishers that have a great collection of sample papers and content for students.

» **Prepare a timetable :** Once you are sorted with the study resources and syllabus, we would suggest you to prepare the timetable. Do not go for the entire 2 years instead prepare a 1-year timetable for studying and covering the syllabus. The remaining 1 year can be dedicated to mock tests and evaluation.

» **Mock tests :** Now that you have studied the chapters and are done with the first half of the study strategy, it's time for evaluation! This may include collecting a good set of question papers (of previously held exams) or important questions which can be easily accessed through an online search.

These tips will help you lower your stress on the day of examination and provide you with the confidence to perform better. Trusted sources like Oswal Publishers provide collections of useful sample papers and mock tests online for better preparation.

Never leave things for tomorrow. Have the discipline and sincerity that will help you reach your goal. Following the above-discussed pointers will definitely drive you towards success.To learn more about the easy preparation for exams, Oswal Publishers is always within your reach!

Good luck with your exams!

1 Our Universe and Solar System

Level-1

1. The atmospheric layer farthest from the Earth's surface is known as :
(a) Stratosphere (c) Exosphere
(b) Ionosphere (d) None of the above

2. Which of the following is not a layer of the atmosphere ?
(a) Troposphere (c) Lithosphere
(b) Stratosphere (d) None of the above

3. The Mriga is the Indian name of which of the following constellations ?
(a) Ursa Minor (c) Aries
(b) Orion (d) None of the above

4. Which layer of the atmosphere witnesses an increase in temperature with an increase in height due to the absorption of X-rays and ultra-violet rays ?
(a) Stratosphere (c) Thermosphere
(b) Mesosphere (d) None of the above

5. The second layer of the atmosphere from the earth is :
(a) Stratosphere (c) Troposphere
(b) Mesosphere (d) Exosphere

6. The zone that can support life is called :
(a) Homosphere (c) Biosphere
(b) Troposphere (d) Ionosphere

7. Which of the following planets of the solar system has the longest day ?
(a) Mercury (c) Venus
(b) Jupiter (d) None of the above

8. Which of the following is not an era in the history of earth?
(a) Palaeozoic (c) Velozoic
(b) Mesozoic (d) Cenozoic

9. The oceanic crust consists of a volcanic lava rock called :
(a) Sial (c) Mantle
(b) Basalt (d) Crust

10. What is the period before the Palaeozoic called ?
(a) Medieval (c) Cenozoic
(b) Mesozoic (d) Precambrian

11. What are the small planets revolving around the sun between the orbits of Mars and Jupiter called ?
(a) Asteroids (c) Satellites
(b) Meteors (d) Comets

12. In which of the following periods of the Palaeozoic Era did cone-bearing trees start to appear ?
(a) Permian Period
(b) Carboniferous Period
(c) Devonian Period
(d) Silurian Period

13. By about how many minutes is the sidereal day lesser than the mean period of a solar day?
(a) 3 (c) 5
(b) 4 (d) 6

14. When was Chandrayaan-2 launched?
(a) July 22, 2019 (c) July 21, 2019
(b) August 20, 2019 (d) August 21, 2019

15. The Andromeda is a :
(a) Galaxy (c) Asteroid
(b) Star (d) None of the above

16. All planets at a greater distance from the sun than the earth are called .....planets.
(a) Inferior (c) Outer
(b) Inner (d) Superior

17. We always see the same face of the moon, because:
(a) It is smaller than the Earth
(b) It revolves on its axis in a direction opposite to that of the Earth
(c) It takes equal time to revolve around the Earth and rotates on its own axis
(d) None of the above

18. The fact that the planets move around the Sun, not in circles but in ellipses, was first demonstrated by:
(CDS (I) - 2017)
(a) Galileo (c) Johannes Kepler
(b) Martin Luther (d) Copernicus

19. The moon's period of revolution with reference to the sun is about.....
(a) 29.53 days (c) 27.53 days
(b) 28.52 days (d) 26.54 days

20. How much per cent of the total surface of the moon is visible from the earth ?
(a) 56% (c) 58%
(b) 57% (d) 59%

21. During Lunar eclipse, which of the following is at the centre? **(SSC-2017)**
(a) Earth (c) Sun
(b) Moon (d) Any other planet

22. What is the study of the Universe called ?
(a) Ecology (c) Cosmology
(b) Astronomy (d) Dendrochronology

23. Which one of these is the most abundant element in the Solar System ?
(a) Hydrogen (c) Helium
(b) Oxygen (d) Nitrogen

24. Which one of these is the closest star from the Sun ?
(a) Sirius (c) Spica
(b) Proxima Centauri (d) Vega

25. When did our home galaxy, Milky Way, begin to form?
(a) Around 10 billion years ago
(b) Around 30 billion years ago
(c) Around 35 billion years ago
(d) Around 12 billion years ago

26. Which one of the following is correct about the planets?
(a) Mercury is the hottest planet in our solar system.
(b) There are 9 planets in our solar system.
(c) Uranus is the coldest planet.
(d) Venus is a terrestrial planet.

27. Which one of the following is a feature of Terrestrial Planets ?
(a) They are gaseous bodies.
(b) They have a ring system around them.
(c) They have a large number of natural satellites.
(d) They have a core of molten metals.

28. Which of the following is not a Jovian planet?**(SSC-2019)**
(a) Mars (c) Jupiter
(b) Uranus (d) Saturn

29. The hottest planet in our solar system is .....
(a) Jupiter (c) Earth
(b) Venus (d) Mercury

30. One Astronomical unit represents the distance between:
(a) The Moon and the Sun
(b) The Earth and the Moon
(c) The Sun and the Earth
(d) The Earth and Mars

31. How many planets can be seen by the unaided eye ?
(a) One (c) Five
(b) Three (d) Four

32. Which one of them is a group of terrestrial planets ?
(a) Mercury, Earth, Mars, Jupiter
(b) Uranus, Mercury, Venus, Mars
(c) Mercury, Venus, Jupiter, Mars
(d) Mercury, Venus, Earth, Mars

33. Which one of the following is a group of Jovian planets?
(a) Jupiter, Saturn, Mercury, Neptune
(b) Saturn, Uranus, Neptune, Mars
(c) Saturn, Uranus, Neptune, Earth
(d) Uranus, Jupiter, Saturn, Neptune

34. Which one of the following represents the correct order of planets from the closest to the farthest from the sun ?
(a) Venus, Earth, Uranus, Jupiter
(b) Saturn, Uranus, Jupiter, Earth
(c) Mercury, Venus, Earth, Mars
(d) Earth, Mars, Saturn, Jupiter,

35. Which one of the following represents the correct order of planets from the largest to the smallest size?
(a) Jupiter, Saturn, Uranus, Neptune, Earth,
(b) Uranus, Neptune, Earth, Mars, Venus
(c) Saturn, Uranus, Venus, Mars, Neptune,
(d) Venus, Mars, Saturn, Mercury, Uranus

36. Which planet has no rings ?
(a) Saturn (c) Mars
(b) Neptune (d) Uranus

37. With reference to Mercury which one of the following sentences is not correct?
(a) A year on Mercury takes 88 Earth days.
(b) Mercury does not have any moons or rings.
(c) Mercury is the second densest planet.
(d) Mercury is the hottest planet in our solar system.

38. The sun is made up of .....
(a) Hydrogen (c) Carbon
(b) Helium (d) All of these

39. Which one of the following is not a part of the Sun's interior ?
(a) Radiation Zone (c) Core
(b) Convective Zone (d) Corona

40. What is called the boundary of the Sun's interior and the solar atmosphere.
(a) Convective zone (c) Photosphere
(b) Core (d) Radiation zone

41. What is called the uppermost portion of the sun's atmosphere ?
(a) Convective zone (c) Photosphere
(b) Core (d) Corona

42. Which planet is referred to as the Earth's sister planet ?
(a) Neptune (c) Venus
(b) Mars (d) Jupiter

43. Which planet has retrograde rotation ?
(a) Neptune (c) Venus
(b) Mars (d) Jupiter

44. Which planet/planets in our system generate magnetic fields by the movement of liquid metal at their cores ?
(a) Mercury (c) Earth
(b) Mercury and Saturn (d) Earth and Mercury

45. Which planet/planets have no magnetic field ?
(a) Mars (c) Neptune
(b) Jupiter (d) Venus and Mars

46. Which one of the planets has no natural satellite ?
(a) Mercury (c) Jupiter
(b) Mars (d) Neptune

47. Which is the densest planet in the solar system ?
(a) Mars (c) Earth
(b) Jupiter (d) Venus

48. Which one of the following represents the correct order of planets in terms of density from high to low ?
(a) Venus > Mercury > Neptune > Jupiter
(b) Mars > Neptune > Mercury > Venus
(c) Earth > Mercury > Venus >Mars
(d) Jupiter > Uranus > Saturn > Venus

49. The tallest mountain in the solar system is situated in ..... planet.
(a) Jupiter (c) Earth
(b) Mars (d) Neptune

50. Which planet has the largest dust storms in the solar system ?
(a) Jupiter (c) Venus
(b) Earth (d) Mars

51. Mars has ..... moons.
(a) 5 (c) 1
(b) 18 (d) 2

52. Which planet has the shortest day of all the planets ?
(a) Earth (c) Venus
(b) Jupiter (d) Neptune

53. Flattest planet of the solar system is .....
(a) Mars (c) Saturn
(b) Uranus (d) Neptune

54. Which planets are referred to as Ice giant planets ?
(a) Jupiter and Mars
(b) Jupiter and Saturn
(c) Saturn and Neptune
(d) Neptune and Uranus

55. Which one of the following pairs is incorrect ?
(a) Venus: pale yellow
(b) Mars: reddish-brown
(c) Neptune: pale green
(d) Saturn: pale gold.

56. Which one of the following pairs is incorrect ?
(a) Uranus; Ariel (c) Neptune; Triton
(b) Jupiter; Phobos (d) Saturn; Triton

57. The Asteroid Belt is located between the orbits of ……and …….
(a) Mars and Earth (c) Neptune and Saturn
(b) Jupiter and Uranus (d) Mars and Jupiter

58. The closest point in a comet's orbit to the Sun is called…….
(a) Plasma (c) Perihelion
(b) Aphelion (d) Tails

59. The 'point of no return' around a black hole is called the …….
(a) event horizon (c) hyper zone
(b) radiation zone (d) constellation

60. Planet X is a Jovian planet made up of hydrogen and helium gases. It has 62 moons and is best known for its fabulous ring system. What is planet X ?
(a) Mars (c) Saturn
(b) Jupiter (d) Neptune

61. Planet X is a small terrestrial planet that has no moon and it is the second densest planet. What is planet X ?
(a) Mars (c) Venus
(b) Earth (d) Mercury

62. Pythagoras described the cosmos as the…….
(a) universe (c) planet
(b) stars (d) comets

63. Which is the closest dwarf planet to the Sun ?
(a) Pluto (c) Ceres
(b) Eris (d) Haumea

64. Dwarf Planet X is the largest that has 5 moons and it was reclassified from a planet to a dwarf planet in 2006. What is Dwarf Planet X ?
(a) Pluto (c) Ceres
(b) Eris (d) Haumea

65. Mark the correct statement regarding Sun:
(a) The inner layer of the sun is called the corona
(b) The outer layer of the sun is known as the corona
(c) Corona of the sun is always visible with naked eyes
(d) Corona is not visible anytime

66. The Big Bang took place …… years ago.
(a) 13.7 million (c) 14.8 billion
(b) 13.7 billion (d) 12.9 million

67. The formation of stars is believed to have taken place some :
(a) 5-6 billion years ago
(b) 7-8 billion years ago
(c) 9-10 billion years ago
(d) 11-12 billion years ago

68. On an average, how much of the sun's energy does the earth receive at the top of its atmosphere ?
(a) 0.48 calories per sq cm per minute
(b) 0.95 calories per sq cm per minute
(c) 1.77 calories per sq cm per minute
(d) 1.94 calories per sq cm per minute

69. Our galaxy(Milky way) is an example of :
(a) Elliptical galaxy (c) Spiral galaxy
(b) Irregular galaxy (d) None of the above

70. Which of the following planets rotate in an anticlockwise direction ?
(a) Mercury (c) Uranus
(b) Venus (d) None

71. Cassini Mission is associated with the study of :
(a) Jupiter (c) Saturn
(b) Mars (d) Sun

72. Which of the following space missions was used for the exploration of Uranus and Neptune ?
(a) Voyager 1 (c) New Horizons
(b) Voyager 2 (d) None of the above

73. Which of the following planets has the highest average density in the solar system ?
(a) Jupiter (c) Earth
(b) Mars (d) Saturn

74. On which day the sun is vertically overhead at the Tropic of Capricorn ?
(a) 21 June (c) 21 March
(b) 22 December (d) 23 September

75. Consider the following statements:
Assertion: The linear distance of a latitude at the pole is a little longer than that at the equator.
Reason: The earth is slightly flattened at the poles.
Select the correct answer from the following codes.
(a) A and R is correct. R is the correct explanation of A
(b) A and R is correct. But R is not the correct explanation of A
(c) A is false, R is true
(d) A is true, R is false

76. Between which of the following latitudes does the net radiation balance record a surplus ?
(a) 40° N to 25° S (c) 40° N to 20° N
(b) 40° N to 40° S (d) 40° N to 20° S

77. 'Supernova' is :
(a) An asteroid (c) A dying star
(b) A black hole (d) None of the above

78. Who first propounded that the Sun is at the centre of our Solar system and the earth revolves around it?
(a) Newton (c) Panini
(b) Galileo (d) Copernicus

79. Information about 'Black Hole' was first provided by :
(a) S. Chandrasekhar (c) Rutherford
(b) Hermann Bondi (d) Copernicus

80. When the sun, moon and earth are aligned in a straight line, it is known as…….
(a) Solstice (c) Aphelion
(b) Syzygy (d) Perihelion

Answer with Explanations

Level-1

1. (c) Extending from the top of the thermosphere to 10,000 km above the earth is the exosphere which is farthest from the Earth. This layer has very few atmospheric molecules, which can't escape into space.

2. (c) The atmosphere can be divided into five layers. Starting from the Earth's surface, they are the troposphere, stratosphere, mesosphere, thermosphere and exosphere. The lithosphere is the rigid, outermost shell of a terrestrial-type planet or natural satellite, that is defined by its rigid mechanical properties.

3. (b) It is the Indian name for the Orion constellation. It is one of the most conspicuous and recognizable constellations in the night sky. It was named after Orion, a hunter in Greek mythology.

4. (c) In the thermosphere, the temperature increases with the increase in height as the gas molecules present absorb the X-rays and the ultraviolet radiations of the Sun.

