

Sr. No.081.....

ENTRANCE TEST-2024

SCHOOL OF EARTH & ENVIRONMENTAL SCIENCES

APPLIED GEOLOGY

Question Booklet Series

A

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. :

--	--	--	--	--	--

Instructions for Candidates :

1. Write your Entrance Test Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be '**Negative Marking**' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheets provided with the question booklet.
12. OMR Answer Sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

SEAL

- 180
1. The first stage of the Ocean basin formation where due to the splitting of the continents formation of rift valleys occurs is called :
 - (A) Terminal stage
 - (B) Declining stage
 - (C) Suturing stage
 - (D) Embryonic stage
 2. Mohorovicic discontinuity is a discontinuity between :
 - (A) Lithosphere and Asthenosphere
 - (B) Crust and Mantle
 - (C) Mantle and core
 - (D) Outer and inner core
 3. All the connected continents (Pangaea) in Palaeozoic era were surrounded by an Ocean known as :
 - (A) Panthalassa
 - (B) Gondwana
 - (C) Laurasia
 - (D) Tethys Sea
 4. An ultrabasic igneous rock with minerals olivine and pyroxenes as its major constituents is :
 - (A) Basalt
 - (B) Andesite
 - (C) Peridotite
 - (D) Rhyolite
 5. An isolated crescent shaped sand dune produced by the action of wind predominantly from one direction is known as :
 - (A) Seif dunes
 - (B) Hairpin dunes
 - (C) Barchans
 - (D) Star dunes
 6. Soil material (clay, silt, etc.) deposited by the running water of a river is called :
 - (A) Sedimentary rock
 - (B) Moraine
 - (C) Loess
 - (D) Alluvium
 7. The Abyssal plain is an underwater plain on the deep ocean floor found at a depth of :
 - (A) 3000-6000 Meters
 - (B) 1000-2000 Meters
 - (C) 4000-7000 Meters
 - (D) 1500-2500 Meters
 8. The soil which is a mixture of clay, sand, silt consists of additional organic matter and is very fertile is known as :
 - (A) Loamy soil
 - (B) Laterite soil
 - (C) Peat soil
 - (D) Chalk soil
 9. Which of the following minerals shows Rhomboidal cleavage ?
 - (A) Muscovite
 - (B) Calcite
 - (C) Quartz
 - (D) Pyrope
 10. The ratio of the velocity of light in a vacuum to its velocity in a specific medium gives :
 - (A) Pleochroism
 - (B) Refractive Index
 - (C) Birefringence
 - (D) Optic sign

11. Which of the following four metals are found as oxide ores in nature ?
- (A) Copper, Iron, Lithium, Cobalt
 - (B) Zinc, Titanium, Silver, Nickel
 - (C) Silver, Cobalt, Copper, Aluminium
 - (D) Aluminium, Manganese, Iron, Zinc
12. Which of the following two minerals belong to the pyroxene group ?
- (A) Pyrope and Almandine
 - (B) Agate and Jasper
 - (C) Augite and Pigeonite
 - (D) Paragonite and Lepidolite
13. The point of intersection formed by three or more adjacent faces in a crystal is called :
- (A) Interfacial angle
 - (B) Extinction angle
 - (C) Solid angle
 - (D) $2V$ angle
14. The phenomenon of some minerals existing in two crystal systems while still having the same chemical formula is known as :
- (A) Polymorphism
 - (B) Dimorphism
 - (C) Pseudomorphism
 - (D) Isomorphism
15. An arrangement of atoms or molecules in three dimensions and in repetitive pattern forms :
- (A) A space lattice
 - (B) Interfacial angle
 - (C) Twinning
 - (D) Screw axis
16. In some crystals two or more crystals of the same mineral grow together in a series of repeated very thin layers that are parallel or at a slight angle forming twins. Such type of twins are known as :
- (A) Polysynthetic twins
 - (B) Cross twins
 - (C) Carlsbad twins
 - (D) Merohedral twins
17. The characteristic texture of plutonic (intrusive) rocks crystallised from slowly cooling intrusions at greater depths and built up by mutually inter-grown crystals visible by the naked eye is known as :
- (A) Porphyritic Texture
 - (B) Phaneritic Texture
 - (C) Aphanitic Texture
 - (D) Pyroclastic Texture
18. Diorite is a medium-grained intrusive igneous rock. Its fine-grained equivalent is
- (A) basalt
 - (B) andesite
 - (C) pumice
 - (D) rhyolite
19. The process whereby a pre-existing igneous, sedimentary, or metamorphic rock undergoes compositional and mineralogical transformations associated with chemical reactions triggered by the reaction of fluids that invade the protolith is known as :
- (A) Anatexis
 - (B) Partial Melting
 - (C) Migmatization
 - (D) Metasomatism

20. High-pressure metamorphism resulting from the crushing and shearing of rock during tectonic movement, mostly along faults is referred to as :
- Contact metamorphism
 - Cataclastic metamorphism
 - Shock metamorphism
 - Regional metamorphism
21. As per Wentworth Scale the average range of size (diameter) of a cobble is :
- 64-256 mm
 - 256-320 mm
 - 32-64 mm
 - 16-32 mm
22. Clastic sedimentary rocks containing silt or clay-sized particles that are less than 0.0625 mm in size with clay minerals are called :
- Rudaceous rocks
 - Arenaceous rocks
 - Argillaceous rocks
 - Calcareous rocks
23. Sedimentary structures that usually occur at the interface of two differing lithologies and grain size and indicate small scale (in Centimeters) groove or irregularities are known as :
- Ripple Marks
 - Horizontal bedding
 - Sole marks
 - Cross bedding
24. The measuring unit of dynamic viscosity is :
- Darcy
 - Centimeters
 - Millimeters
 - Centipoises
25. A variety of coal with 86 -94 percent dry carbon content is :
- Anthracite
 - Bituminous
 - Sub-bituminous
 - Lignite
26. Which is the State in India that produces the largest quantity of Bauxite ?
- Jharkhand
 - Madhya Pradesh
 - Orissa
 - West Bengal
27. A mineral/ore deposit where grains of valuable minerals like gold or rare earths are mixed with sand deposited by a river or glacier is :
- Hydrothermal deposits
 - Placer deposits
 - Magmatic deposits
 - Epithermal deposits
28. Which of the following is not an ore mineral of copper ?
- Cuprite
 - Chalcopyrite
 - Bornite
 - Pyrite
29. The degree of freedom at a Eutectic point of a binary system is :
- One
 - Ten
 - Twenty
 - Zero

30. As per Gold Schmidt's geochemical classification of elements, metals and heavier non-metals that have a low affinity for oxygen and prefer to bond with sulphur to form sulphide type minerals or highly insoluble sulphides are called :
- Lithophile
 - Siderophile
 - Chalcophile
 - Atmophile
31. The ratio of the radius of the cation to the radius of anion gives us the :
- Radius ratio
 - Coordination number
 - Phase rule
 - Partition Coefficient
32. Dendrochronology is :
- A technique of radiometric dating
 - Determination of age based on natural splitting (fission) of Uranium-238
 - Technique of dating Varves the Paired layers of outwash gravel and sediments deposited in glacial lakes by retreating ice sheets
 - Technique of dating events, artifacts, etc. by using the number and characteristic patterns of annual growth rings of trees
33. In paleomagnetism "Superchron" is a :
- Polarity interval of the earth lasting at least 10 million years
 - Periods in which the predominant direction of the earth's magnetic field was the same as the present
 - Polarity interval of the earth lasting at least one million years
 - Periods in which the predominant direction of the earth's magnetic field was the opposite as the present
34. The Mercalli scale is used to measure :
- Gravitational pull
 - Intensity of an earthquake
 - Depth of the Ocean
 - Geological structures
35. Secondary seismic waves cannot travel through :
- Gases
 - Solids
 - Vacuum
 - Liquids
36. A geophysical exploration method in which the bulk electric property of all materials that shows how strongly it opposes the flow of electric current is used is known as :
- Seismic method
 - Magnetic method
 - Gravity method
 - Resistivity method
37. As per WHO standards the permissible limit of fluoride in drinking water is :
- 1- 1.5 mg/L
 - 0.5- 0.8 mg/L
 - 1.5- 2 mg/L
 - 2- 3 mg/L
38. A relatively small body of water occurring above the regional water table with an impermeable base under which lies an unsaturated zone is called :
- Unconfined aquifer
 - Confined aquifer
 - Perched aquifer
 - Karst aquifer

39. Measuring unit of permeability is :
- Millilitres
 - Cubic meters
 - Milidarcy
 - Litre
40. Geological formation which is neither porous nor permeable and cannot store water in it and at the same time it cannot permit water through it, is a :
- Confined aquifer
 - Aquifuge
 - Aquiclude
 - Aquitard
41. Contour line in a geological map is a line :
- That joins points of equal pressure in a map
 - That joins points of equal temperature in a map
 - That joins points of equal precipitation in a map
 - That joins points of equal elevation in a map
42. What type of fault is associated with the creation of Horst and Graben ?
- Reverse fault
 - Thrust fault
 - Normal fault
 - Strike Slip fault
43. The sense of movement across a boundary, such as a fault in which the left side opposite the observer moves is known as :
- Opposite
 - Sinistral
 - Parallel
 - Dextral
44. What is hade in a fault ?
- It is the inclination of the fault plane with vertical
 - It is the inclination of the fault plane with horizontal
 - It is the inclination of fault with any strata
 - It is the bearing of the fault with the ground
45. Shallow-focus earthquakes occur at :
- Convergent plate boundary
 - Divergent plate boundary
 - Transform plate boundary
 - None of these
46. The Indian subcontinent broke away from the southern part of Pangea at around :
- 70 Ma
 - 90 Ma
 - 110 Ma
 - 130 Ma
47. Drucker-Prager Failure theory is dependent upon :
- Pressure
 - Temperature
 - Rock strength
 - None of the Above
48. Hotspots are thought to be the surface expressions of:
- Listric faults
 - Mantle plumes
 - Magma chambers
 - Igneous dykes
49. The roots of *Glossopteris* and *Gangamopteris* plants are called :
- Thinnfeldia*
 - Sigillaria*
 - Vertibraria*
 - Nilssonia*
50. Trilobite genera that existed in the Cambrian included :
- Abadiella*, *Judomia*, *Paradoxides*, and *Olenus*
 - Cyclopyge*, *Cheirurus*, *Parabolina*, and *Trinucleus*
 - Dalmanites*, *Encrinurus*, *Calymene*, and *Paralejurus*
 - Archegonus*, *Hesslerides*, *Endops*, and *Tripoetus*

51. The forest-dwelling dog sized-horse from which the modern horse evolved belonged to the genus :
- (A) Equis
(B) Loxodonta
(C) Eohippus
(D) Australopithecus
52. Dinosaurs went extinct :
- (A) At the end of the Carboniferous
(B) At the end of the Permian
(C) At the end of the Ordovician
(D) At the end of the Cretaceous
53. Rannibennur, Chitradurga, and Bababudan are the stratigraphic units of :
- (A) Cuddapah supergroup
(B) Dharwar supergroup
(C) Vindhyan supergroup
(D) Gondwana supergroup
54. The Karewa Lake in Kashmir existed during :
- (A) Carboniferous
(B) Jurassic
(C) Cretaceous
(D) Pleistocene
55. In Stratigraphy, a part of the formation which has some remarkable lithology or some characteristic fossil assemblage is demarcated as :
- (A) Complex
(B) Group
(C) Member
(D) Bed
56. Pinjor and Tatrot formations belong to :
- (A) Upper Siwaliks
(B) Jutogh Group
(C) Middle Siwaliks
(D) Salkhala Group
57. The speed of electromagnetic waves in a vacuum is :
- (A) 2.25×10^8 m/s
(B) 3×10^8 m/s
(C) 2.45×10^8 m/s
(D) 2×10^8 m/s
58. Albedo of fresh snow ranges between :
- (A) 75-90 %
(B) 05-10%
(C) 10-15%
(D) 40-45%
59. Which law states that a good absorbent of heat is also a good radiator ?
- (A) Stefan's Law
(B) Kirchoff's Law
(C) Plank's Law
(D) Wien's Law
60. Which colour has the highest wavelength in Electromagnetic Spectrum ?
- (A) Violet
(B) Red
(C) Orange
(D) Indigo

Sr. No.

ENTRANCE TEST-2023

SCHOOL OF ENVIRONMENTAL AND EARTH SCIENCES APPLIED GEOLOGY

Total Questions : 60
Time Allowed : 70 Minutes

Question Booklet Series

A

Roll No. :

--	--	--	--	--	--

Instructions for Candidates :

1. Write your Entrance Test Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be '**Negative Marking**' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheets provided with the question booklet.
12. OMR Answer Sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

1. The second most abundant element in the solar system is:
 - (A) Hydrogen
 - (B) Helium
 - (C) Iron
 - (D) Oxygen
2. Which of the following is not a metamorphic rock?
 - (A) Anthracite
 - (B) Schist
 - (C) Eclogite
 - (D) Puddingstone
3. The Love waves generated during an earthquake are:
 - (A) Compressional waves
 - (B) Shear waves
 - (C) Longitudinal waves
 - (D) Transverse waves
4. The oldest eon in the Geological time scale is named:
 - (A) Archaean
 - (B) Proterozoic
 - (C) Hadean
 - (D) Phanerozoic
5. The correct sequence of thrust faults encountered as we move from South to North in the Himalayas is:
 - (A) MFT-MBT-MCT
 - (B) MBT-MFT-MCT
 - (C) MCT-MBT-MFT
 - (D) MFT-MCT-MBT
6. Which of the following matches with respect to Goldschmidt's classification of chemical elements is incorrect?
 - (A) Atmophile-Oxygen
 - (B) Lithophile-Lithium
 - (C) Chalcophile-Cadmium
 - (D) Siderophile-REE
7. The terrestrial planet in the solar system that displays retrograde rotation is:
 - (A) Mercury
 - (B) Venus
 - (C) Mars
 - (D) Uranus
8. The conversion of anhydrite to gypsum is an example of _____.
 - (A) Oxidation
 - (B) Hydration
 - (C) Carbonation
 - (D) Hydrolysis
9. Which of the following is the non-radioactive isotope of lead (Pb)?
 - (A) Pb²⁰⁴
 - (B) Pb²⁰⁸
 - (C) Pb²¹⁰
 - (D) Pb²⁰⁷
10. Badland topography generally occurs in:
 - (A) Calcareous rocks in humid region
 - (B) Shale in arid region
 - (C) Clay in sub-humid region
 - (D) Calcareous rock in arid region
11. Which one of the following would indicate the presence of a former glacial lake?
 - (A) Loess
 - (B) Varved clay
 - (C) Till
 - (D) Outwash sands
12. Which of the following is not an erosional feature of karst topography?
 - (A) Blind valleys
 - (B) Lapies
 - (C) Poljes
 - (D) Dripstones