5. (a) The stratosphere is a layer of Earth's atmosphere. It is the second layer of the atmosphere as you go upward. The troposphere, the lowest layer, is right below the stratosphere. The next higher layer above the stratosphere is the mesosphere.

6. (c) The zone that can support life is called Biosphere. The biosphere, also known as the ecosphere, is the worldwide sum of all ecosystems. It can also be termed as the zone of life on Earth, a closed system, and largely self-regulating.

7. (c) Venus has the longest day of any planet in our solar system. It completes one rotation every 243 Earth days. Its day lasts longer than its orbit. It orbits the Sun every 224.65 Earth days, so a day is nearly 20 Earth days longer than its year.

8. (c) Velozoic is not an era in the history of the earth. The Paleozoic Era is the earliest of three geologic eras of the Phanerozoic Eon. The Mesozoic Era is an interval of geological time from about 252 to 66 million years ago. It is also called the Age of Reptiles. The Cenozoic Era meaning "new life", is the current and most recent of the three Phanerozoic geological eras, following the Mesozoic Era and extending from 66 million years ago to the present day.

9. (b) The oceanic crust consists of a volcanic lava rock called basalt. Basaltic rocks of the ocean plates are much denser and heavier than the granitic rock of the continental plates. The crust and the upper layer of the mantle together make up a zone of rigid, brittle rock called the Lithosphere.

10. (d) The period before Palaeozoic is called Pre Cambrian. The Precambrian Era comprises all of geologic time prior to 600 million years ago. The Precambrian was originally defined as the era that predated the emergence of life in the Cambrian Period.

11. (a) The small planets revolving around the sun between the orbits of Mars and Jupiter are called Asteroids. Asteroids are minor planets, especially of the inner Solar System. Larger asteroids have also been called planetoids.

12. (a) Cone-bearing trees started appearing in the Permian Period of the Palaeozoic Era. It is the last period of the Palaeozoic era; the following Triassic period belongs to the Mesozoic era.

13. (b) A solar day is the time it takes for the Earth to rotate about its axis so that the Sun appears in the same position in the sky. The sidereal day is 4 minutes shorter than the solar day.

14. (a) Chandrayaan-2 was launched on July 22, 2019 and inserted into the lunar orbit on August 20, 2019.

15. (a) The Andromeda is the earth's closest galactic neighbour. The Andromeda Galaxy, also known as Messier 31, M31, or NGC 224, is a spiral galaxy approximately 780 kiloparsecs from Earth, and the nearest major galaxy to the Milky Way. Its name stems from the area of the Earth's sky in which it appears, the constellation of Andromeda.

16. (d) All planets at a greater distance from the sun than the earth are called superior planets. The superior planets are those planets which are farther from the Sun than the Earth, namely Mars, Jupiter, Saturn, Uranus, Neptune and Pluto.

17. (c) If the Moon didn't spin at all, then eventually it would show its far side to the Earth while moving around our planet in orbit. However, since the rotational period is exactly the same as the orbital period, the same portion of the Moon's sphere is always facing the Earth.

18. (c) Johannes Kepler

For the first time, Kepler discovered that the planets move around the Sun, not in circles but in ellipses.

19. (a) The Moon takes 29.53 days to return to the same point on the celestial sphere as referenced to the Sun because of the motion of the Earth around the Sun.

20. (d) One side of the moon always faces Earth. Even so, over time, it's possible to see as much as 59% of the moon's surface, due to lunar libration. Lunar libration lets us see more than 50% of the moon.

21. (a) **Earth:** The Solar Eclipse occurs only when the sun and the moon are in conjunction. This can only happen when the Sun, Moon and Earth are nearly aligned in a straight line in three dimensions during a new moon when the Moon is close to the ecliptic plane.

22. (c) Ecology is the branch of biology that deals with the relations of organisms to one another and to their physical surroundings.

Astronomy is the study of the celestial objects - sun, moon, stars, planets, comets, galaxies, dust and other non-Earthly bodies.

The study of the universe is called Cosmology.

Dendrochronology (or tree-ring dating) is the scientific method of dating tree rings (also called growth rings) to the exact year they were formed.

23. (a) The most abundant element in the Universe is Hydrogen; helium is second. However, the rank of abundance does not continue to correspond to the atomic number; oxygen has abundance rank 3, but atomic number 8.

24. (b)Three stars in the Alpha Centauri system are close to the sun . The two main stars are Alpha Centauri A and Alpha Centauri B, which form a binary pair. They are an average of 4.3 light-years from Earth. The third star is Proxima Centauri. It is about 4.22 light-years from Earth and is the closest star other than the sun.

25. (d) The Milky Way began forming around 12 billion years ago and is part of a group of about 50 galaxies called the Local Group. The Milky Way Galaxy is our home galaxy in the universe because it contains our Solar System.

26. (d) In our solar system, four innermost planets which are closest to the sun: Mercury, Venus, Earth and Mars have some features in common with the earth and hence they are called Terrestrial Planets. Terrestrial planets are Earth-like planets made up of rocks or metals with a hard surface. Terrestrial planets also have a molten heavy-metal core, few moons and topological features such as valleys, volcanoes and craters.

27. (d) A terrestrial planet is one with a heavy metal core, a rocky mantle, and a solid surface. It also must meet the three planetary criteria as set forth by the IAU. Apart from that they have a thin atmosphere and have very few or no natural satellites.

28. (a) Mars is not a Jovian Planet. Jovian planets in the solar system-Jupiter, Saturn, Uranus, and Neptune-are all classified as "gas giants," meaning that they are made out of gases, rather than the solid materials that comprise the 'terrestrial' planets (such as Earth).

29. (b) Venus is the second planet from the Sun. It is blanketed with a thick atmosphere of carbon dioxide – the gas that we breathe out. The carbon dioxide traps most of the heat from the Sun. The cloud layers also act as a blanket. The result is a runaway greenhouse effect that has caused the planet's temperature to soar to 465°C, hot enough to melt lead. This means that Venus is the hottest planet of all.

30. (c) One astronomical unit (AU) represents the mean distance between the Earth and our sun. More exactly, one astronomical unit (AU) = 92,955,807 miles (149,597,871 km). Earth's orbit around the sun isn't a perfect circle. So Earth's distance from the sun changes throughout the year. When the Earth is at perihelion – its nearest point to the sun for the year, in January – it's about 0.983 AU from the sun. When our planet swings out to aphelion – its farthest point, in July – we're about 1.017 AU away from the sun.

31. (c) Mercury, Venus, Mars, Jupiter and Saturn are five brightest planets. They have been known since ancient times and can easily be seen with the naked eye if one knows when and where to look. They are visible for much of the year, except for short periods of time when they are too close to the Sun to observe.

32. (d) In our solar system, four innermost planets which are closest to the sun: Mercury, Venus, Earth and Mars have some features in common with the earth and hence they are called Terrestrial Planets. Terrestrial planets are Earth-like planets made up of rocks or metals with a hard surface. Terrestrial planets also have a molten heavy-metal core, few moons and topological features such as valleys, volcanoes and craters.

33. (d) The Planets which are situated outside the orbit of Mars are called Jovian Planets. Their structure is similar to that of Jupiter, Saturn, Uranus and Neptune. The common features of Jovian Planets are :

- They all have gaseous bodies.
- They have a ring system around them.
- They have a large number of natural satellites.

34. (c) The order of the planets from closest to the Sun outwards is; Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and finally Neptune.

Following table represents distance from the sun and orbital period of planets.

Name	Distance from the Sun	Orbit Period
Mercury	57,909,227 km (0.39 AU)	88 days
Venus	108,209,475 km (0.73 AU)	225 days
Earth	149,598,262 km (1 AU)	365.24 days
Mars	227,943,824 km (1.38 AU)	1.9 years
Jupiter	778,340,821 km (5.20 AU)	11.9 years
Saturn	1,426,666,422 km (9.58 AU)	29.5 years
Uranus	2,870,658,186 km (19.22 AU)	84.0 years
Neptune	4,498,396,441 km (30.10 AU)	164.8 years

35. (a) The largest planet in the solar system is Jupiter, followed by Saturn, Uranus, Neptune, Earth, Venus, Mars with the smallest being Mercury.

Following table represents Diameter of planets :

Name	Diameter
Mercury	4,879 km
Venus	12,104 km
Earth	12,742 km
Mars	6,779 km
Jupiter	139,822 km
Saturn	116,464 km
Uranus	50,724 km
Neptune	4,244 km

36. (c) Mars is terrestrial planet but Jupiter, Saturn, Uranus and Neptune have following common features of Jovian Planets :

- They all are gaseous bodies.
- They have a ring system around them.
- They have a large number of natural satellites.

37. (d) Mercury is the second hottest planet while Venus is the hottest planet in our solar system because it is blanketed with a thick atmosphere of carbon dioxide – the gas that we breathe out. The carbon dioxide traps most of the heat from the Sun. The cloud layers also act as a blanket. The result is a runaway greenhouse effect that has caused the planet's temperature to soar to 465°C, hot enough to melt lead. This means that Venus is even hotter than Mercury.

38. (d) The Sun is made up of hot gases like hydrogen (about 70%) and helium (about 28%). Carbon, nitrogen and oxygen make up 1.5% and the other 0.5% is made

up of small amounts of many other elements such as neon, iron, silicon, magnesium and sulphur. The Sun shines because it is turning hydrogen into helium via the process of nuclear fusion in its extremely hot core.

39. (d) The Sun is made up of hot gases. It has no solid surface. However, it still has a defined structure. There are three main parts to the Sun's interior:

Core : It is at the center. It is the hottest region, where the nuclear fusion reactions that power the Sun occur.

Radiation zone: The section immediately surrounding the core.

Convective zone: The outermost ring of the sun.

Corona is a part of the sun's atmosphere and it is an extremely hot outermost layer.

40. (c) **Photosphere:** The innermost part of the sun's atmosphere. It's a boundary between the Sun's interior and the solar atmosphere, it's a visible surface of the sun. Core, radiation zone and convective zone includes the inner part of the Sun.

41. (d) **Corona:** The uppermost portion of the Sun's atmosphere is called the corona, and is surprisingly much hotter than the Sun's surface (photosphere) so it gives out very little light as compared to photosphere. This region becomes visible only during a total solar eclipse and looks like a bright crown.

42. (c) Venus is the second brightest object in the night sky after the Moon and it is the second planet from the Sun. Venus is the second largest terrestrial planet and is sometimes referred to as the Earth's sister planet due to their similar size and mass. The surface of the planet is obscured by an opaque layer of clouds made up of sulphuric acid.

43. (c) **Retrograde rotation:** Rotation of the Planet opposite direction to the Sun.

All eight planets in the Solar System orbit the Sun in the direction of the Sun's rotation, which is counter clockwise when viewed from above the Sun's north pole. Six of the planets also rotate about their axis in this same direction. The exceptions – the planets with retrograde rotation – are Venus and Uranus.

44. (d) Magnetic field is generated on the earth by liquid metal at the core and Earth's rapid rotation of 24 hours generates enough movement of the liquid to stimulate a magnetic field. Mercury's magnetic fields are generated by the movement of liquid metal at their cores. Mercury's magnetic field is 100 times weaker than the Earth's.

45. (d) Magnetic fields protect a planet from the charged particles streaming out from the Sun in the form of the solar wind. Mars has no inner dynamo to create a major global magnetic field thus Mars does not have a conventional magnetic field while Venus does not have a magnetic field, likely because of its extremely slow rotation rate at about 243 Earth days.

46. (a) The terrestrial planets, Mercury and Venus have no natural satellites; Earth has one large natural satellite, known as the Moon; and Mars has two tiny natural satellites, Phobos and Deimos.

47. (c) Density plays a vital role in determining a planet's surface gravity and is intrinsic to understanding how a planet was formed. Earth is the fifth from the sun and the fourth smallest planet; it has the highest density of any planet in the Solar System, at 5.514 g/cm 3.

48. (c) Order of planets in terms of density:

Earth > Mercury > Venus > Mars > Neptune > Jupiter > Uranus > Saturn

Densities of planets are given as following :

Planet	Average Density (g/cm^3)
Mercury	5.42
Venus	5.24
Earth	5.51
Mars	3.93
Jupiter	1.33
Saturn	0.69
Uranus	1.27
Neptune	1.64

49. (b) Olympus Mons is part of a complex of volcanoes that lie along a volcanic plateau called the Tharsis Bulge. Olympus Mons measures some 600 km across and rises nearly 27 km above the surrounding terrain. It is a shield volcano built by the continuous action of flowing lava over millions and millions of years that began some 3 billion years ago.

50. (d) The surface of mars is covered with red-colored iron oxide dust. Winds on Mars can support dust storms that blanket the entire planet. Dust particles in the air absorb sunlight and warm the surrounding atmosphere, creating winds as they flow to the polar regions. The winds lift more dust from the surface, further warming the atmosphere. Unlike Earth, Mars is a global desert, so dust from the surface feeds further into the storms. Thus, Mars has the largest dust storms in the solar system.

51. (d) Mars has two moons -Phobos & Deimos. Mars is also often described as the Red Planet due to its reddish appearance. Mars is a terrestrial planet with a thin atmosphere composed primarily of carbon dioxide. Mars is the fourth planet from the Sun and is the second smallest planet in the solar system.

52. (b) Jupiter turns on its axis once every 9 hours and 55 minutes. Its rapid rotation flattens the planet slightly, giving it an oblate shape and has the shortest day of all the planets. Jupiter has a small axial tilt of only 3.13 degrees, meaning it has little seasonal variation during its 11.86-year-long orbit of the Sun.

53. (c) Saturn has the second-shortest day of any of the solar system's planets. Its polar diameter is 90% of its equatorial diameter. Saturn is the flattest of all the planets. This is because of the planet's low density and fast rotation, Saturn turns on its axis once every 10 hours and 34 minutes.

54. (d) Giant planets are also called Jovian Planets. The four giant planets are Jupiter, Saturn, Uranus, and

Neptune. There are two ice giants in the Solar System: Uranus and Neptune. They are composed mainly of elements heavier than hydrogen and helium, such as oxygen, carbon, nitrogen, and sulfur.

55. (c) The colour of Neptune is pale blue due to the presence of methane gas. It appears darker than Uranus due to dimmer illumination (greater distance from the Sun). The actual colours of Uranus and Neptune are quite similar.

56. (b) Uranus has 27 moons and one of them is Ariel.

Neptune has 14 named moons. One of Neptune's moons is Triton.

Jupiter also has the biggest moon in our solar system, Ganymede.

Mars has two moons. Their names are Phobos and Deimos.

Titan is the largest moon of the planet Saturn. Titan is the second largest moon in our Solar System.

57. (d) The Asteroid Belt is located between the orbits of Mars and Jupiter. It is placed between 2.2 and 3.2 astronomical units (AU) from the Sun. The thickness of this belt is 1 AU. The four largest asteroids in the belt are Ceres, Vesta, Pallas, and Hygiea. They contain half the mass of the entire belt.