13. Match the geomorphic features with their environments of formation :
- | <u>Feature</u> | <u>Environment</u> |
|----------------|--------------------|
| P. Tombolo | 1. Aeolian |
| Q. Moulin | 2. Fluvial |
| R. Zeugen | 3. Glacial |
| S. Billabong | 4. Coastal |
- (A) P-4, Q-3, R-2, S-1
(B) P-3, Q-4, R-2, S-1
(C) P-4, Q-3, R-1, S-2
(D) P-3, Q-4, R-1, S-2
14. Diamond exhibits _____ cleavage while pyroxenes show _____ cleavage.
- (A) Cubic, prismatic
(B) Octahedral, cubic
(C) Octahedral, prismatic
(D) Cubic, pyramidal
15. In the interference figure of an uniaxial mineral, the melatope indicates:
- (A) Position of optic axis
(B) Position of optic normal
(C) Vibration direction of ordinary ray
(D) The direction along which mineral is elongated
16. The phenomenon of double refraction is shown by:
- (A) Isotropic minerals
(B) Uniaxial and biaxial minerals
(C) Uniaxial minerals
(D) Biaxial minerals
17. Most of the rock forming silicates are studied under _____ light microscopy while most of the ore forming minerals are studied under _____ light microscopy.
- (A) Transmitted, reflected
(B) Reflected, transmitted
(C) Transmitted, transmitted
(D) Reflected, reflected
18. Identify the tectosilicate mineral from the Mohs' scale of hardness, which produces clay mineral due to chemical weathering.
- (A) Orthoclase
(B) Quartz
(C) Talc
(D) Topaz
19. Match the following minerals with their appropriate physical properties seen in hand specimen.
- | | |
|--------------|------------------------------|
| P. Pyroxene | 1. Pearly lustre |
| Q. Calcite | 2. Rhombohedral cleavage |
| R. Garnet | 3. Prismatic habit |
| S. Muscovite | 4. Perfect dodecahedral form |
- (A) P-1, Q-2, R-4, S-3
(B) P-3, Q-2, R-4, S-1
(C) P-3, Q-4, R-2, S-1
(D) P-1, Q-4, R-3, S-2
20. Which of the following statements about the rock forming silicate minerals is correct?
- (A) Sorosilicates have an Si:O ratio of 2:7.
(B) Phyllosilicates are minerals having isolated silica tetrahedra linked by divalent cations
(C) All amphiboles crystallise in monoclinic system
(D) Zeolite minerals like laumontite, analcite, wairakite, heulandite etc. are essentially ionosilicates.
21. Which of the following optical properties of a mineral is seen exclusively under cross nicols?
- (A) Body color
(B) Pleochroism
(C) Interference color
(D) Cleavage plane

22. Muscovite crystallizes in the _____ system.
- (A) Tetragonal
(B) Hexagonal
(C) Isometric
(D) Monoclinic
23. Which of the following is not a silicate mineral?
- (A) Augite
(B) Apatite
(C) Andalusite
(D) Anorthite
24. Which of the following processes does not help in 'magmatic differentiation'?
- (A) Assimilation with the surrounding country rocks
(B) Fractional crystallization
(C) Mingling with other magmas
(D) Equilibrium crystallization
25. The system of classification of igneous rocks in which the constituent minerals of an igneous rock are considered both chemically and qualitatively:
- (A) Dunham classification
(B) Shands classification
(C) CIPW classification
(D) IUGS classification
26. Match the following:
- | <u>Texture</u> | <u>Rocks</u> |
|---------------------|--------------|
| A. Rapakivi texture | 1. Dolerites |
| B. Ophitic texture | 2. Komatites |
| C. Spinifex texture | 3. Granites |
- (A) A-1, B-2, C-3
(B) A-3, B-2, C-1
(C) A-3, B-1, C-2
(D) A-1, B-3, C-2
27. The most abundant volatile that is present within magmatic liquids is:
- (A) Water vapor
(B) Carbon dioxide
(C) Nitrogen
(D) Sulphur dioxide
28. Which of the following volcanic eruptions is the most dangerous?
- (A) Hawaiian
(B) Vesuvian
(C) Strombolian
(D) Pelean
29. Select the rock that is not a metamorphic one.
- (A) Biotite gneiss
(B) Staurolite schist
(C) Chert
(D) Quartzite
30. Select the correct order of metamorphic rocks with increasing grade of metamorphism.
- (A) Slate, schist, phyllites, gneiss, migmatite
(B) Slate, phyllites, gneiss, schist, migmatite
(C) Slate, schist, gneiss, phyllites, migmatite
(D) Slate, phyllites, schist, gneiss, migmatite
31. Which one of the following sedimentary structures is formed by liquefaction?
- (A) Graded bedding
(B) Longitudinal scour
(C) Convolute lamination
(D) Flute cast
32. Which of the following sedimentary rocks is most prone to chemical weathering?
- (A) Sandstone
(B) Shale
(C) Limestone
(D) Conglomerate

33. Choose the sandstone that is mineralogical and textural immature.
- (A) Quartz arenite
(B) Quartz wacke
(C) Arkose
(D) Feldspathic wacke
34. Most of the coal deposits of India belong to _____ Era.
- (A) Paleozoic
(B) Mesozoic
(C) Cenozoic
(D) Mesozoic-Cenozoic boundary
35. The supergene enrichment process that commonly enhances the grade of primary copper deposits is essentially a _____ process.
- (A) Contact metasomatic
(B) Metamorphic
(C) Weathering
(D) Hydrothermal
36. 'Cockade ore' is formed when:
- (A) Ore is arranged in successive layers
(B) Small crystals develop haphazardly within cavities
(C) Fissure fillings are composed of alternate bands of quartz and altered country rocks
(D) Breccia fragments are surrounded by crusts
37. Arrange the elements Fe, O, H, He, Si in decreasing order of their abundance in the solar system.
- (A) H>He>O>Si>Fe
(B) He>H>Si>O>Fe
(C) H>He>O>Fe>Si
(D) Si>Fe>H>He>O
38. The number of alpha (α) particles emitted to produce a daughter isotope of ^{206}Pb from a parent isotope of ^{238}U by radioactive decay is:
- (A) 2
(B) 4
(C) 6
(D) 8
39. Airy's model of isostasy :
- (A) Requires mountains to have higher density than the oceanic crust
(B) Requires mountains to have lower density than the oceanic crust
(C) Requires mountains to have the same density as oceanic crust
(D) Does not consider the densities of mountain and oceanic crust
40. Parallel magnetic reversal patterns observed on the ocean floor near mid-oceanic ridges suggest the:
- (A) Formation of new crust in the geologic past
(B) Presence of mineral deposits in the oceanic crust
(C) Origin of Earth's magnetic field in the inner core
(D) Non-uniform movement of tectonic plates in the geologic past
41. Earth's main magnetic field is generated due to:
- (A) Magnetic material present in the crust
(B) Inter planetary interactions
(C) Electric current present in the outer core
(D) Polar wandering
42. The sum of specific yield and specific retention in an aquifer is called:
- (A) Transmissivity
(B) Storativity
(C) Porosity
(D) Hydraulic conductivity

43. A confined aquifer of cross sectional area (A) has a hydraulic gradient of $5 * 10^{-3}$ and its coefficient of permeability is 2 m/day. 250 m³ of water is collected from the aquifer over a period of 24 hours. What is the value of 'A' in m² ?
- (A) 2500
 (B) 25000
 (C) 250
 (D) 25
44. According to fold classification by interlimb angle, ones with interlimb angle of 100 degrees would be classified as:
- (A) Gentle
 (B) Open
 (C) Isoclinal
 (D) Tight
45. Tabular cross-bedding is formed due to the migration of _____ .
- (A) 2D dunes only
 (B) 2D ripples and dunes
 (C) 3D ripples only
 (D) 3D ripples and dunes
46. A shallow focus earthquake strikes near a seismological observatory. A seismologist first observes _____ on the seismograph.
- (A) P - waves
 (B) S - waves
 (C) Rayleigh waves
 (D) Love waves
47. In an outcrop of an intensely folded and metamorphosed terrain, a geologist measures the dip of the bedding to be 70 degrees whereas the dip of the axial planar foliation is about 35 degrees. What should be the most plausible interpretation?
- (A) It is the normal limb of an overturned fold
 (B) It is the overturned limb of an overturned fold
 (C) It is a recumbent fold
 (D) It is an upright non-plunging fold
48. In which of the following tectonic settings are the highest mountain chains and thickest crust found?
- (A) Island arc
 (B) Continental arc
 (C) Continental collision
 (D) Transcurrent
49. Which of the following is associated with a divergent plate boundary?
- (A) Ridge
 (B) Trench
 (C) Island arc
 (D) Accretionary prism
50. Find the odd one out.
- (A) *Murex*
 (B) *Nerita*
 (C) *Turbo*
 (D) *Venus*
51. Aristotle's lantern present in some echinoids is an apparatus for _____ .
- (A) Reproduction
 (B) Respiration
 (C) Chewing
 (D) Aiding the water circulatory system

52. The Paleozoic Po Formation is exposed in the _____.
- (A) Spiti Basin
(B) Kashmir-Liddar Valley
(C) Kumaon-Garhwal
(D) Nepal
53. The shortest period of the Paleozoic is:
- (A) Ordovician
(B) Silurian
(C) Cambrian
(D) Permian
54. Choose the Archaean stratigraphic unit from the following:
- (A) Cuddapah Supergroup
(B) Erinpura Granite
(C) Haimanta Group
(D) Bababudan Group
55. Choose the youngest stratigraphic unit from those given :
- (A) Lameta Beds
(B) Garbyang Fm.
(C) Barakar Fm.
(D) Bhuj Fm.
56. The mass movement process in which cohesive blocks of earth move on a failure plane with concave-up geometry, is known as:
- (A) Debris flow
(B) Creep
(C) Rotational slide
(D) Translational slide
57. Rapid mass movement of water saturated regolith is called:
- (A) Landslide
(B) Creep
(C) Solifluction
(D) Earth flow
58. The valency of iron in hematite is_____.
- (A) 2
(B) 3
(C) 4
(D) 5
59. Which of the following oil field is NOT located in the western part of India?
- (A) Bombay High
(B) Ankleshwar
(C) Gandhar
(D) Moran
60. Match the tectonic units listed in Group I with their geographical locations in Group II.
- | <u>Group I</u> | <u>Group II</u> |
|--|---------------------|
| P. Continent-oceanic lithosphere convergence | 1. Himalayas |
| Q. Continent-continent collision | 2. Andes |
| R. Continental rift system | 3. Japanese islands |
| S. Oceanic-oceanic lithosphere convergence | 4. East Africa |
- (A) P-2, Q-1, R-4, S-3
(B) P-2, Q-3, R-4, S-1
(C) P-3, Q-4, R-1, S-2
(D) P-4, Q-1, R-2, S-3

ROUGH WORK

ENTRANCE TEST-2022**SCHOOL OF ENVIRONMENTAL AND EARTH SCIENCES****APPLIED GEOLOGY**

Total Questions : 60

Question Booklet Series **D**

Time Allowed : 70 Minutes

Roll No. :

--	--	--	--	--	--

Instructions for Candidates :

1. Write your Entrance Test Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be '**Negative Marking**' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheets provided with the question booklet.
12. OMR Answer Sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.



1. The function of sutures in ammonites is to :
 - (A) Increase the shell strength
 - (B) Increase the surface area for the secretion of gas or liquid
 - (C) Regulate the specific gravity of the animal
 - (D) All of these
2. Which of the following flora belongs to the Lower Gondwana ?
 - (A) Gangamopteris
 - (B) Cladophlebis
 - (C) Sphenopteris
 - (D) Ptilophyllum
3. Select the correct stratigraphic sequence of the Vindhyan Supergroup :
 - (A) Rewa – Bhandar – Kaimur – Semri
 - (B) Semri – Rewa – Kaimur – Bhandar
 - (C) Semri – Bhandar – Rewa – Kaimur
 - (D) Semri – Kaimur – Rewa – Bhandar
4. Ophiolitic mélangé is characteristic of :
 - (A) Lesser Himalaya
 - (B) Higher Himalaya
 - (C) Outer Himalaya
 - (D) Indus Suture Zone
5. The Guryul Ravine in Kashmir is famous for which of the following boundary ?
 - (A) Cretaceous – Tertiary
 - (B) Precambrian – Cambrian
 - (C) Neogene – Quaternary
 - (D) Permian – Triassic
6. Main boundary fault lies between :
 - (A) Outer Himalaya and Lesser Himalaya
 - (B) Lesser Himalaya and Higher Himalaya
 - (C) Higher Himalaya and Trans Himalaya
 - (D) None of these
7. Microwave spectrum having longer wavelength can penetrate :
 - (A) Cloud
 - (B) Fog
 - (C) Rain
 - (D) All of these
8. Geostationary satellites orbit at an altitude of :
 - (A) 36000 kms
 - (B) 26000 kms
 - (C) 30000 kms
 - (D) 45000 kms
9. The terminal support of a bridge on either side of the river valley is called as :
 - (A) Piers
 - (B) Abutment
 - (C) Rock bolt
 - (D) None of these
10. Nebulae from which the first generation of stars formed, consisted entirely of small atoms which were generated by :
 - (A) Supernova explosions
 - (B) Big-bang nucleosynthesis
 - (C) Stellar nucleosynthesis
 - (D) Both (B) and (C)
11. If a, b and c are the average P-wave velocities in the lower mantle, outer core and inner core respectively, then :
 - (A) $a > b > c$
 - (B) $a > c > b$
 - (C) $c > a > b$
 - (D) $c > b > a$