58. (c) The main body of the comet is called the nucleus, and it can contain water, methane, nitrogen and other ices. It is a very small solar system body made mostly of ice mixed with smaller amounts of dust and rock. The closest point in a comet's orbit to the Sun is called 'perihelion'. The most distant point is called 'aphelion'.

59. (a) Supermassive black holes exist in the hearts of galaxies and usually contain the mass equivalent of millions of suns. The point of no return around a black hole is called the event horizon. This is the region where the gravity of the black hole overcomes the momentum of material spinning around it in the accretion disk. Once something crosses the event horizon, it is lost to the pull of the black hole.

60. (c) Saturn is a gas giant because it is predominantly composed of hydrogen and helium. Saturn is probably best known for the system of planetary rings that make it visually unique. It is composed mostly of ice particles, with a smaller amount of rocky debris and dust. It has 62 known moons .

61. (d) Mercury has a diameter of 4,879 km, making it the smallest planet but it is very dense because it is made up of heavy metals and rock. Mercury's density is 5.4 grams, with only the Earth having a higher density.

62. (a) Cosmology is the study of the cosmos and it means it is the scientific study of the origin, evolution, and eventual fate of the universe. The philosopher Pythagoras first used the term cosmos or the order of the universe.

63. (c) Ceres is the smallest of the bodies currently classified as dwarf planets with a diameter of 950 km. It is located in the asteroid belt, between Mars and Jupiter, making it the only dwarf planet in the inner solar system. Ceres is the closest dwarf planet to the Sun. It is the only dwarf planet with no moons.

64. (a) Pluto is the largest and second most massive (after Eris) known dwarf planet in the Solar System, Its moons are Charon , Hydra , Nix , Kerberos and Styx .

Pluto was reclassified from a planet to a dwarf planet in 2006, when the IAU formalised the definition of a planet as 'a planet is a celestial body that

(a) is in orbit around the Sun,

(b) has sufficient mass for its own gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape.

(c) has cleared the neighbourhood around its orbit.'

65. (b) Corona is an aura of plasma that surrounds the sun and other stars. The sun's corona extends millions of km into outer space and is most easily seen during a total solar eclipse, but it is also observable with a coronagraph. The word corona is a Latin word meaning "crown", from the Ancient Greek.

66. (a) The Big Bang Theory says that the universe started from a singularity which then inflated over the next 13.8 billion years to the cosmos that we know today. While the majority of the astronomical community accepts the theory, there are some theorists who have alternative explanations besides the Big Bang — such as eternal inflation or an oscillating universe.

67. (a) Star formation is the process through which dense regions within the molecular clouds in interstellar space collapse and form stars. The process is said to have started 5-6 billion years ago.

68. (d) The earth's surface receives most of its energy in short wavelengths. The energy received by the earth is known as incoming solar radiation which in short is termed as insolation. As the earth is a geoid resembling a sphere, the sun's rays fall obliquely at the top of the atmosphere and the earth intercepts a very small portion of the sun's energy. On an average the earth receives 1.94 calories per sq. cm per minute at the top of its atmosphere.

69. (c) Milky way galaxy and Andromeda galaxy are examples of large spiral galaxies, disc-shaped with greater concentration of stars near the centre.

70. (a) Venus and Uranus rotate in the clockwise or retrograde direction while all the other planets rotate in the anticlockwise motion.

71. (c) NASA's Cassini spacecraft is back in contact with Earth after its successful first-ever dive through the narrow gap between the planet Saturn and its rings.

72. (b) Voyager 2 went on to explore Uranus and Neptune, and is still the only spacecraft to have visited those outer planets. It was launched 16 days before its twin, Voyager 1, on a trajectory that took longer to reach Jupiter and Saturn but enabled further encounters with Uranus and Neptune.

(c) Earth has the highest density of any planet in the Solar System, at 5.514 g/cm^3. This is considered the standard by which other planet's densities are measured. In addition, the combination of Earth's size, mass and density also results in a surface gravity of 9.8 m/s^2.

73. (b) By 22nd December, the sun is vertically overhead at the Tropic of Capricorn. This is winter solstice, when the southern hemisphere experiences its longest day and shortest night.

74. (a) At the equator, the linear distance of a degree of latitude is 68.704 miles. At 45 degrees it is 69.054 miles and at poles it is 69.407 miles. At the same time the meridians of longitude, which converge at the poles enclose a narrower space. Therefore the degree of longitude decreases in length. It is longest at the equator.

75. (a) At the equator the linear distance of a degree of latitude is 68.704 miles. At 45 degree it is 69.054 miles and at poles it is 69.407 miles. At the same time the meridians of longitude, which converge at the poles enclose a narrower space. Therefore degree of longitude decreases in length. It is longest at the equator.

76. (b) Incoming solar radiation is in the form of Shortwave Infrared Radiation. The net latitudinal radiation balance records a surplus between 40° N to 40° S latitudes.

Here, the incoming solar insolation is higher than the heat loss due to long wave radiation emission from the earth. Poleward from these latitudes, there is net loss of heat due to low incoming solar radiation.

77. (d) A supernova is a large explosion that takes place at the end of a star's life cycle. A supernova happens where there is a change in the core, or center of a star. A change can occur in two different ways, with both resulting in a supernova. First type of supernova happens in binary star systems wherein two stars orbit the same point. The second type of supernova occurs at the end of a single star's lifetime.

78. (d) Nicolaus Copernicus was an astronomer, scientist, mathematician of Poland. In 1514, Copernicus propounded the Heliocentric Theory of the solar system in his work 'Commentariolus' (in Latin small commentary). Notably, Indian astronomer Varahamihira propounded the same theory around a thousand years before Copernicus in the sixth century. He mentioned that the moon revolves around the earth and the earth rotates around the sun.

79. (a) Information about 'Black Hole' was first presented by Dr. S. Chandrasekhar. On 11 January, 1935 he presented a research paper in the Royal Astronomical Society of London and propounded that a white dwarf star turns into a black hole after attaining a certain mass. He was jointly awarded the Nobel Prize for Physics in 1983 with W. A. Fowler.

80. (b) In astronomy, a syzygy is a (roughly) straight-line configuration of three or more celestial bodies in a gravitational system. The word is often used in reference to the Sun, Earth, and either the Moon or a planet, where the latter is in conjunction or opposition. Solar and lunar eclipses occur at times of syzygy, as do transits and occultation. The term is often applied when the Sun and Moon are in conjunction (new moon) or opposition (full moon)

Level-2

1. Which of the following statements is/are correct about the solar system?
(a) The sun, the moon and all those objects shining in the night sky are called stars.
(b) Celestial bodies have their own heat and light, which they emit in large amounts. These celestial bodies are called stars.
(c) Both a and b
(d) None of the above

2. Which among the following are celestial bodies?
1. Planets 2. Asteroids
3. Comets 4. Stars
Choose the correct option :
(a) 1, 2, 3 and 4 (c) 1, 2, 3, 4 and 5
(b) 1, 2, 3, 5 and 6 (d) All of the above

3. Consider the following statements :
1. The term albedo is commonly used to determine the brightness of a planet.
2. Planet Mercury receives greater sunlight in comparison to Earth.
Which of the statements given above is/are correct?
(a) Only 1 (c) Both 1 and 2
(b) Only 2 (d) None of the above

4. Consider the following statements:
1. The ratio of the gravitational pull of the moon and earth is 1:6.
2. The time taken for the rotation of the moon on its own axis and revolution around the earth is almost the same.
Which of the following statements is/are correct?
(a) Only 1 (c) Both 1 and 2
(b) Only 2 (d) None of the above

5. Consider the following statements and select the correct answer from the code given below :
1. The northern end of the earth's axis is called the North Pole.
2. 45 degree latitude is half of the length of the equator.
3. Earth's axis is parallel.
4. The earth's speed of revolution is faster in aphelion position.
Code:
(a) Only 1 and 2 (c) Only 3 and 4
(b) Only 2 and 3 (d) Only 1 and 3

6. Consider the following statements :
1. Rotation is the movement of the earth on its own axis.
2. The movement of the earth around the sun in a fixed path or orbit is called Rotation.
3. The circle that divides the day from night on the globe is called the circle of illumination.
Which of the following statements are correct?
(a) Only 1 and 2 (c) Only 3
(b) Only 2 and 3 (d) None of the above

7. Which one of the following statements with regards to the winter solstice is correct? **(CDS (I)-2017)**
(a) The South Pole experiences 24 hours of darkness

(b) It occurs on June 21
(c) The North Pole experiences 24 hours of darkness
(d) The Sun is at aphelion

8. The phases of the Moon are caused by :
(a) The rotation of the Earth
(b) The highly elliptical orbit of the Moon
(c) Revolution of the moon around the earth
(d) The Earth's shadow cast on the Moon as the Earth moves in between the Sun and the Moon.

9. Consider the following statements regarding 'storm surges' :
1. Storm surges can be caused due to the gravitational pull of the Sun and the Moon.
2. Coastal wetlands act as natural barriers in reducing the damage done by a storm surge.

Which of the statements given above is/are correct ?
(a) 1 only (c) Both 1 and 2
(b) 2 only (d) Neither 1 nor 2

10. Consider the following statements :
1. The axis of the earth's magnetic field is inclined at 23 and half degree to the geographic axis of the earth.
2. Earth's magnetic equator passes through Thumba in South India.

Which of the statements given above is/are correct?
(a) Only 1 (c) Both 1 and 2
(b) Only 2 (d) None of the above

11. The terms 'Event Horizon', 'Singularity', `String Theory' and 'Standard Model' are sometimes seen in the news in the context of: **(UPSC, Prelims-2017)**
(a) Observation and understanding of the Universe
(b) Study of the solar and the lunar eclipses
(c) Placing satellites in the orbit of the Earth
(d) Origin and evolution of living organisms on the Earth

12. Consider the following statements :
1. A black hole is an astronomical entity that cannot be seen by a telescope.
2. The gravitational field on a black hole is so strong that it does not allow even light to escape.

In the context of the above statements, which one of the following is/ are correct? Select the code :
(a) Only 1 (c) Both 1 and 2
(b) Only 2 (d) None of the above

13. Consider the following statements :
A person in space craft situated at the mid of earth and Sun will see that :
1. Sky is black.
2. Stars do not twinkle.
3. The temperature outside the spacecraft is more than that of earth's surface.

Which of the following statements is/are correct ?
(a) Only 1 (c) Both 1 and 2
(b) Only 2 (d) None of the above

14. Which of the following statements is/are correct regarding the solar system?
1. The Earth is the densest of all the planets in our solar system.
2. The predominant element in the composition of Earth is silicon.

(a) Only 1 (c) Both 1 and 2
(b) Only 2 (d) None of the above

15. Arrange the planets given below in order of increasing distance from the sun?
1. Pluto 2. Earth
3. Jupiter 4. Uranus

Codes:
(a) 2,3,4,1 (c) 3,2,4,1
(b) 4,3,2,1 (d) 1,2,4,3

16. Consider the following statements:
Assertion: The space bricks, developed by IISC, exploit lunar soil, and use bacteria and guar beans to consolidate the soil into possible load-bearing structures.
Reasoning: They could eventually be used to assemble structures for habitation on the moon's surface.
In light of the given statements, which of the following is correct:
(a) A is correct and R is the correct explanation of A
(b) A is correct but R is not the correct explanation of A
(c) A is correct and R is incorrect
(d) A is incorrect and R is correct

17. Which statement is true about the planets?
(a) Planets are non-luminous bodies and don't shine.
(b) Planets shine though they are non-luminous bodies.
(c) Planets do not shine though they are luminous bodies.
(d) Planets are luminous body and also shine.

18. Which of the following pairs is not properly matched?
(a) The largest planet of the Solar System - Jupiter
(b) The smallest planet of the Solar System - Mercury
(c) The brightest planet of the Solar System-Venus
(d) The slowest moving planet of Solar System- Mars

19. The term 'Goldilocks Zone' is in the context of : **(UPSC, Prelims-2015)**
(a) The limits of habitable zone above the surface of the Earth
(b) Regions inside the Earth where shale gas is available
(c) Both (a) and (b)
(d) None of the above

20. Which of the following is/are correct about Solar eclipse?
1. Solar eclipse occurs when the Moon comes between Earth and Sun.
2. In this situation, the part of earth which is towards the Sun receives the shadow of the Moon.

(a) Only 1 (c) Both 1 and 2
(b) Only (d) None of the above

21. Diamond Ring is a phenomenon observed :
(a) At the start of totality during total solar eclipse
(b) At the end of totality during total solar eclipse
(c) Only along the peripheral regions of the totality trail
(d) Both a and b

22. Scientists observe the merger of giant black holes' billions of light-years away from the Earth. What is the significance of this observation? **(UPSC, Prelims-2019)**
(a) 'Higgs boson particles' were detected.
(b) 'Gravitational waves' were detected.
(c) Possibility of intergalactic space travel through 'wormhole' was confirmed.
(d) It enabled the scientists to understand 'singularity'.

23. A solar eclipse can occur only when :
(a) the moon comes between the sun and the earth.
(b) the earth comes between the sun and the moon.
(c) the sun comes between the earth and the moon.
(d) none of these .

24. A lunar eclipse can occur only when :
(a) the moon comes between the sun and the earth.

(b) the earth comes between the sun and the moon.
(c) the sun comes between the earth and the moon.
(d) none of these

25. A meteorite is :
(a) A comet with a bright gaseous tail
(b) A piece of matter which burns and gets converted into ash as it enters the Earth's atmosphere from outer space
(c) A piece of matter which does not burn completely and reaches the surface of the earth
(d) None of the above

26. Gravitational waves are 'ripples' in the fabric of space-time caused by some of the most violent and energetic processes in the Universe. Which of the following can produce gravitational waves?
(a) Colliding black holes
(b) Collapse of supernovae
(c) Coalescing neutron stars
(d) All of the above

Answer with Explanations

Level-2

1. (b) The sun, the moon and all those objects shining in the night sky are called celestial bodies. Some celestial bodies are very big and hot. They are made up of gases. They have their own heat and light, which they emit in large amounts. These celestial bodies are called stars.

2. (d) The term celestial body is as expansive as the entire universe, both known and unknown. By definition a celestial body is any natural body outside of the Earth's atmosphere. Easy examples are the Moon, Sun, and the other planets of our solar system. But those are very limited examples. The Kuiper belt contains many celestial bodies. Any asteroid in space is a celestial body.

3. (c) The term albedo is commonly used to determine the brightness of a planet. Planet Mercury receives greater sunlight in comparison to Earth but its albedo is less than that of Earth. The albedo of Mercury is 0.138 while on Earth, it is 0.367.

4. (c) The ratio of the gravitational pull of moon and earth is 1:6. The time taken for rotation of the moon on its own axis and revolution around the earth are the same. Moon is also known as the fossil planet.

5. (d) North pole is the northernmost point of Earth i.e., the northern end of the Earth's axis is called the North pole, So statement (1) is true. 45 deg latitude passes from the middle of the equator and poles. The length of 45 deg parallel line is 2833.039 Km, while the length of the equator is 40075.62 Km, and so the 45 deg parallel is not half of the length of the equator and statement (2)is wrong Both axes of Earth are tilted at an angle of 23 deg and are parallel to each other and in this way statement (3) is true. The situation of Aphelion occurs on 4th July, when the distance between the Sun and Earth is maximum and in the situation of Aphelion the cruising speed of Earth goes slow. Thus statement (4) is wrong.

6. (a) Rotation is the movement of the earth on its axis. The movement of the earth around the sun in a fixed path or orbit is called Revolution.

7. (c) The North Pole experiences 24 hours of darkness. On December 21, the earth is in an equivalent position on the opposite points in its orbit. So the South pole is tipped towards the sun and North pole away from it resulting in 24 hours of darkness at the North pole, as the sun is overhead on the Tropic of Capricorn. This phenomenon is winter solstice; while on June 21, the North pole is tipped towards the Sun but the South pole is tipped away from the sun resulting in 24 hours of darkness on the South Pole, as the sun is overhead on the Tropic of Cancer. This phenomenon is summer solstice; while Aphelion is the position of the earth in its orbit when it is at its distant point from the sun.

8. (c) The phases of the moon occur because of the revolution of the moon around the Earth. The amount that one sees of the moon depends on where the moon is in its revolution around the Earth. The time it takes for the moon to rotate/revolve around the earth is about 28 days.

9. (c) A storm surge is a rise in sea level that occurs during tropical cyclones or intense storms. The storms produce strong winds that push the water into shore, which can lead to flooding. Tides occur due to the gravitational pull of the Sun and the Moon whereas a storm surge is primarily caused by the relationship between the winds and the ocean's surface. The water level rises where the winds are strongest. Water is pushed in the direction in which the winds are blowing. Wetlands, such as swamps, estuaries, and mud flats, act as sponges for tropical cyclones.

10. (b) The axis of the magnetic field of Earth is different at different places, and not equally inclined at 23%. Thus statement 1 is wrong. The magnetic pole of the Earth in the Northern hemisphere is situated at Queen Elizabeth Island of Northern Canada not on a peninsula, thus statement (2) is also incorrect. Earth's magnetic Equator passes through Thumba in South India. This is the reason for establishing Thumba Equatorial Rocket Launching Station (TERLS) here as it proves a suitable place for satellite launch. Thus statement 3 is true and option (d) is correct.

11. (a) Singularity and event horizons are related to Black Holes.

Standard model of physics tries to explain universal phenomena.

String theory is used in the context of quantum physics that is used to understand quantum phenomena.

12. (c) Both are true. It is not possible to observe a black hole directly with the help of a telescope. The intense gravitational field of a black hole due to high density does not allow any type of radiation. Even light rays cannot escape from this. The presence of a black hole is ascertained by the behaviour of stars, gases and masses near it with the help of a space telescope.

13. (b) Due to absence of atmosphere in space, the sky appears black and stars do not twinkle. Twinkling of stars is caused by the passing of light through different layers of turbulent atmosphere similarly it is due to the atmosphere that light scatters to let us see the blue sky.

14. (a) The average density of Earth is highest among all the other eight planets of our Solar System. It is 5.515 g/cm^3. The density of other planets is as follows (Unit-

g/cm^3) Mercury (5.50), Venus (5.27), Mars (3.95), Jupiter (1.33), Saturn (0.69) Uranus (1.70), Neptune (1.60). Thus statement (a) is correct. The largest constituent element of earth is Iron (35%). Oxygen (30%) is the second and Silicon (15%) is the third largest' element in the composition of Earth. The Sun comprises 99.8% mass of the solar system. The diameter of the Sun is about 109 times of the Earth's diameter.

15. (a) (i) Mercury (57.9 million km.)
(ii) Venus (108.2 million km.)
(iii) Earth (149.6 million km.)
(iv) Mars (227.9 million km.)
(v) Jupiter (778.3 million km.)
(vi) Saturn (1427.0 million km.)
(vii) Uranus (2871.0 million km.)
(viii)Neptune (4497.1 million km.)

16. (a) The brick-like structures developed by IISC exploits lunar soil, and uses bacteria and guar beans to consolidate the soil into possible load-bearing structures. Furthermore, these space bricks could eventually be used to assemble structures for habitation on the moon's surface.

17. (b) Planets are non-luminous bodies but they shine because they reflect the light of the Sun. Thus option (b) is correct.

18. (d) All of the given options are true, except (d) because the slowest moving planet of the solar system is Neptune. It takes 165 years to complete one revolution around the Sun.

19. (a) In Astronomy, the circumstellar habitable zone is also called 'Goldilocks Zone'. It refers to the habitable zone around a star where the temperature is just right- not too hot and not too cold-for liquid water to exist on a planet. Earth is the only planet inhabiting life in the entire solar system. It is the only planet situated in the Goldilocks zone of the solar system.

20. (c) Solar eclipse occurs when the Moon comes between Earth and Sun. In this situation, the part of earth which is towards the Sun receives the shadow of the Moon and also the Moon's shadow falling on the Earth is smaller than the cross-section of the Earth. This is the reason that the total or full solar eclipse is not visible on every part of the Earth together, but visible only to a limited portion of the Earth.

21. (d) The diamond-ring effect occurs at the beginning and end of totality during a total solar eclipse. As the last bits of sunlight pass through the valley on the moon's limb and the faint corona around the sun is just becoming visible, it looks like a ring with glittering diamond on it. Notably, a total solar eclipse can not last for more than 8 minutes.

22. (b) When the two supermassive black holes in each of these systems finally come together in millions of years, their encounters will produce strong gravitational waves. Gravitational waves produced by the collision of two stellar-mass black holes have already been detected by the Laser Interferometer Gravitational-Wave Observatory (LIGO). Observatories such as the planned NASA/ESA space-based Laser Interferometer Space Antenna (LISA) will be able to detect the lower-frequency gravitational waves from supermassive black hole mergers, which are a million times more massive than those detected by LIGO.

23. (a) When the moon orbits the Earth, it moves between the Sun and the Earth. When this happens, the moon blocks the light of the sun from reaching the Earth. This causes an eclipse of the sun, or solar eclipse. During a solar eclipse, the moon casts a shadow onto Earth.

24. (b) The moon moves in an orbit around Earth, and at the same time, Earth orbits the sun. Sometimes Earth moves between the sun and the moon. When this happens, Earth blocks the sunlight that normally is reflected by the moon. (This sunlight is what causes the moon to shine.) Instead of light hitting the moon's surface, Earth's shadow falls on it. This is an eclipse of the moon -- a lunar eclipse. A lunar eclipse can occur only when the moon is full.

25. (c) Meteorites are pieces of matter which enter the earth's atmosphere from outer spaces due to the gravitational force of the Earth. They are large in size, do not burn completely and therefore manage to reach the surface of the Earth.

26. (d) The strongest gravitational waves are produced by catastrophic events such as colliding black holes, the collapse of stellar cores (supernovae), coalescing neutron stars or white dwarf stars, the slightly wobbly rotation of neutron stars that are not perfect spheres, and possibly even the remnants of gravitational radiation created by the birth of the universe.

❐❐

2 Physical Features of Earth

Level-1

1. Choose a temperate desert out of the following :
(a) The Arabian Desert
(b) The Atacama Desert
(c) The Kalahari Desert
(d) The Patagonian Desert

2. Oxisol is mainly found in :
(a) Tropical soils (c) Grasslands
(b) Desert soils (d) Subtropical soils

3. Which direction is the Indian Plate moving with respect to the Eurasian Plate?
(a) North to South (c) East to West
(b) South to North (d) West to East

4. Which of the following is the reasons for the world's major deserts being situated to the West of the continents?
(a) Global circulation of oceanic currents
(b) Coriolis Force
(c) Gravitational pull of the moon
(d) All of the above

5. Slow cooling of magma leads to :
(a) Formation of large crystals
(b) Formation of small crystals
(c) Rate of cooling does not affect crystal size
(d) Withering of crystals

6. Earthquake is caused due to :
(a) Release of earth's energy
(b) Temperate cyclone
(c) Tropical cyclone
(d) High-speed transport

7. Tillite is a :
(a) Igneous Rock that consists of consolidated masses of unweathered blocks and glacial till in a rock flour.
(b) Metamorphic Rock that consists of consolidated masses of unweathered blocks and glacial till in a rock flour.
(c) Sedimentary Rock that consists of consolidated masses of unweathered blocks and glacial till in a rock flour.
(d) Igneous Rock that consists of consolidated masses of weathered blocks and glacial till in a rock flour.

8. Convectional current theory says :
(a) Currents are generated due to radioactive elements causing a thermal difference in the core portion.
(b) Currents are generated due to radioactive elements causing a thermal difference in the crust portion.
(c) Currents are generated due to radioactive elements causing a thermal difference in the mantle portion.
(d) None of the above

9. Mark the correct statement.
(a) Metamorphic rocks through continuous denudation change into sedimentary rocks.
(b) Igneous rocks through continuous denudation change into sedimentary rocks.
(c) Metamorphic rocks through continuous denudation change into igneous rocks.
(d) None of the above

10. Observe the match.
1. Foliated metamorphic rocks – marble
2. Non-foliated metamorphic rocks – gneiss
Mark the correct option.
(a) 1 only (c) Both 1 and 2
(b) 2 only (d) None of the above

11. Coriolis force is :
(a) Zero at poles
(b) Maximum at the equator
(c) Turns the winds right in the northern hemisphere
(d) Turns the wind right in the southern hemisphere

12. Which one of the following is related to the formation or modification of the present atmosphere of the Earth?
(a) Solar winds (c) Tectonic forces
(b) Differentiation (d) Erosion

13. What is the radius of the Earth?
(a) 5,600 km (c) 4,870 km
(b) 7,200 km (d) 6,371 km

14. The gravitational force on the surface of the Earth is :
(a) Greater near the poles and less at the equator.
(b) Greater near the equator and less at the poles.
(c) Only exists near the equator.
(d) Same at different latitudes.

15. The Lithosphere refers to the portion of depth up to ..... km from the surface of the earth.
(a) 300 km (c) 400 km
(b) 200 km (d) 360 km

16. Which one of the following is a direct source of information about the interior of the Earth?
(a) Gravitational force (c) Earthquake Waves
(b) Earth Magnetism (d) Volcanoes

17. Which one of the following earthquake waves are more destructive?
(a) S- waves (c) Surface waves
(b) P- waves (d) None of the above

18. During an earthquake, the shadow zone for both P-waves and S-waves is in between ..... from epicentre.
(a) 100 and 120 degrees.
(b) 105 and 160 degrees.
(c) 105 and 145 degrees.
(d) 145 and 160 degrees.

19. The mean thicknesses of oceanic crust and continental crust are respectively around :
(a) 4 km and 25 km (c) 7 km and 50 km
(b) 5 km and 30 km (d) None of the above.

20. Consider these pairs:

1. Cardamom Hills	Coromandel Coast
2. Kaimur Hills	Konkan Coast
3. Mahadeo Hills	Central India
4. Mikir Hills	North-East India

Which of the above pairs are correctly matched?

(a) 1 and 2 (c) 3 and 4
(b) 2 and 3 (d) 2 and 4

21. The upper portion of the mantle is called :

(a) Asthenosphere
(b) Conrad Discontinuity
(c) Mesosphere
(d) Moho Discontinuity

22. The thickness of Lithosphere ranges from :

(a) 5-100 km (c) 10-200 km
(b) 10-150 km (d) None of the above

23. What is the density value of the material at the centre of the earth?

(a) 5 g/cm^3 (c) 10 g/cm^3
(b) 7 g/cm^3 (d) 13 g/cm^3

24. The Deccan Traps from India, presently covering most of the Maharashtra plateau, is an example of

(a) Composite Volcanoes
(b) Caldera
(c) Flood Basalt Provinces
(d) Mid–Ocean Ridge Volcanoes

25. The cooled portion of the magma chambers in the deeper depths of the crust in the form of large domes, is called :

(a) Laccoliths (c) Sills
(b) Lapoliths (d) Batholiths

26. What are the most commonly found wall-like intrusive forms of lava in the western Maharashtra area?

(a) Sills (c) Sheets
(b) Dykes (d) Phacoliths

27. Which are the most explosive of the earth's volcanoes?

(a) Caldera
(b) Composite Volcanoes
(c) Shield Volcanoes
(d) Mid-ocean Ridge Volcanoes

28. The Barysphere .....mass of the Earth.

(a) 1.27% (c) 2. 17%
(b) 2.72% (d) 4.58%

29. The Mesosphere makes up about ___ of the Earth's volume.

(a) 30.5% (c) 49.5%
(b) 45.9% (d) 55%

30. The continents cover .....of the surface of the earth.

(a) 15% (c) 31%
(b) 29% (d) 33%

31. Who was the first to put forth a comprehensive argument in the form of 'The continental drift theory ' in 1912 ?

(a) Alfred Wegener (c) James Dwight Dana
(b) Walter Alvarez (d) Hugh Miller

32. India has been divided into how many Seismic Risk Zones?

(a) 5 (c) 4
(b) 6 (d) 7

33. Convectional Current Theory was first discussed by .....

(a) Alfred Wegener (c) Arthur Holmes
(b) Abraham Ortelius (d) None of the above

34. Which of the following areas of India does not come under the zone of high seismic intensity?

(a) Uttarakhand (c) Kutch
(b) Karnataka Plateau (d) Rajasthan

35. Polar fleeing force relates to :

(a) Revolution of earth (c) Gravitation
(b) Rotation of earth (d) Tidal force

36. Which one of the following facts was not considered by Hess (1961) while discussing the concept of the sea floor spreading ?

(a) Volcanic activity along the mid-oceanic ridges
(b) Stripes of the normal and reverse magnetic field were observed in rocks of the ocean floor.
(c) Distribution of fossils in different continents
(d) Age of rocks from the ocean floor.