12. What shall be the colour of vegetation in a False Colour Composite (FCC) ?
- (A) Green
(B) Blue
(C) Yellow
(D) Red
13. Which type of dam usually has triangular profile and can resist the forces by its own weight ?
- (A) Geotechnical dam
(B) Arch dam
(C) Gravity dam
(D) Embankment dam
14. Which of the following region does not fall in seismic zone IV/V ?
- (A) Assam
(B) Jammu and Kashmir
(C) Central India
(D) Kutchchh (Gujarat)
15. Which of the following is not a tectonic force responsible for folding or faulting rocks ?
- (A) Compressive force
(B) Tensional force
(C) Shear force
(D) None of these
16. Which of the following is responsible for landslides ?
- (A) Rainfall
(B) Topography
(C) Lithology
(D) All of these
17. The important Ozone-Depleting Chemical(s) (ODCs) is/are :
- (A) Chlorofluorocarbons
(B) Halon
(C) Methyl chloroform
(D) All of these
18. Which of the following rocks are not present in the Himalayan foreland basin ?
- (A) Souni Volcanics
(B) Murree
(C) Siwalik
(D) Subathu
19. The Cretaceous-Tertiary (K/T) boundary is delineated at :
- (A) 50 Ma
(B) 66 Ma
(C) 70 Ma
(D) 75 Ma
20. Which of the following measures is part of proactive strategy regarding disaster management ?
- (A) Prevention
(B) Mitigation
(C) Preparedness
(D) All of these
21. The dripstones that rise from the floor of a carbonate cave are called :
- (A) Stalactites
(B) Stylolites
(C) Stalagmites
(D) Geodes

22. Coral reefs are generally found in the latitudinal extensions of :
- 20°N - 20°S
 - 30°N - 30°S
 - 45°N - 45°S
 - 60°N - 60°S
23. Solifluction is related to :
- Creep
 - Mudflow
 - Rock fall
 - Rock slide
24. Pot holes are commonly found on the :
- Sea floor
 - Mountains
 - Cave floor
 - Channel floor
25. How many sets of cleavage are present in quartz ?
- One set
 - Two set
 - Three set
 - No cleavage
26. Which among the following are single chain silicates ?
- Inosilicates
 - Sorosilicates
 - Cyclosilicates
 - Nesosilicates
27. In VIBGYOR, from left to right the :
- Wavelength increases
 - Wavelength decreases
 - Frequency increases
 - None of these
28. The interference colour of a mineral depends on :
- Phase difference
 - Thickness of the slide
 - Birefringence
 - All of these
29. Which of the following is a non-pleochroic mineral ?
- Biotite
 - Quartz
 - Hornblende
 - Hypersthene
30. Quartz crystallizes in which of the following crystal system ?
- Cubic system
 - Monoclinic system
 - Triclinic system
 - Hexagonal system
31. Which of the following crystal system has three mutually perpendicular axes of different lengths ?
- Cubic
 - Tetragonal
 - Orthorhombic
 - Hexagonal
32. Which of the following twinning is characteristic of plagioclase ?
- Cyclical
 - Polysynthetic
 - Penetration
 - None
33. Muscovite is a _____ mineral.
- Uniaxial positive
 - Uniaxial negative
 - Biaxial positive
 - Biaxial negative

34. Crystals of igneous rocks that are too small to be seen with naked eyes are known as :
- Phaneritic
 - Aphanitic
 - Porphyritic
 - Pyroclastic
35. The ultrabasic rock constituted solely of olivine is called :
- Dunite
 - Kimberlite
 - Periodotite
 - Harzburgite
36. The plutonic equivalent of basalt rock is :
- Andesite
 - Gabbro
 - Granite
 - Rhyolite
37. Which of the following factor doesn't affect metamorphism ?
- Diagenesis
 - Temperature
 - Pressure
 - Chemically active fluids
38. An equigranular texture in which most of the grains are euhedral is called :
- Allotriomorphic
 - Hypidiomorphic
 - Panidiomorphic
 - Perthitic
39. In clastic sediments, the correct order of decreasing grain size is :
- Boulder > pebble > silt > sand
 - Granule > pebble > clay > silt
 - Cobble > granule > silt > clay
 - Granule > pebble > sand > silt
40. A sedimentary rock composed of angular gravels is called :
- Shale
 - Breccia
 - Sandstone
 - Conglomerate
41. A rudaceous sedimentary rock consisting of clasts of several different rock types is called :
- Oligomictic
 - Petromictic
 - Polymictic
 - None
42. Which of the following process is not involved in the formation of clastic sedimentary rocks ?
- Weathering
 - Transportation
 - Deposition
 - Precipitation
43. Bauxite is the primary source of which of the following minerals ?
- Aluminium
 - Oxygen
 - Titanium
 - Carbon
44. Metal content of an ore is denoted by :
- Tenor
 - Gangue
 - Ore content
 - None of these

45. The solid, insoluble organic matter which yields petroleum type hydrocarbons on heating and distillation is called :
- (A) Crude oil
(B) High density natural gas
(C) Kerogen
(D) None of these
46. Match the fuels in Group I with corresponding areas of occurrence in Group II :
- | Group I | Group II |
|--------------------|------------------------------|
| P. Uranium | 1. Vastan, Gujarat |
| Q. Lignite | 2. Singrauli, Madhya Pradesh |
| R. Bituminous coal | 3. Digboi, Assam |
| S. Petroleum | 4. Jadugoda, Jharkhand |
- (A) P-4, Q-1, R-3, S-2
(B) P-4, Q-1, R-2, S-3
(C) P-3, Q-4, R-2, S-1
(D) P-2, Q-4, R-1, S-3
47. Elements having strong affinity towards sulphides are known as :
- (A) Siderophiles
(B) Chalcophiles
(C) Lithophiles
(D) Atmosphiles
48. Each carbon atom in diamond is joined to four other carbon atoms by :
- (A) Metallic bonds
(B) Ionic bonds
(C) van der Waals bond
(D) Covalent bonds
49. Which of the following rock contributes the highest amount of radioactive heat in the Earth's crust ?
- (A) Granite
(B) Basalt
(C) Dunite
(D) Gabbro
50. The most important tool of a geologist is :
- (A) Field diary
(B) Clinometer
(C) Hammer
(D) Chisel
51. Which of the following sub-disciplines of geology deals in the physical characteristics of the whole Earth and the forces operating in the Earth ?
- (A) Geomorphology
(B) Tectonics
(C) Structural Geology
(D) Geophysics
52. The water in the zone of aeration is called :
- (A) Hygroscopic water
(B) Connate water
(C) Vadose water
(D) None of these
53. As per Darcy's law the rate of flow of water through a porous media is :
- (A) Directly proportional to head loss
(B) Inversely proportional to length of flow path
(C) Applicable only under laminar conditions
(D) All of these
54. Which of the following is a low angle reverse fault ?
- (A) Normal fault
(B) Strike-slip fault
(C) Thrust fault
(D) All of these