37. The Fuji plate consists of .....

(a) The Saudi Arabian landmasses
(b) Asiatic and Pacific Plate
(c) South America and Pacific Plate
(d) North-east of Australia

38. Which one of the following has the slowest rate of Plate Movement?

(a) The Arctic Ridge
(b) The East Pacific Rise
(c) Nazca Plate
(d) None of the above

39. Which one of the following is the type of plate boundary of the Indian plate along the Himalayan mountains?

(a) Ocean-continent convergence
(b) Divergent boundary
(c) Transform boundary
(d) Continent-continent convergence

40. Earth's crust consists of .....percent of oxygen.

(a) 5.00 (c) 27.72
(b) 8.13 (d) 46.60

41. Which are the two main constituents of granite.

(a) Iron and nickel
(b) Silica and aluminium
(c) Iron and silver
(d) Iron oxide and potassium

42. What is the most commonly found mineral in meteorites?

(a) Amphibole (c) Pyroxene
(b) Mica (d) Quartz

43. What is the chief chemical in limestone?

(a) Sulphur (c) Phosphorus
(b) Calcium Carbonate (d) Calcium Sulphate

44. .....glacier feeds water to Alaknanda river.

(a) Gangotri (c) Pindari
(b) Alkapuri (d) Miram

45. Carbon dioxide and water vapour are found only up to ..... km from the surface of the earth.

(a) 120 km (c) 90 km
(b) 100 km (d) 75 km

46. The earth's axis makes an angle of .....degrees with the plane of its orbit around the sun.
(a) 66 (c) 90
(b) 84 (d) 105

47. The sun is directly overhead at noon on 21st June at:
(a) The equator (c) 23.5°S
(b) 23.5° N (d) 66.5° N

48. The Inter-Tropical Convergence Zone normally occurs:
(a) near the Equator
(b) near the Tropic of Cancer
(c) near the Tropic of Capricorn
(d) near the Arctic Circle

49. What is the circle that divides the earth into two equal parts or hemispheres called?
(a) Small circle (c) Large circle
(b) Hemispherical (d) Great circle

50. The condition when the Tropic of Cancer receives the vertical rays of the sun is called:
(a) Summer solstice (c) Makar solstice
(b) Winter solstice (d) Spring solstice

51. Which of the following describes the lithosphere?
(a) Upper and lower mantle
(b) Crust and core
(c) Crust and upper mantle
(d) Mantle and core

52. Andaman and Nicobar Islands are separated by which of the following?
(a) Ten degree channel (c) Bay of Bengal
(b) Great Channel (d) Andaman Sea

53. The Tropic of Cancer does not pass through:
(a) Bangladesh (c) Myanmar
(b) Pakistan (d) Taiwan

54. Mark the correct statement regarding planetary winds.
(a) All planetary winds are blowing from east to west.
(b) They change their position as per the apparent the sun.
(c) They change their position as per the temperature variation.
(d) All of the above are correct.

55. Mark the correct statement regarding temperature distribution.
(a) It decreases from the equator to pole because of decreasing trend of insolation.
(b) Southern hemisphere oceans are comparatively hotter.
(c) Winds blowing from land to sea increase the sea surface temperature near the coast.
(d) States within the ambit of the sea and land breeze face extreme temperature.

56. Which of the following countries will not come under the 'Middle East' countries?
(a) Bahrain (c) Turkey
(b) Egypt (d) Libya

57. Through which of the following countries does the Prime Meridian pass?
(a) Algeria (c) Both a and b
(b) Mali (d) Neither a nor b

58. Which of the following countries is divided in almost half by the equator?
(a) Brazil (c) Ecuador
(b) Colombia (d) Indonesia

59. Which of the following is/are in the Frigid zone?
(a) Kara Sea (c) Both a and b
(b) Laptev Sea (d) Neither a nor b

60. Which of the following cities will lie in between the equator and the Tropic of Capricorn?
(a) Sucre (c) Johannesburg
(b) Juba (d) Caracas

61. Which of the following countries will not come in the Torrid zones and the Temperate zones?
(a) Mexico (c) India
(b) Paraguay (d) Morocco

62. What is the line just opposite to prime meridian on the globe called?
(a) International Parallels
(b) Latitude
(c) Longitude
(d) International Date Line

63. On which of the following does the world regulate clocks and time?
(a) Greenwich Mean Time
(b) Coordinated Universal Time
(c) International Atomic Time
(d) None of these

64. The New Naval Observatory Meridian is situated in :
(a) Philadelphia (c) Lisbon
(b) Tenerife (d) Washington DC

65. Which of the following parallels is half as long as the Equator?
(a) 15th (c) 60th
(b) 30th (d) 90th

66. How many major Circles of Latitude are there?
(a) 3 (c) 5
(b) 4 (d) 6

67. Which of the following major Circles of Latitude is not completely fixed?
(a) Tropic of Cancer (c) Both a and b
(b) Tropic of Capricorn (d) Neither a nor b

68. Choose the country that is not in the same side of the Prime Meridian as the other three :
(a) Norway (c) Sweden
(b) Iceland (d) Finland

69. Which of the following countries does the Equator not pass through?
(a) Peru (c) Uganda
(b) Gabon (d) Colombia

70. Through which of the following countries does the Tropic of Cancer not pass?
(a) Saudi Arabia (c) China
(b) Myanmar (d) Qatar

71. Iceland is in the :
(a) Temperate zone (c) In both a and b
(b) Frigid zone (d) Neither a nor b

72. Which of the following is the starting point to measure longitudes?
(a) Equator (c) South Pole
(b) North Pole (d) Prime Meridian

73. Latitude and longitude lines together form the :
(a) Global map (c) Global course
(b) Global grid (d) None of these

74. Which of the following divides the earth into two equal parts?
(a) Prime Meridian (c) Both a and b
(b) Equator (d) Neither a nor b

75. How many time zones do the latitudes divide the earth into?
(a) 24 (c) 0
(b) 360 (d) None of these

76. Through which of the following continents does the Equator not pass?
(a) South America (c) Asia
(b) Africa (d) Europe

77. In which year was the International Date Line established?
(a) 1881 (c) 1883
(b) 1882 (d) 1884

78. Why does the International Date Line deviates and not follow the 180° longitude entirely?
(a) Due to magnetic deviation
(b) Due to territories and island groups
(c) Both a and b
(d) Neither a nor b

79. If a person goes from New Zealand to Tonga he will have to:
(a) Change his date in the watch to one day back.
(b) Change his date in the watch to one day ahead.
(c) Not change his date in the watch.
(d) None of these.

80. Which of the following countries will be on the western side of the International Date Line?
(a) Samoa (c) Both a and b
(b) USA (d) Neither a nor b

81. How many time zones do the longitudes divide the earth into?
(a) 24 (c) 15
(b) 360 (d) None of these

82. Which of the following longitudes is taken as the Indian Standard Time?
(a) 80.5 °E (c) 82.5 °E
(b) 81.5 °E (d) 83.5 °E

83. Which of the following countries is present at the intersection of the Prime Meridian and the Tropic of Cancer?
(a) Mali (c) Niger
(b) Algeria (d) Mauritania

84. Which of the following countries is present at the intersection of the Prime Meridian and the Equator?
(a) Ivory Coast (c) Namibia
(b) Angola (d) None of these

85. If we are moving on the equator from West to East, then which of the following countries will come first?
(a) Ethiopia (c) Sumatra
(b) Indonesia (d) Brunei

86. Through which cities does the longitude of the Indian Standard Time pass?
(a) Mirzapur (c) Both a and b
(b) Prayagraj (d) Neither a nor b

87. What is situated at 66 degree south of the equator?
(a) Arctic Circle (c) Tropic of Cancer
(b) Antarctic Circle (d) Tropic of Capricorn

88. Through which of the following states does the Indian Standard Time longitude pass through?
(a) West Bengal (c) Andhra Pradesh
(b) Bihar (d) Tamil Nadu

89. Through which of the following states do the Tropic of Cancer and the Indian Standard Meridian both pass?
(a) Madhya Pradesh (c) Uttar Pradesh
(b) Karnataka (d) None of these

90. Due to which of the following reasons do we have an immediate sense of time?
(a) Rotation of earth (c) Revolution of moon
(b) Revolution of earth (d) All of the above

91. If we go on the Prime Meridian, which of the following countries will come first?
(a) Algeria (c) Nigeria
(b) Libya (d) Ivory Coast

92. Which of the following are active Volcanoes?
1. Aconcagua 2. Etna
3. Kilimanjaro 4. Vesuvius
Select the correct answer from the codes given below-codes :
(a) 1 and 2 (c) 2 and 3
(b) 1 and 3 (d) 2 and 4

93. Which of the following falls under the depositional landforms?
(a) Alluvial fans (c) Valleys
(b) Plunge pools (d) All of the above

94. Process of Weathering:
(a) It provides regolith for the formation of soil.
(b) It produces concentrations of valuable mineral ores of iron, manganese, tin, etc.
(c) It aids mass wasting.
(d) All of the above are correct.

95. Which process of chemical weathering causes rusting of iron?
(a) Oxidation (c) Dissilication
(b) Carbonation (d) None of the above

96. Which of the following landforms is made by winds?
(a) Col (c) Cirques
(b) U-shaped Valleys (d) Mushroom rock

97. Mark the correct statement.
(a) In weathering oxidation means addition of mineral with oxygen.
(b) Repetition of chemical addition of water in rocks leads to fatigue.
(c) Red color of iron upon reduction turns to greenish or bluish grey.
(d) All of the above.

98. What is reduction?
(a) It is the placement of mineral in absence of oxygen mainly below the water table.
(b) It is the placement of mineral in presence of oxygen mainly below the water table.
(c) It is the placement of mineral in absence of hydrogen mainly below the water table.
(d) It is the placement of mineral in presence of hydrogen mainly below the water table.

99. Mark the correct statement regarding formation of Waterfalls and Rapids.
(a) Forms in mature stage.
(b) Forms in youth stage and disappear in mature stage.
(c) Forms in mature stage and disappear in old stage.
(d) None of the above

100. Identify the pairs not responsible for the formation of caves in Karst Topography?
(a) Shales and limestone
(b) Quartz and dolomites
(c) Shales and Sandstones
(d) Sandstones and limestone

101. Mark the correct statement.
(a) In exogenic forces the energy emanates from within the earth.
(b) The process of diastrophism & gravity come under exogenic forces.
(c) Running water, wind, snow are the examples of exogenic force.
(d) All of the above.

102. The sedimentary rock formed out of deposits of glaciers is called .
(a) Placer deposits
(b) Tillite
(c) Gondwana sediments
(d) None of the above

103. Mark the correct cement regarding Green Cement.
(a) It is manufactured using calcium oxide.
(b) It is vulnerable to acid rain.
(c) It is produced from industrial waste as fly ash.
(d) It has lesser strength than traditional cement.

104. In which of the following stages of landform development, downward cutting is dominated?
(a) Youth stage (c) Late mature stage
(b) Early mature stage (d) Old stage

105. Alluvial Fans are a type of _____ landforms.
(a) Erosional (c) Depositional
(b) Running Water (d) None of the above

106. .....is an accumulation of valuable minerals caused by the effect of gravity on moving particles.
(a) Alluvial fan (c) Oxbow
(b) Barrage (d) Placer deposits

107. Velocity of a stream is affected by:
(a) Position outside the river
(b) Degree of turbulence
(c) Does not affected by gradient
(d) All of the the above

108. What are the favourable conditions for mass movement?
(a) Increase in gradient and height of slopes.
(b) Removal of material from over the original slope surfaces.
(c) Saturation and lubrication of slope materials.
(d) All of the above.

109. Mark the correct statement.
(a) The degree of meandering of the channel of a river, stream, or other watercourse is measured by its sinuosity.
(b) A meander is one of a series of regular sinuous curves, bends, loops, turns, or windings in the channel of a river, stream, or other watercourse.
(c) Both a and b
(d) None of the above

110. Which one of the following countries of South-West Asia does not open out to the Mediterranean Sea?
(UPSC, Prelims-2015)
(a) Syria (c) Lebanon
(b) Jordan (d) Israel

111. Mark the correct statement about Delta.
(a) These are the wetlands that form as river empty their water and sediment into another water body.
(b) Nile delta is created as Nile river empties into Caspian Sea.
(c) Delta is formed when carrying capacity of river increases.
(d) All of the above are correct.

112. Point bars are:
(a) Erosional feature
(b) Depositional feature
(c) Formed due to volcanic eruption
(d) Formed due to tsunami

113. ..... are formed when streams flowing from higher levels break into foot slope plains of low gradient.
(a) Meanders (c) Alluvial fans
(b) Rapids (d) Deltas

114. How many elements compose about 98% of the total crust of the earth?
(a) 6 (c) 8
(b) 7 (d) 9

115. Which of the following features of a mineral is determined by the internal arrangement of the molecules?
(a) External crystal form
(b) Cleavage
(c) Both a and b
(d) Neither a nor b

116. Which of the following minerals composes about half of the earth's crust?
(a) Quartz (c) Feldspar
(b) Pyroxene (d) None of these

117. Which of the following is present in Pyroxene?
(a) Calcium (c) Both a and b
(b) Aluminium (d) Neither a nor b

118. Which of the following has the least relative resistance from being scratched?
(a) Gypsum (c) Calcite
(b) Talc (d) Fluorite

119. Hornblende is a form of :
(a) Quartz (c) Amphibole
(b) Pyroxene (d) Mica

120. Which of the following elements falls under the category of Olivine?
(a) Silica (c) Both a and b
(b) Magnesium (d) Neither a nor b

121. The time taken by the molten rocks to cool determines the .....of the igneous rocks.
(a) Size of grains (c) Both a and b
(b) Density (d) Neither a nor b

122. Lithification occurs due to :
(a) Temperature (c) Organic matter
(b) Pressure (d) Water-flow

123. Which of the following is/are sedimentary rock?
(a) Sandstone (c) Both a and b
(b) Chert (d) Neither a nor b

124. What is the technical term for onion peeling of rocks?
(a) Regolisation (c) Exfoliation
(b) Weathering (d) Thawing

125. Exfoliation of rocks can be seen in:
(a) Desert areas (c) Both a and b
(b) Tropical regions (d) Neither a nor b

126. Which of the following is a slow, gradual but more or less continuous movement of soil down hill-slopes?
(a) Soil creep (c) Solifluction
(b) Slumping (d) Landslides

127. Which of the following are consequences of soil-creep?
(a) Mass displacement of houses
(b) Tilting of trees and poles
(c) Both a and b
(d) Neither a nor b

128. Solifluction happens when :
(a) There is high temperature.
(b) There is scree on the upper surface of the slope.
(c) The soil cover is wet.
(d) All of the above.

129. In which country are soil-flow called as bog-bursts?
(a) Canada (c) Ireland
(b) USA (d) France

130. Landslides are caused by :
(a) Volcanic disturbances
(b) Rain
(c) Both a and b
(d) Neither a nor b

131. Karst landforms are formed by :
(a) Igneous rocks (c) Both a and b
(b) Soluble rocks (d) Neither a nor b

132. What is the phenomenon called that is caused by the mechanical grinding of the river's traction load against the banks and bed of the river?
(a) Corrasion (c) Attrition
(b) Corrosion (d) Hydraulic action

133. How many types of corrasion action are there?
(a) 2 (c) 4
(b) 3 (d) 5

134. Corrosion is a type of river erosion that is caused by :
(a) Mechanical action of the river
(b) Chemical or solvent action of water
(c) Both a and b
(d) Neither a nor b

135. How many types of thermal metamorphism are there?
(a) 2 (c) 4
(b) 3 (d) 5

136. What is the mechanical loosening and sweeping away of materials by the river water itself called?
(a) Hydraulic action (c) Pirating action
(b) Attrition (d) None of these

137. What is the meaning of attrition (in reference to river erosion)?
(a) Formation of plunge-pools
(b) Widening of V-shaped valleys
(c) Increasing depth of the river
(d) None of these

138. Which of the following landforms is seen in the upper stage of a river?
(a) Meanders (c) Both a and b
(b) River-cliffs (d) Neither a nor b

139. In which of the following stages of the river is vertical corrasion more dominant than the lateral corrasion?
(a) Upper stage (c) Lower stage
(b) Middle stage (d) None of these

140. Which of the following is an example of a waterfall formed by a bar of resistant rocks lying transversely across a river valley?
(a) Victoria falls (c) Yosemite falls
(b) Niagara falls (d) Livingstone falls

141. Rapids and cataracts are formed due to :
(a) Sudden turn of a river stream
(b) High lateral corrasion
(c) Outcrop of a band of hard rocks
(d) None of these

142. Meanders are majorly caused by :
(a) Coriolis effect (c) Both a and b
(b) Gravity (d) Neither a nor b

143. Which of the following are features of the middle or valley course of the river?
(a) Interlocking spurs (c) Both a and b
(b) Flood plains (d) Neither a nor b

144. A nunatak is a peak that is present ..... the ice field or glacier.
(a) Underneath (c) At level with
(b) Above (d) None of these

145. Which part of the glaciers moves with the highest speed?
(a) The sides
(b) The middle
(c) There is no uniformity in the speed of any part
(d) None of these

146. Which of the following is a glacier formed when several glaciers combine to form a huge land-mass on a plain?
(a) Valley glacier (c) Alpine glacier
(b) Piedmont glacier (d) None of these

147. What is the shape of a cirque or corrie?
(a) Rectangular (c) Ox-bow
(b) Horse-shoe shaped (d) None of these

148. Which of the following erosion takes place due to glacier?
(a) Plucking (c) Both a and b
(b) Abrasion (d) Neither a nor b

149. In which season does the 'rimayes' appear?
(a) Summer (c) Monsoon
(b) Winter (d) Spring

150. The Hamada deserts consists of a large number of :
(a) Rocks (c) Both a and b
(b) Ice (d) Neither a nor b

151. Which of the following is the name given to stony deserts?
(a) Ger (c) Wadis
(b) Reg (d) Gullies

152. In which country are sandy deserts known as Karakum?
(a) Nigeria (c) Turkmenistan
(b) Egypt (d) Afghanistan

153. Where is the Qattara Deflation situated?
(a) Sahara Desert (c) Thar Desert
(b) Atacama Desert (d) Patagonia Desert

154. Which of the following desert landforms exhibit 'ridge and furrow' structure?
(a) Zeugen (c) Both a and b
(b) Yardang (d) Neither a nor b

155. Mesas in the deserts are in the shape of :
(a) Columns (c) Cones
(b) Tables (d) None of these

156. Which of the following means 'island-mountain'?
(a) Ventifacts (c) Inselberg
(b) Dreikanter (d) Buttes

157. There has been instances of blood-rains in Italy. These are due to dusts from the :
(a) Thar Desert (c) Both a and b
(b) Sahara Desert (d) Neither a nor b

158. The name Karst has been taken from the name of a district in the country of :
(a) France (c) Czechoslovakia
(b) Yugoslavia (d) Germany

159. Which of the following are limestone gorges?
(a) Cheddar gorge (c) Both a and b
(b) Verdon Gorge (d) Neither a nor b

160. Stalagmites and stalactites are features of the :
(a) Desert regions (c) Glacial regions
(b) Karst regions (d) None of these

161. Which of the following factors control the formation of soils?
(a) Parent material (c) Both a and b
(b) Time (d) Neither a nor b

162. River terraces are caused due to :
(a) Lateral erosion (c) Both a and b
(b) Vertical erosion (d) Neither a nor b

163. Which of the following landforms is made by winds?
(a) Col (c) Cirques
(b) U-shaped Valleys (d) Mushroom rock

164. Which of the following minor plates is located in Pacific Ocean?
(a) Nazca plate (c) Philippine plate
(b) Cocos plate (d) All of the above

165. Which of the following is a characteristic of the Himalayas?
(a) Geologically old and fold mountains
(b) Geologically old and block mountains
(c) Geologically young and fold mountains
(d) Geologically young and rift mountains

166. Polar fleeing force is related to :
(a) Revolution of earth (c) Polar winds
(b) Rotation of earth (d) None of the above

167. Consider the following pairs between the Factor impacting temperature and Temperature :
1. Altitude - Higher the altitude, higher the temperature
2. Latitude - Higher the latitude, lower the temperature.
3. Distance from the Sea - Coastal areas have less variation in mean temperatures than inland areas.

Choose the correct matches.
(a) 1 only (c) 2 and 3 only
(b) 1 and 2 only (d) 3 only

168. Which of the following are associated with depositional features of glaciated landforms?
(a) Boulder clay (c) Eskers
(b) Drumlins (d) All of the above

169. Residual Mountains are:
(a) Mountains of elevation
(b) Mountains of accumulation
(c) Mountains of denudation
(d) None

170. Which of the following are examples of Fold Mountains?
(a) Andes mountains (c) Alps mountains
(b) Rockies mountains (d) All of the above

171. Rich mineral resources are often found in which type of landform on earth?
(a) Plains (c) Deltas
(b) Plateaus (d) None of the above

172. Batholith, Laccolith, Sill and Dyke are forms of:
(a) Igneous rocks (c) Metamorphic rocks
(b) Sedimentary rocks (d) All of the above

173. Which of the following plateaus is generally enclosed by Fold Mountains?
(a) Intermontane plateau
(b) Volcanic plateau
(c) Dissected plateau
(d) None

174. Due to Earth's internal processes, large areas are broken or cracked and displaced vertically. The landform thus produced is a :
(a) Tectonic Plateau (c) Fold Mountains
(b) Block Mountains (d) None of the above

175. 'Formed due to deposition, they are very fertile and are thickly-populated regions of the world'. What are they?
(a) Hilly areas (c) Plains
(b) Desert areas (d) Islands

176. Which one of the water bodies separates the Andaman from the Nicobar?
(a) 11° Channel (c) 10° Channel
(b) Gulf of Mannar (d) Andaman Sea

177. Which of the following is an Igneous Rock Formation?
(a) Gabbro (c) Diamond
(b) Marble (d) Shale

178. Which of the following processes are associated with river erosion?
(a) Abrasion (c) Attrition
(b) Corrosion (d) All of the above

179. Which of the following is referred as "buried sunshine"?
(a) Bauxite (c) Lignite
(b) Haematite (d) Coal

Answer with Explanations

Level-1

1. (d) Temperate deserts of continental regions have low rainfall and strong temperature contrasts between summer and winter. In the intermontane region of the Western United States between the Pacific coast and Rocky Mountains, the temperate desert has characteristics of a sagebrush (Artemisia) semi-desert, with a very pronounced drought season and a short humid season. While the rest of the three are tropical deserts, the Patagonian desert in Argentina is a temperate desert.

2. (a) Oxisol is a soil of an order comprising stable, highly weathered, tropical mineral soils with highly oxidized subsurface horizons. Rainforests are very fragile habitats. In many places they are wet deserts, which grow on soils poor in nutrients. In many tropical regions, the bedrock is very old and weathered, and, consequently, depleted in minerals and nutrients. Mineral release is also inhibited by the acidic nature of many tropical soils.

3. (b) The Indian Plate or India Plate is a major tectonic plate straddling the equator in the eastern hemisphere. The Indian Plate is moving in the direction of South to North with respect to the Eurasian Plate. This is the reason why there are earthquakes occurring.

4. (d) Gravitation from the sun and the moon pulls air and water on the earth's surface and tends to make them lag behind, relative to the earth's rotational movement. The gravitational drag is greatest in the equator, where the centrifugal speed of the earth is fastest. Thus, as the earth turns, ocean currents and winds flow in the equator from east to west, tugged by universal gravitation, forming the equatorial currents and the easterly trade winds. As the westbound surface waters move away from the continents, they pull cold, nutrient-rich waters to the surface that generate a cool, stable coastal atmosphere, with little evaporation from the sea and very low rainfall other than morning fogs. In the coasts neighboring these oceanic upwelling, typical coastal fog deserts tend to develop, forming some of the driest ecosystems on earth.

5. (a) The rate at which magma cools. Slow cooling leads to the formation of large crystals. If the crystals remain undisturbed while cooling, they grow according to a regular pattern. Magma closer to the surface cools much faster than magma that hardens deep below ground. With rapid cooling, there is no time for magma to form large crystals. If magma erupts to the surface and becomes lava, the lava will also cool quickly and form minerals with small crystals.

6. (a) An earthquake (also known as a quake, tremor or temblor) is the shaking of the surface of the Earth, resulting from the sudden release of energy in the Earth's lithosphere that creates seismic waves. Earthquakes can range in size from those that are so weak that they cannot be felt to those violent enough to toss people around and destroy whole cities.

7. (c) Tillite, sedimentary rock that consists of consolidated masses of unweathered blocks (large, angular, detached rock bodies) and glacial till (unsorted and unstratified rock material deposited by glacial ice) in a rock flour (matrix or paste of unweathered rock). The matrix, which comprises a large percentage of the rock, usually is dark gray to greenish black in colour and consists of angular quartz and feldspar grains and rock fragments in a very fine-grained paste.

8. (c) Arthur Holmes in 1930s discussed the possibility of convection currents operating in the mantle portion. These currents are generated due to radioactive elements causing thermal differences in the mantle portion. Holmes argued that there exists a system of such currents in the entire mantle portion. This was an attempt to provide an explanation to the issue of force, on the basis of which contemporary scientists discarded the continental drift theory.

9. (a) Metamorphic rocks arise from the transformation of existing rock types, in a process called metamorphism, which means "change in form". The protolith may be a sedimentary, igneous, or existing metamorphic rock. Metamorphic rocks make up a large part of the Earth's crust and form 12% of the Earth's land surface.

10. (d) Foliated metamorphic rocks such as gneiss, phyllite, schist, and slate have a layered or banded appearance that is produced by exposure to heat and directed pressure. Non-foliated metamorphic rocks such as hornfels, marble, quartzite, and novaculite do not have a layered or banded appearance.

11. (c) It is an effect whereby a mass moving in a rotating system experiences a force (the Coriolis force) acting perpendicular to the direction of motion and to the axis of rotation. On the earth, the effect tends to deflect moving objects to the right in the northern hemisphere and to the left in the southern and is important in the formation of cyclonic weather systems. It is maximum at poles and zero at equator.

12. (a) Solar winds. Due to the close vicinity of the parent star, i.e., Sun, the intense solar winds blew off most of the hydrogen, helium and dust from the Earth's primordial atmosphere. The solar wind is a stream of charged particles released from the upper atmosphere of the Sun, called the corona.

13. (d) We have to take an average of the earth's radius because the earth is not a sphere. The radius of Earth at the equator is 3,963 miles (6,378 kilometers); this is according to NASA's Goddard Space Flight Center. The planet's rotation causes it to bulge at the equator. Earth's polar radius is 3,950 miles (6,356 km) — a difference of 13 miles (22 km). The average is 6371 km.

14. (a) The gravitation force on the surface of the earth is greater near the poles and less at the equator. This is because of the distance from the centre at the equator being greater than that at the poles.

15. (a) In an earth like terrestrial-type planet the lithosphere is the rigid, outermost shell that is defined by its rigid mechanical properties. On Earth, it is composed of the crust and the portion of the upper mantle that behaves elastically on time scales of thousands of years or greater. 300 km.

16. (d) As and when the molten material (magma) is thrown onto the surface of the earth as in the form of volcanic eruption, it becomes available for laboratory analysis, making it a direct source of information about the interior of the earth.

17. (c) These waves are the last to report on seismograph. They cause displacement of rocks and create troughs and crests in the material through which they pass due to their direction of vibrations is perpendicular to the wave direction in the vertical plane, and hence, the collapse of structures occurs, making them the most damaging waves.

18. (c) There exists some specific areas called the 'shadow zone' where the earthquake waves are not reported in the seismograph. It was observed that seismographs located at any distance within 105 degrees from the epicentre, recorded the arrival of both P-waves and S-waves. However, the seismographs located beyond 145 degrees from epicentre, record the arrival of P-waves, but not that of S-waves. Thus, a zone between 105 and 145 degrees from epicentre is identified as the shadow zone for both the types of waves.

19. (b) Oceanic crust is thinner as compared to the continental crust. Oceanic crust is the uppermost layer of the oceanic portion of a tectonic plate. Continental crust is the layer of igneous, sedimentary, and metamorphic rocks that forms the continents and the areas of shallow seabed close to their shores, known as continental shelves. Their mean thickness are 5 km and 30 km respectively.

20. (c) The Cardamom Hills or Yela Mala are mountain range of southern India and part of the southern Western Ghats. Kaimur Range is the eastern portion of the Vindhya Range, about 483 km long.

21. (a) The portion of the interior beyond the crust is called mantle. The mantle extends from Moho's discontinuity to a depth of 2,900 km. The upper portion of the mantle is called Asthenosphere. The word astheno means weak. It is considered to be extending up to 400 km.

22. (c) A lithosphere is the rigid, outermost shell, that is defined by its rigid mechanical properties. On Earth, it is composed of the crust and the portion of the upper mantle that behaves elastically on time scales of thousands of years or greater. The crust and the uppermost part of the mantle are called lithosphere.

23. (d) The core is made up of very heavy material mostly constituted by nickel and iron. It is sometimes referred to as the NiFe layer. Its density is 13 g/cm^3.

24. (c) Flood basalt provinces are volcanoes that outpour with highly fluid thick basalt lava that flows for long distances. It is believed that initially the trap formations covered a much larger area than the present. The Deccan traps of India are Flood Basalt provinces.

25. (d) They appear on the surface only after the denudational processes remove the overlying materials. They cover large areas and at times, assume depth that may be several km. These are granitic bodies. Batholiths are almost always made mostly of felsic or intermediate rock types, such as granite, quartz monzonite, or diorite.