- 55. Which of the following components reflect non-rigid deformation ?
 - (A) Translation
 - (B) Rotation
 - (C) Strain
 - (D) All of these
- 56. Which of the following fold has inclined fold axis ?
 - (A) Plunging fold
 - (B) Non-plunging
 - (C) Homocline
 - (D) None of these
- 57. Which among the following separates a younger sedimentary rock unit from an intrusive igneous rock or metamorphic rock ?
 - (A) Non-conformity
 - (B) Disconformity
 - (C) Angular unconformity
 - (D) None

- 58. Trace fossils are also known as :
 - (A) Body fossils
 - (B) Chemical fossils
 - (C) Pseudofossils
 - (D) Ichnofossils
- 59. Which among the following has short geological range, wide geographical distribution and rapid evolutionary rate ?
 - (A) Trace fossil
 - (B) Index fossil
 - (C) Living fossil
 - (D) Chemical fossil
- 60. Which among the following is a late Eocene-Oligocene horse ?
 - (A) *Eohippus*
 - (B) *Mesohippus*
 - (C) *Orohippus*
 - (D) *Pliohippus*



4

Sr. No.053

ENTRANCE TEST-2020

SCHOOL OF ENVIRONMENTAL AND EARTH SCIENCES

APPLIED GEOLOGY

Question Booklet Series **A**

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. :

--	--	--	--	--	--

Instructions for Candidates :

1. Write your Entrance Test Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be '**Negative Marking**' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheets provided with the question booklet.
12. OMR Answer Sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

SEAL

1. The planets in the order of increasing distance from Sun are :
- (A) Mercury, Earth, Mars, Venus
 (B) Mercury, Venus, Mars, Earth
 (C) Mercury, Venus, Earth, Mars
 (D) Mercury, Mars, Earth, Venus
2. The composition of Earth is generally compared with :
- (A) Tektites
 (B) Chondrites
 (C) Siderites
 (D) Achondrites
3. The average mineral composition of upper mantle is similar to :
- (A) Granite
 (B) Peridotite
 (C) Granite-gneiss
 (D) Hornfels
4. Which country is located at the mid oceanic ridge ?
- (A) Iceland
 (B) Greenland
 (C) Switzerland
 (D) Scotland
5. The combined effect of weathering and erosion is :
- (A) Exfoliation
 (B) Denudation
 (C) Hydration
 (D) All the above
6. Coral reefs develop only between the latitudes of :
- (A) $27^{\circ} 35''\text{N}$ and $27^{\circ} 45''\text{S}$
 (B) 27°N and 27°S
 (C) $27^{\circ} 21''\text{N}$ and $27^{\circ} 29''\text{S}$
 (D) $27^{\circ} 11''\text{N}$ and $27^{\circ} 45''\text{S}$
7. The thinly laminated deposits formed in glacial lakes are known as :
- (A) Kames
 (B) Sink holes
 (C) Varves
 (D) Eskers
8. Due to continuous erosion at the base of the coastal land a structure is developed called :
- (A) Wave cut beach
 (B) Wave cut cliff
 (C) Sea caves
 (D) Sea Arch
9. The minerals, which exhibit constant and characteristic colouration, are called :
- (A) Allochromatic
 (B) Pseudochromatic
 (C) Idiochromatic
 (D) None of the above
10. Tourmaline is an example of :
- (A) Phyllosilicates
 (B) Nesosilicates
 (C) Cyclosilicates
 (D) Tectosilicates

SEAL

11. The chemical formula of enstatite is :
 (A) MgSiO_3
 (B) FeSiO_2
 (C) MnSiO_3
 (D) CaSiO_4
12. The plagioclase feldspar alters to a clay mineral called :
 (A) Kaolinite
 (B) Sericite
 (C) Montmorillonite
 (D) Gibbsite
13. The Zircon mineral crystallize in :
 (A) Orthorhombic
 (B) Isometric
 (C) Tetragonal
 (D) None of the above
14. A face parallel to the vertical crystallographic axis is :
 (A) Basal face
 (B) Prism face
 (C) Pyramidal face
 (D) Pedion face
15. Galena is characterized by :
 (A) 2 axes of four-fold symmetry
 (B) 2 axes of three-fold symmetry
 (C) 3 axes of four-fold symmetry
 (D) All the above
16. Staurolite mineral is characterized by :
 (A) Carlsbad twinning
 (B) Contact twinning
 (C) Penetration twinning
 (D) Manebach twinning
17. The plutonic equivalent of Andesite is :
 (A) Granite
 (B) Granodiorite
 (C) Diorite
 (D) None of these
18. A light spongy rock of acidic composition that floats on water :
 (A) Pumice
 (B) Obsidian
 (C) Pitchstone
 (D) None of the above
19. Hornfels texture is formed due to :
 (A) Dynamic Metamorphism
 (B) Contact Metamorphism
 (C) Metasomatism
 (D) Anataxis
20. Regional metamorphism of shales leads to the formation of :
 (A) Schist
 (B) Slate
 (C) Gneiss
 (D) All the above

21. The grain size of sand is
(A) > 2 mm
(B) 2 mm to 0.1 mm
(C) 0.1 mm to 0.01 mm
(D) > 0.1 mm
22. Bedding in which beds/laminations lie at an angle to the planes of general bedding :
(A) Graded Bedding
(B) Angular Bedding
(C) Current Bedding
(D) Convolute Bedding
23. A sandstone dominantly composed of sharply angular grains is :
(A) Orthoquartzite
(B) Arkose
(C) Greywacke
(D) Grit
24. Sedimentary rock composed of angular rock fragments is called :
(A) Conglomerate
(B) Breccia
(C) Sandstone
(D) Shale
25. The ore deposit formed simultaneously with the host rock is referred as :
(A) Hydrothermal Ore deposit
(B) Epigenetic Ore deposit
(C) Syngenetic Ore deposit
(D) None of the above
26. The deposition occurred along joints and bedding planes in limestones is known as :
(A) Ladder veins
(B) Gash veins
(C) Composite veins
(D) Sheeted veins
27. Sideronitic texture is typically associated with :
(A) Early magmatic deposits
(B) Late magmatic deposits
(C) Metamorphic rocks
(D) Sedimentary rocks
28. In lower Gondwana the coal found is mainly :
(A) Lignite
(B) Anthracite
(C) Bituminous
(D) All the above
29. Most abundant element in the Solar System is :
(A) Hydrogen
(B) Helium
(C) Argon
(D) Iron
30. Which of the following element does not belong to Rare Earth Element Group ?
(A) Lanthanum
(B) Europium
(C) Samarium
(D) Zirconium
31. Which of the following is the absolute dating technique ?
(A) Optically Luminescence dating
(B) Dendrochronology
(C) Rb-Sr Geochronology
(D) Lichenometry

SEAL

32. The half-life of Sm-Nd chronological system is : 36. The shadow zone of the earthquakes lies between :
- (A) 106×10^6 years (A) 98° and 198°
 (B) 106×10^7 years (B) 103° and 143°
 (C) 106×10^8 years (C) 103° and 108°
 (D) 106×10^9 years (D) 114° and 128°
33. The discontinuity found within the earth's crust is known as : 37. Water that has been out of contact from hydrological cycle for an appreciable geological time :
- (A) Gutenberg discontinuity (A) Meteoric water
 (B) Mohorovicic discontinuity (B) Vadose water
 (C) Moho discontinuity (C) Magma water
 (D) Conrad discontinuity (D) Connate water
34. The average bouguer anomaly for the ocean as a whole is : 38. The actual volume of water that flows through an aquifer in specified time is given as :
- (A) Positive (A) $Q = \frac{KC(d_1 - d_2)/2}{d}$
 (B) Negative (B) $Q = \frac{KAT(h_1 - h_2)/2}{d/l}$
 (C) Neutral (C) $Q = \frac{KA(c_1 - c_2)/4}{c}$
 (D) Unpredictable (D) $Q = \frac{KA(h_1 - h_2)}{d}$
35. The velocity of p waves V_p is given as :
- (A) $V_p = \sqrt{\frac{K + \frac{4}{3}\mu}{\rho}}$
 (B) $V_p = \sqrt{\frac{K + \frac{1}{3}\theta}{\rho}}$
 (C) $V_p = \sqrt{\frac{K + \frac{3}{3}\phi}{\rho}}$
 (D) $V_p = \sqrt{\frac{K + \frac{5}{3}\phi}{\rho}}$
39. The maximum permissible limit of Arsenic in groundwater given by Bureau of Indian Standards is :
- (A) $10\mu\text{gL}^{-1}$
 (B) $20\mu\text{gL}^{-1}$
 (C) $50\mu\text{gL}^{-1}$
 (D) $80\mu\text{gL}^{-1}$

- 2
40. The various dripstone features found in caverns are collectively called :
- (A) Stalagmites
 - (B) Stalactites
 - (C) Speleothems
 - (D) Sinkholes
- 21
41. Schuppen structures are associated with :
- (A) Normal faulting
 - (B) Strike slip faulting
 - (C) Thrust faulting
 - (D) Recumbent folding
- 22
42. The fold with sharp and angular crest and trough is referred as :
- (A) Chevron fold
 - (B) Conjugate fold
 - (C) Parasitic fold
 - (D) None of the above
- 24
43. Mullions are formed under :
- (A) Tensional stress regime
 - (B) Compressional strain regime
 - (C) Compressive stress regime
 - (D) Tensile stress regime
- 2
44. The Hade of a fault is :
- (A) $90 + \text{dip}$
 - (B) $90 - \text{dip}$
 - (C) $\text{Plunge} + \text{Rake}$
 - (D) $\text{Plunge} + \text{dip}$
45. Isokatabases are the line connecting points of :
- (A) Equal subsidence
 - (B) Equal uplift
 - (C) Equal degree of tectonic activity
 - (D) Equal degree of volcanic activity
46. The band of earthquakes in a down going plate is referred as :
- (A) Decollement zone
 - (B) Owen fracture zone
 - (C) Wadati-benioff zone
 - (D) Shear zone
47. The western coast of the South American Plate and the eastern edge of the Nazca Plate is delineated by :
- (A) Mariana Trench
 - (B) Peru-Chile Trench
 - (C) Aleutian Trench
 - (D) Juan de fuca Trench
48. Oceanic crust sediments and fragments that have been smoothed and smashed against the continents are known as :
- (A) Amorites
 - (B) Trilobites
 - (C) Ophiolites
 - (D) Smashorites
49. Species that existed for relatively shorter time period with wide geographical distribution are referred as :
- (A) Trace fossils
 - (B) Index fossils
 - (C) Formation fossils
 - (D) Dry fossils

50. The first vertebrate appeared during :
- Triassic
 - Jurassic
 - Ordovician
 - Pre-Cambrian
51. The most characteristic feature of the Cynognathus is :
- Presence of swimming paddles
 - Mammal like form
 - Stream lined body
 - Armour on the body
52. The Hipparian Faunas were characteristic of :
- Eocene
 - Pliocene
 - Miocene
 - Triassic
53. Kaimur and Cheyair group belongs to :
- Delhi and Vindhyan supergroup
 - Cuddapah and Delhi supergroup
 - Vindhyan and Cuddapah supergroup
 - Cuddapah and Vindhyan supergroup
54. The characteristic fossil of ammonites found in Chari formation is :
- Perisphinctes
 - Perisphinctes anceps
 - Macrocephalites macrocephalus
 - Peltoceras athleta
55. In Kashmir Muth-Quartzites are overlain by :
- Agglomeratic slates
 - Fenestella shale
 - Dogra slates
 - Syringothris limestone
56. The Siwalik rocks range in age from :
- Lower Miocene to Middle Pliocene
 - Miocene to Pleistocene
 - Middle Miocene to Lower Pleistocene
 - Lower Oligocene to Middle Pleistocene
57. The atmospheric window of UV-visible ranges from :
- 0.30 – 0.78 μm
 - 0.30 – 0.60 μm
 - 0.30 – 0.75 μm
 - 0.30 – 0.85 μm
58. Due to presence of quartz and feldspar the granite occurs in a spectral region of :
- 9 – 11 μm
 - 9 – 17 μm
 - 9 – 18 μm
 - 9 – 15 μm
59. Natural cycles of variation of solar radiation that reach Earth's surface at approximately 20,000, 40,000 and 100,000 years :
- Milankovitch cycles
 - Gigantic cycles
 - Solar cycles
 - None of these
60. Tsunamis are generated due to :
- Storms
 - Hurricanes
 - Earthquakes
 - Tornados

1. Miohippus is :
 - (A) Pleistocene horse
 - (B) Pliocene horse
 - (C) Miocene horse
 - (D) Oligocene horse
2. Foraminifera belongs to :
 - (A) Protista
 - (B) Bryozoa
 - (C) Mollusca
 - (D) Gastropoda
3. First non-flowering plant was found in :
 - (A) Jurassic
 - (B) Cretaceous
 - (C) Permian
 - (D) Carboniferous
4. Glossopteris is characteristic fossil of :
 - (A) Vindhyan supergroup
 - (B) Dharwar supergroup
 - (C) Cuddapah supergroup
 - (D) Gondwana supergroup
5. Majority of mineral crystallizes in :
 - (A) Monoclinic system
 - (B) Orthorhombic system
 - (C) Tetragonal system
 - (D) Cubic system
6. Galena has :
 - (A) 5-fold symmetry
 - (B) 2-fold symmetry
 - (C) 7-fold symmetry
 - (D) 4-fold symmetry
7. In triclinic system :
 - (A) All the axes are equal
 - (B) All the axes are unequal
 - (C) All the angles between the axes are equal
 - (D) Two axes are equal
8. The bravais lattice of sodium chloride structure is :
 - (A) Base centered cube
 - (B) Body centered cube
 - (C) Face centered cube
 - (D) All the above
9. Polarized light can be obtained by :
 - (A) By reflection
 - (B) By absorption
 - (C) All of the above
 - (D) None of the above
10. Which is an isotropic mineral ?
 - (A) Gypsum
 - (B) Quartz
 - (C) Garnet
 - (D) None of the above
11. Which is a biaxial mineral ?
 - (A) Orthoclase
 - (B) Rutile
 - (C) Vesuvianite
 - (D) Zircon
12. The isometric system includes all those crystals in which :
 - (A) All the crystallographic axis are essentially equal in length
 - (B) Two crystallographic axis are equal in length and the third is longer
 - (C) All the crystallographic axis are unequal in length
 - (D) None of the above
13. The loss of volatile substances from lava causes :
 - (A) A rapid decrease in viscosity
 - (B) A rapid increase in viscosity
 - (C) No change in viscosity
 - (D) None of the above
14. Large crystals are embedded in fine-grained groundmass is typical feature of :
 - (A) Poikilitic Texture
 - (B) Porphyritic Texture
 - (C) Ophitic Texture
 - (D) Microgranular Texture