26. (b) Dykes. These are formed when the lava makes its way through cracks and the fissures developed in the land, it solidifies almost perpendicular to the ground, gets cooled in the same position to develop a wall like structure.

27. (a) They are usually so explosive that when they erupt they tend to collapse on themselves rather than building any tall structure. The collapsed depressions are called calderas. Their explosiveness indicates that the magma chamber supplying the lava is not only huge but is also in close vicinity.

28. (b) The Barysphere is the interior of the Earth which is located beneath the lithosphere, including both the mantle and the core. However, it is sometimes used to refer only to the core or only to the mantle. It contains 2.72% of the mass of the earth.

29. (c) The mesosphere is that layer of the Earth's atmosphere that is located directly above the stratosphere but directly below the thermosphere. In the mesosphere, temperature decreases as the altitude increases 49.5%. The stratosphere and the mesosphere are collectively referred to as the 'middle atmosphere'.

30. (b) Collectively, the continents occupy more than 57 million square miles (149 million square kilometers), or 29 percent of Earth's surface and the remainder is under oceanic waters. From largest to smallest,

the continents are Asia, Africa, North America, South America, Antarctica, Europe, and Australia. Since Europe and Asia form one uninterrupted landmass, they are sometimes considered a single continent, Eurasia. In other schemes, North and South America are treated as one continent. The continent of Australia is part of the region of Oceania, along with the islands of the Pacific Ocean.

31. (a) From the known records of the history of science, it was Abraham Ortelius, a Dutch map maker, who first proposed such a possibility as early as 1596. Antonio Pellegrini drew a map showing the three continents together. However, it was Alfred Wegener—a German meteorologist who put forth a comprehensive argument in the form of the continental drift theory in 1912. This was regarding the distribution of the oceans and the continents.

32. (c) On the basis of data provided by Indian Meteorological Department and other agencies, Bureau of Indian Standards has published latest version of seismic zoning map of India. The earthquake resistant design code of India assigns four levels of seismicity zone factors for India. India is divided into four seismic zones on the basis of earthquake intensity- namely zone 2, zone 3, zone 4 and zone 5.

33. (c) Arthur Holmes in 1930s discussed the possibility of convection currents operating in the mantle portion. These currents are generated due to radioactive elements causing thermal differences in the mantle portion. Holmes argued that there exists a system of such currents in the entire mantle portion. This was an attempt to provide an explanation to the issue of force, on the basis of which contemporary scientists discarded the continental drift theory.

34. (b) On the basis of data provided by Indian Meteorological Department and other agencies, Bureau of Indian Standards has published latest version of seismic zoning map of India The earthquake resistant design code of India assigns four levels of seismicity zone factors for India. India is divided into four seismic zones on the basis of earthquake intensity-namely zone 2, zone 3, zone 4 and zone 5. Intensity of earthquakes in different zones:

Seismic Zone Intensity on Modified Mercalli scale.

Zone II (Low intensity zone) VI (or less) low damage.

Zone III (Moderate intensity zone) VII damage to buildings.

Zone IV (Severe intensity zone) VIII destruction of buildings.

Zone V (Very severe intensity zone) IX (and above) very high damage.

35. (b) Wegener suggested that the movement responsible for the drifting of the continents was caused by pole-fleeing force and tidal force. The polar-fleeing force relates to the rotation of the earth. We are aware of the fact that the earth is not a perfect sphere; it has a bulge at the equator. This bulge is due to the rotation of the earth.

36. (c) The mapping of the ocean floor and palaeomagnetic studies of rocks from oceanic regions revealed the following facts :

(i) It was realized that all along the mid- oceanic ridges, volcanic eruptions are common and they bring huge amounts of lava to the surface in this area.

(ii) The rocks equidistant on either sides of the crest of mid-oceanic ridges show remarkable similarities in terms of period of formation, chemical compositions and magnetic properties. Rocks closer to the mid-oceanic ridges have normal polarity and are the youngest. The age of the rocks increases as one moves away from the crest.

(iii) The ocean crust rocks are much younger than the continental rocks. The age of rocks in the oceanic crust is nowhere more than 200 million years old. Some of the continental rock formations are as old as 3,200 million years.

(iv) The sediments on the ocean floor are unexpectedly very thin. Scientists were expecting, if the ocean floors were as old as the continent, to have a complete sequence of sediments for a period of much longer duration. However, nowhere was the sediment column found to be older than 200 million years.

(v) The deep trenches have deep-seated earthquake occurrences while in the mid- oceanic ridge areas, the quake foci have shallow depths.

These facts and a detailed analysis of magnetic properties of the rocks on either sides of the mid-oceanic ridge led Hess (1961) to propose his hypothesis, known as the sea floor spreading.

37. (d) The theory of plate tectonics proposes that the earth's lithosphere is divided into seven major and some minor plates. Young Fold Mountain ridges, trenches, and/or faults surround these major plates. The major plates are as follows :

(i) Antarctica and the surrounding oceanic plate.

(ii) North American (with western Atlantic floor separated from the South American plate along the Caribbean islands) plate.

(iii) South American (with western Atlantic floor separated from the North American plate along the Caribbean islands) plate.

(iv) Pacific plate.

(v) India-Australia-New Zealand plate

(vi) Africa with the eastern Atlantic floor plate.

(vii) Eurasia and the adjacent oceanic plate.

Some important minor plates are listed below:

(i) Cocos plate : Between Central America and Pacific plate.

(ii) Nazca plate : Between South America and Pacific plate.

(iii) Arabian plate : Mostly the Saudi Arabian landmass.

(iv) Philippine plate : Between the Asiatic and Pacific plate.

(v) Caroline plate : Between the Philippine and Indian plate (North of New Guinea) .

(vi) Fuji plate : North-east of Australia.

38. (a) The strips of normal and reverse magnetic field that run parallel the mid-oceanic ridges help scientists determine the rates of plate movement. These rates vary considerably. The Arctic Ridge has the slowest rate (less than 2.5 cm/yr), and the East Pacific Rise near Easter Island, in the South Pacific about 3,400 km west of Chile, has the fastest rate (more than 15 cm/yr).

39. (b) The Indian plate includes Peninsular India and the Australian continental portions. The subduction zone along the Himalayas forms the northern plate boundary in the form of continent-continent convergence. In the east, it extends through Rakinyoma Mountains of Myanmar towards the island arc along the Java Trench. The eastern margin is a spreading site lying to the east of Australia in the form of an oceanic ridge in SW Pacific. The Western margin follows Kirthar Mountain of Pakistan. It further extends along the Makran coast and joins the spreading site from the Red Sea rift southeastward along the Chagos Archipelago. The boundary between India and the Antarctic plate is also marked by oceanic ridge (divergent boundary) running in roughly W-E direction and merging into the spreading site, a little south of New Zealand.

40. (d) About 98 per cent of the total crust of the earth is composed of eight elements like oxygen, silicon, aluminium, iron, calcium, sodium, potassium and magnesium, and the rest is constituted by titanium, hydrogen, phosphorous, manganese, sulphur, carbon, nickel and other elements.

Sl No.	Elements	By weight (%)
1.	Oxygen	46.60
2.	Silicon	27.72
3.	Aluminium	8.13
4.	Iron	5.00
5.	Calcium	3.63
6.	Sodium	2.83
7.	Potassium	2.59
8.	Magnesium	2.09
9.	Others	1.41

41. (b) Granite is a common type of felsic intrusive igneous rock that is granular and phaneritic in texture. Granites can be predominantly white, pink, or gray in color, depending on their mineralogy. The word "granite" comes from the Latin granum, a grain, in reference to the coarse-grained structure of such a holocrystalline rock. Strictly speaking, granite is an igneous rock with between 20% and 60% quartz by volume, and at least 35% of the total feldspar consisting of alkali feldspar, although commonly the term "granite" is used to refer to a wider range of coarse-grained igneous rocks containing quartz and feldspar.

42. (c) Pyroxene consists of calcium, aluminum, magnesium, iron and silica. Pyroxene forms 10 per cent of the earth's crust. It is commonly found in meteorites. It is in green or black colour. Pyroxenes that crystallize in the monoclinic system are known as clinopyroxenes and those that crystallize in the orthorhombic system are known as orthopyroxenes.

43. (b) Many depositional forms develop within the limestone caves. The chief chemical in limestone is calcium carbonate which is easily soluble in carbonated water (carbon dioxide absorbed rainwater). This calcium carbonate is deposited when the water carrying it in solution evaporates or loses its carbon dioxide as it trickles over rough rock surfaces.

44. (b) We have many glaciers in our country moving down the slopes and valleys in Himalayas. Higher reaches of Uttarakhand, Himachal Pradesh and Jammu and Kashmir, are places to see some of them, one can see river Bhagirathi is basically fed by meltwaters from under the snout (Gaumukh) of the Gangotri glacier. In fact, Alkapuri glacier feeds waters to Alaknanda river. Rivers Alaknanda and Bhagirathi join to make river Ganga near Devprayag.

45. (c) The proportion of gases changes in the higher layers of the atmosphere in such a way that oxygen will be almost in negligible quantity at the height of 120 km. Similarly, carbon dioxide and water vapour are found only up to 90 km from the surface of the earth. Carbon dioxide is meteorologically a very important gas as it is transparent to the incoming solar radiation but opaque to the outgoing terrestrial radiation. It absorbs a part of terrestrial radiation and reflects back some part of it towards the earth's surface. It is largely responsible for the green house effect. Water vapour is also a variable gas in the atmosphere, which decreases with altitude. In the warm and wet tropics, it may account for four per cent of the air by volume, while in the dry and cold areas of desert and polar regions, it may be less than one per cent of the air. Water vapour also decreases from the equator towards the poles. It also absorbs parts of the insolation from the sun and preserves the earth's radiated heat. It thus, acts like a blanket allowing the earth neither to become too cold nor too hot. Water vapour also contributes to the stability and instability in the air.

46. (a) The amount and the intensity of insolation vary during a day, in a season and in a year. The factors that cause these variations in insolation are : (i) the rotation of earth on its axis; (ii) the angle of inclination of the sun's rays; (iii) the length of the day; (iv) the transparency of the atmosphere; (v) the configuration of land in terms of its aspect. The last two however, have less influence.

The fact that the earth's axis makes an angle of 66 _ degrees with the plane of its orbit round the sun has a greater influence on the amount.

47. (b) The Tropic of Cancer is the circle marking the latitude 23.5 degrees north, where the sun is directly overhead at noon on June 21, the beginning of summer in the

northern hemisphere. The Tropic of Capricorn is the circle marking the latitude 23.5 degrees south where the sun is directly overhead at noon on December 21, the beginning of winter in the northern hemisphere. The equator is the circle where the Sun is directly overhead at noon on the equinoxes.

The Arctic and Antarctic Circles are located at ±66.5 degrees latitude. Note that 66.5 + 23.5 equals 90 degrees. This means that on December 21, when the Sun is directly over the Tropic of Capricorn at noon, it will not be visible from the Arctic Circle. So above the Arctic Circle, there is a period during the winter when the sun remains below the horizon. The same is true of the Antarctic Circle during Southern Hemisphere winter. On June 21st, when the sun is directly over the Tropic of Cancer at noon, it is not visible from below the Antarctic Circle.

48. (a) The Intertropical Convergence Zone (ITCZ), known by sailors as the doldrums or the calms, is the area encircling Earth near the Equator, where the northeast and southeast trade winds converge. The ITCZ was originally identified from the 1920s to the 1940s as the "Intertropical Front" ("ITF"), but after the recognition in the 1940s and the 1950s of the significance of wind field convergence in tropical weather production, the term ITCZ was then applied. When it lies near the Equator, it is called the near-equatorial trough. Where the ITCZ is drawn into and merges with a monsoonal circulation, it is sometimes referred to as a monsoon trough, a usage more common in Australia and parts of Asia. In the seamen's speech, the zone is referred to as the doldrums because of its erratic (monotonous) weather patterns with stagnant calms and violent thunderstorms.

49. (d) The circle that divides the earth into two equal parts or hemispheres is called great circle. A great circle always divides the Earth in half, thus the Equator is a great circle (but no other latitudes) and all lines of longitude are great circles.

50. (a) The condition when the Tropic of Cancer receives the vertical rays of the sun is called Summer Solstice. It happens twice yearly, once in each hemisphere. For that hemisphere, the summer solstice is when the Sun reaches its highest position in the sky and is the day with the longest period of daylight.

51. (c) The solid outer part of the Earth is called lithosphere, which consists of the crust and upper part of the mantle. The crust is the uppermost part and in solid state, whereas the mantle is in thick liquid state lying below the crust.

52. (a) It comprises two island groups, the Andaman Islands (partly) and the Nicobar Islands, separated by the 150 km wide Ten Degree Channel (on the 10°N parallel), with the Andamans to the north of this latitude, and the Nicobars to the south (or by 179 km). The Andaman Sea lies to the east and the Bay of Bengal to the west.

53. (b) Pakistan lies north of the Tropic of Cancer . There are 16 countries, 3 continents and 6 water bodies that lie on Tropic of Cancer passes. North America - Mexico, Bahamas(Archipelago); Africa - Niger, Algeria, Mauritania, Egypt, Libya, Mali, Western Sahara; Asia - Myanmar, Oman, Bangladesh, India, Saudi Arabia, China, United Arab Emirates, Taiwan.

54. (b) Some are westerly and others are easterly as per the position of low pressure and Coriolis force. Apparent movement of sun changes the position of low pressure and high pressure and hence that of the trade winds. The general distribution of winds throughout the lower atmosphere is known as planetary winds.

55. (a) Temperature increases from pole to equator because of increasing trend of insolation. Oceans in southern hemisphere receive less heat due to their less contact with land and thus remain cool. Winds blowing from land to sea decrease the sea surface temperature near coast by removing the warm surface waters and causing upwelling of cold waters. Land and sea breeze normalizes the temperature for e.g. Mumbai.

56. (d) The Middle East is a transcontinental region that mostly has countries of Western Asia, Turkey (both Asian and European), and Egypt (which is mostly in North Africa). Libya is however not included in this group as the only country from Africa is Egypt.

57. (c) The Prime Meridian is the meridian or a longitude which is defined as 0°. The Prime Meridian passes through both the given countries – Algeria and Mali. In the Northern Hemisphere, the Prime Meridian passes through the UK, France and Spain in Europe and Algeria, Mali, Burkina Faso, Tongo and Ghana in Africa.

58. (d) The Sumatran islands are divided almost in half by the equator. The other countries do get passed through by the equator but not nearly in half.

59. (c) Both the Seas are over Russia and fall in the Frigid zone. Frigid zone is each of the two areas of the earth respectively north of the Arctic Circle and south of the Antarctic Circle.

60. (a) Juba is the capital of South Sudan and lies above the equator. Johannesburg is a city in South Africa and is well below the Tropic of Capricorn. Caracas is the capital of Venezuela and is above the Equator. Sucre is the capital of Bolivia and it fits the description perfectly.

61. (d) Mexico like India falls partially in the Torrid zone and partially in the Northern Temperate Zone. Paraguay falls partially in the Torrid zone and partially in the Southern Temperate Zone. Morocco lies fully in the Northern Temperate Zone.

62. (d) The line just opposite to prime meridian on the globe is called International Date Line. The International Date Line is an imaginary line of demarcation on the surface of Earth that runs from the North Pole to the South Pole and demarcates the change of one calendar day to the next.

63. (a) The Coordinated Universal Time (UTC) is the successor of Greenwich Mean Time and is the primary time standard on which the world clocks and time is set.

64. (d) The New Naval Observatory Meridian passes through Washington DC. It passes through the clock room of the new Naval Observatory, 2.3 miles (3.8 km) northwest of the White House, at 77°3'56.7"W (1897) or 77°4'2.24"W (NAD 27) or 77°4'1.16"W (NAD 83).

65. (c) If we neglect the minor flattening of the Earth by 0.3%, then the 60th parallel north or south is half as long as the Equator. The parallel is also called a circle of latitude.

66. (c) There are five major circles of latitude, listed below from north to south. They are as follows :

- Arctic Circle
- Tropic of Cancer
- Equator
- Tropic of Capricorn
- Antarctic Circle

67. (c) There are five major Circles of Latitude - Arctic Circle, Tropic of Cancer, Equator, Tropic of Capricorn and Antarctic Circle. The position of the Equator is fixed (90 degrees from Earth's axis of rotation) but the latitudes of the other circles depend on the tilt of this axis relative to the plane of Earth's orbit, and so are not perfectly fixed.

68. (b) Iceland is on the western side of the Prime Meridian, while these three countries – Norway, Sweden and Finland are on the eastern side.

69. (a) The equator passes through 13 countries: Ecuador, Colombia, Brazil, Sao Tome & Principe, Gabon, Republic of the Congo, Democratic Republic of the Congo, Uganda, Kenya, Somalia, Maldives, Indonesia and Kiribati.

70. (d) Tropic of Cancer passes through 16 countries -Mexico, Bahamas, Niger, Algeria, Mauritania, Egypt, Libya, Mali, Western Sahara, Myanmar, Oman, Bangladesh, India, Saudi Arabia, China, United Arab Emirates, Taiwan.

71. (a) Iceland is a Nordic island nation. It has massive glaciers. It is entirely in the Temperate zone. In geography, temperate latitudes of the Earth lie between the subtropics and the polar circles. Average yearly temperatures in these regions are not extreme, not burning hot nor freezing cold.

72. (d) The Prime Meridian is the starting point to measure longitudes. This Prime Meridian line runs vertically, north and south, right over the British Royal Observatory in Greenwich England, from the North Pole to the South Pole. As the vertical starting point for longitude, the Prime Meridian is numbered 0 degrees longitude.

73. (b) They form the global grid which is used for monitoring locations on earth. Latitude and longitude comprises a grid system of lines encircling the globe and is used to determine the locations of points on the earth. Lines of latitude, also called parallels, run east - west. Latitude lines always run parallel to each other, and hence, they are always an equal distance apart.

74. (c) Both the Prime Meridian and the Equator divides the earth into two equal parts. The Prime Meridian is called the 0 degrees longitude and the Equator is the 0 degrees latitude.

75. (c) The latitudes don't divide the earth into time-zones. Hence the answer is c. It is the longitudes that divide the earth into time-zones.

76. (d) The equator passes through South America, Africa, and parts of Asia in the southern islands. The other 4 continents namely North America, Europe, Australia, and Antarctica are either above or below the equator line.

77. (d) The International Date Line that is in the mid-Pacific Ocean was established in 1884. It roughly follows a 180 degrees longitude north-south line on the Earth. It is located halfway round the world from the Prime Meridian—the zero degrees longitude established in Greenwich, England, in 1852.

78. (b) The International Date Line roughly passes through the 180° longitude, however, it doesn't pass entirely through it. This is because of the presence of territories and island groups. The line averts these places so that the same country would not have two dates.

79. (c) Since New Zealand and Tonga are on the same side of the International Date Line, he won't have to change the date.

80. (a) Samoa is in the western side of the International Date Line. The Samoan Islands, now divided into Samoa and American Samoa, were on the west side of the IDL until 1892. In 2011, Samoa shifted back to the west side of the IDL by removing Friday, 30 December 2011 from its calendar.

81. (a) Earth is divided into twenty-four time zones of approximately equal width. The time in each successive time zone is one hour different from the times in neighboring time zones. To establish time zones, Earth's rotation rate of 360 degrees of longitude per day was divided by 24 hours.

82. (c) Indian Standard Time is calculated by taking the reference of 82.5°E longitude. This longitude passes through Mirzapur (Amaravati Chauraha), Uttar Pradesh, which is nearly on the corresponding longitude reference line.

83. (b) Algeria is the country that is present in the intersection of the Prime Meridian and the Tropic of Cancer. Mali and Niger are to the south of Algeria while Mauritania is to the south-west of Algeria.

84. (d) There is just the South Atlantic Ocean that is present at the intersection of the Prime Meridian and the Equator.

85. (c) The equator doesn't pass through Ethiopia, which is situated in Africa. Equator doesn't pass Brunei as well,

which is in Asia. Equator passes through Indonesia and Sumatra in Asia, however, Sumatra comes first.

86. (a) The Indian Standard Time longitude is the 82.5°E longitude. It passes through Mirzapur, but not Prayagraj.

87. (b) The Antarctic Circle is the southernmost major circle of latitude of the Earth. The region south of this circle is known as the Antarctic, and the zone immediately to the north is called the Southern Temperate Zone. It is situated at 66½° south of the equator.

88. (c) The Indian Standard Meridian or the Indian Standard Time Longitude (82.30°E meridian) passes through UP, MP, Chhatisgarh, Odisha and Andhra Pradesh.

89. (a) It is through the state of Madhya Pradesh that the Tropic of Cancer and the Indian Standard Meridian both pass.

90. (a) We feel the sense of time due to the rotation of the earth. It is the reason for the occurrence of days and nights on earth. Due to the revolution of earth we feel the year passing by. However, the immediate sense of time comes from the rotation of earth.

91. (a) Algeria will come first. The rest of the countries are not on the Prime Meridian.

92. (d) A volcano is active if it's currently erupting or showing signs of unrest. The Smithsonian Global Volcanism Program defines an active volcano as having erupted within the last 10,000 years. A volcano finally goes extinct when there's no lava supply in the magma chamber beneath the volcano. Mount Etna, or Etna, is an active stratovolcano on the east coast of Sicily, Italy, in the Metropolitan City of Catania, between the cities of Messina and Catania. It is an active volcano. Mount Vesuvius is a somma-stratovolcano located on the Gulf of Naples in Campania, Italy, about 9 km east of Naples and a short distance from the shore. It is one of several volcanoes which form the Campanian volcanic arc. It is also an active volcano.

93. (a) Only the Alluvial fan is a depositional landform, rest all are erosional landforms. Alluvial fans are formed when streams flowing from higher levels break into foot slope plains of low gradient. Normally very coarse load is carried by streams flowing over mountain slopes. This load becomes too heavy for the streams to be carried over gentler gradients and gets dumped and spread as a broad low to high cone shaped deposit called alluvial fan.

94. (d) Weathering processes are responsible for breaking down the rocks into smaller fragments and preparing the way for formation of not only regolith and soils, but also erosion and mass movements. Weathering of rocks and deposits helps in the enrichment and concentrations of certain valuable ores of iron, manganese, aluminium, copper etc., which are of great importance for the national economy.

95. (a) Oxidation is the reaction of a substance with oxygen. This is the process that causes rust. When iron in rocks reacts with oxygen, it forms iron oxide, which weakens the rock. These processes either form or destroy minerals, thus altering the nature of the rock's mineral composition.

96. (d) While the top three are made by glaciers, mushroom rocks are landforms that are made by winds. A mushroom rock, also called rock pedestal, or a pedestal rock, is a naturally occurring rock whose shape, as its name implies, resembles a mushroom. The rocks are deformed in a number of different ways: by erosion and weathering, glacial action, or from a sudden disturbance.

97. (d) Repetition of chemical addition of water leading into fatigue & disintegration. In weathering, oxidation means a combination of a mineral with oxygen to form oxides or hydroxides. Oxidation occurs where there is ready access to the atmosphere and oxygenated waters. The minerals most commonly involved in this process are iron, manganese, sulphur etc. In the process of oxidation rock breakdown occurs due to the disturbance caused by addition of oxygen. Red colour of iron upon reduction turns to greenish or bluish grey.

98. (a) In weathering, oxidation means a combination of a mineral with oxygen to form oxides or hydroxides. Oxidation occurs where there is ready access to the atmosphere and oxygenated waters. The minerals most commonly involved in this process are iron, manganese, sulphur etc. In the process of oxidation rock breakdown occurs due to the disturbance caused by addition of oxygen. Red colour of iron upon oxidation turns to brown or yellow. When oxidised minerals are placed in an environment where oxygen is absent, reduction takes place. Such conditions exist usually below the water table, in areas of stagnant water and waterlogged ground. Red colour of iron upon reduction turns to greenish or bluish grey.

99. (b) Waterfalls and rapids may exist in youth stage where local hard rock bodies are exposed but disappear in mature stage. Rapids are stream sections with extremely strong currents, numerous obstacles, and steps in their streambeds. A waterfall is a vertical drop in a streambed. Both are sites of vigorous erosion . Rapids often form where resistant bedrock confines a stream to a narrow channel, and forces an increase in water velocity.

100. (c) In areas where there are alternating beds of rocks (shales, sandstones, quartzites) with limestones or dolomites in between or in areas where limestones are dense, massive and occurring as thick beds, cave formation is prominent. Water percolates down either through the materials or through cracks and joints and moves horizontally along bedding planes. It is along these bedding planes that the limestone dissolves and long and narrow to wide gaps called caves result.

101. (c) The energy emanating from within the earth is the main force behind endogenic geomorphic processes.

This energy is mostly generated by radioactivity, rotational and tidal friction and primordial heat from the origin of the earth. Diastrophism & Volcanism come under endogenic forces. Climate is the main controlling factors for exogenic forces. Weathering, mass movements, erosion and deposition are exogenous processes. Running water, wind, snow and waves are agents in exogenous processes and these agents are also known as Geomorphic agents.

102. (b) Counterparts of this succession are found in Africa, Falkland Island, Madagascar, Antarctica and Australia. Overall resemblance of the Gondwana sediments clearly demonstrates that these landmasses had remarkably similar histories. The glacial tillite provides unambiguous evidence of palaeoclimates and also of drifting of continents.

103. (c) It is manufactured using aluminosilicates instead of the more environmentally damaging calcium oxide. These silicates can be obtained from industrial waste materials such as fly ash, thereby making them a viable green resource.

Compared with traditional cement, green cement functions better, requires less natural materials in production, and releases less carbon dioxide.

It greatly reduces the amount of energy needed for both heating and cooling. It dries quickly and has superior strength.

It is resistant to acid rain and is long-lasting.

104. (a) Streams are few during this stage with poor integration and flow over original slopes showing shallow V-shaped valleys with no floodplains or with very narrow floodplains along trunk streams. Streams divides are broad and flat with marshes, swamp and lakes. Meanders if present develop over these broad upland surfaces. These meanders may eventually entrench themselves into the uplands. Waterfalls and rapids may exist where local hard rock bodies are exposed.

105. (c) Alluvial fans are formed when streams flowing from higher levels break into foot slope plains of low gradient. Normally very coarse load is carried by streams flowing over mountain slopes. This load becomes too heavy for the streams to be carried over gentler gradients and gets dumped and spread as a broad low to high cone shaped deposit called alluvial fan. Usually, the streams which flow over fans are not confined to their original channels for long and shift their position across the fan forming many channels called distributaries. Alluvial fans in humid areas show normally low cones with gentle slope from head to toe and they appear as high cones with steep slope in arid and semi-arid climates.

106. (d) In geology, a placer deposit or placer is an accumulation of valuable minerals formed by gravity separation from a specific source rock during sedimentary processes. The name is from the Spanish word placer, meaning "alluvial sand". Types of placer deposits include alluvium, eluvium, beach placers, and paleoplacers.

107. (b) Running water is the most powerful agent of erosion. Continents are eroded primarily by running water at an average rate of 1 inch every 750 years. The velocity of a stream increases as its gradient increases but velocity is also influenced by factors such as degree of turbulence, position within the river, the course of the stream, the shape of the channel and the stream load.

108. (d) The pre-requisites are: (i) removal of support from below to materials above through natural or artificial means; (ii) increase in gradient and height of slopes; (iii) overloading through addition of materials naturally or by artificial filling; (iv) overloading due to heavy rainfall, saturation and lubrication of slope materials; (v) removal of material or load from over the original slope surfaces; (vi) occurrence of earthquakes, explosions or machinery; (vii) excessive natural seepage; (viii) heavy drawdown of water from lakes, reservoirs and rivers leading to slow outflow of water.

109. (c) A meander is one of a series of regular sinuous curves, bends, loops, turns, or windings in the channel of a river, stream, or other watercourse. It is produced by a stream or river swinging from side to side as it flows across its floodplain or shifts its channel within a valley. A meander is produced by a stream or river as it erodes the sediments comprising an outer, concave bank (cut bank) and deposits this and other sediment downstream on an inner, convex bank which is typically a point bar. The degree of meandering of the channel of a river, stream, or other watercourse is measured by its sinuosity. The sinuosity of a watercourse is the ratio of the length of the channel to the straight line down-valley distance.

110. (b) Jordan is landlocked except at its southern extremity, where nearly 26 km (16 mi) of shoreline along the Gulf of Aqaba provide access to the Red Sea.

111. (a) Deltas are wetlands that form as rivers empty their water and sediment into another body of water. The Nile delta, created as it empties into the Mediterranean Sea, has a classic delta formation. When rivers can't carry much load it starts depositing at the mouth of the river and runs into numerous distributaries which lead to formation of Delta.

112. (b) A point bar is a depositional feature made of alluvium that accumulates on the inside bend of streams and rivers below the slip-off slope. Point bars are found in abundance in mature or meandering streams. They are almost uniform in profile and in width and contain mixed sizes of sediments.

113. (c) An alluvial fan is a fan- or cone-shaped deposit of sediment crossed and built up by streams. If a fan is built up by debris flows it is properly called a debris cone or colluvial fan. These flows come from a single point source at the apex of the fan, and over time move to occupy many positions on the fan surface.