15. A volcanic equivalent of trachyte is :
 (A) Dolerite
 (B) Pegmatite
 (C) Basalt
 (D) Syenite
16. The chemically or biochemically precipitated rock is :
 (A) Sandstone
 (B) Rock salt
 (C) Slate
 (D) Limestone
17. The original minerals which have failed to react with changed pressure, temperature conditions are known as :
 (A) Index minerals
 (B) Relict minerals
 (C) Stress minerals
 (D) All the above
18. Glaucophane is an index mineral of :
 (A) Granulite Facies
 (B) Eclogite Facies
 (C) Zeolite Facies
 (D) Blue-Schist Facies
19. During emission of β particle :
 (A) Mass number and atomic number remains same
 (B) Mass number is increased by 2 but atomic number is increased by 4
 (C) Mass number is increased by 4 but atomic number is increased by 2
 (D) Mass number remains same but atomic number increases by 1
20. Identify the correct sequence of abundance of elements in the Earth :
 (A) $O > Si > K > Fe > Mg > Na > Al > Ca$
 (B) $O > Si > Na > Fe > Ca > Al > K > Mg$
 (C) $O > Si > Mg > Fe > Ca > Na > K > Al$
 (D) $O > Si > Al > Fe > Ca > Na > K > Mg$
21. A mass of rock traversed by a network of small ore bearing veins :
 (A) Saddle reefs
 (B) Ladder veins
 (C) Stockworks
 (D) Gash veins
22. The main producer of Lead and Zinc ores in India is :
 (A) Amba Mata deposits of Gujarat
 (B) Sargipalli deposits of Orissa
 (C) Agnigundala deposits of Andhra Pradesh
 (D) Zawar belt of Rajasthan
23. The regions where mineral deposits of a specific type are found abundantly are called :
 (A) Metallogenic epochs
 (B) Metallogenic provinces
 (C) Metallogenic eras
 (D) None of the above
24. Placer deposits in which gravity is the agency occur along the hill slopes are called :
 (A) Aeolian placers
 (B) Alluvial placers
 (C) Eluvial placers
 (D) Deluvial placers
25. The calorific value of anthracite is :
 (A) 15000 to 15600 B.T.U.
 (B) 15000 to 15100 B.T.U.
 (C) 15000 to 16000 B.T.U.
 (D) 15000 to 15900 B.T.U.
26. Which of the following is non coking constituent of coal ?
 (A) Vitrain
 (B) Clarain
 (C) Durain
 (D) All the above
27. About 98% of coal produced in India is found in :
 (A) Cambrian age
 (B) Silurian age
 (C) Permo-carboniferous age
 (D) Jurassic age

1. 28. The most common reservoir rocks are :
- Sandstone
 - Granite
 - Gneiss
 - None of the above
2. 29. In an aquifer the hydraulic conductivity varies :
- Vertically only
 - Laterally only
 - Neither laterally nor vertically
 - Both vertically and laterally
30. Aquitards are :
- Saturated but impermeable formations
 - Saturated and permeable formations
 - Saturated but poorly permeable formations
 - Massive and permeable formations
31. Recharge area is :
- A region supplying water to confined aquifer
 - A region supplying water to unconfined aquifer
 - A region supplying water to perched aquifer
 - All of the above
32. According to BIS the permissible limit of Arsenic in drinking water in absence of any alternate source is:
- 0.05 mg/L
 - 1.07 mg/L
 - 0.08 mg/L
 - 1.05 mg/L
33. The discontinuity between upper crust and lower crust is known as :
- Gutenberg discontinuity
 - Lehman discontinuity
 - Conrad discontinuity
 - Moho discontinuity
34. Low Velocity Zone is characterized by :
- High heat flow and high electrical conductivity
 - High heat flow and low electrical conductivity
 - Low heat flow and high electrical conductivity
 - Low heat flow and low electrical conductivity
35. Maximum velocity by seismic waves is attained in :
- Crust
 - Upper Mantle
 - Lower Mantle
 - Inner Core
36. A wave moves with an up-and down rolling motion like an ocean wave is called :
- Love wave
 - Rayleigh wave
 - Shear wave
 - All of the above
37. A panchromatic image consists of :
- 36 bands
 - One band
 - 5 bands
 - 2 bands
38. Universal Transverse Mercator (UTM) divides the Earth into :
- 60 equal zones
 - 120 equal zones
 - 180 equal zones
 - 360 equal zones
39. A composite image or photograph made by piecing together individual images or photographs covering adjacent areas is known as :
- Image enhancement
 - Geo-referencing
 - Mosaic
 - Parse
40. In electromagnetic spectrum the region from 0.7 to 1000 μm is called :
- Infrared waves
 - Radio wave
 - X-rays
 - Visible light
41. The process of jumping, bouncing and drifting action of sand particles :
- Hydraulic action
 - Saltation
 - Siltation
 - Solifluction

42. Match the following and identify the correct answer :
- | | |
|------------------------------|-----------------------|
| (a) Pediments and inselbergs | (e) Sedimentary rocks |
| (b) Ventifacts | (f) Abrasion |
| (c) Blow outs | (g) Deflation |
| (d) Mesas and Buttes | (h) Crystalline rocks |
- (A) (a)-(f), (b)-(g), (c)-(h), (d)-(e)
 (B) (a)-(e), (b)-(h), (c)-(g), (d)-(f)
 (C) (a)-(h), (b)-(f), (c)-(g), (d)-(e)
 (D) (a)-(f), (b)-(h), (c)-(g), (d)-(e)
43. Earth can be well understood through :
- (A) Geological evidences and Geophysical exploration
 (B) Only Geological evidences
 (C) Only Geophysical exploration
 (D) None of the above
44. Which one of the following elements is the second most abundant in the Earth's crust ?
- (A) Oxygen
 (B) Sulphur
 (C) Silicon
 (D) Carbon
45. A streamlined, wind-sculpted landform found in arid region is called as :
- (A) Horn
 (B) Pedestal
 (C) Yardangs
 (D) Ventifacts
46. The level, which controls the depth of stream erosion, is :
- (A) Ultimate base
 (B) Base level
 (C) Local base level
 (D) All the above
47. When streams diverge from a central area, like spokes from the hub of a wheel, it is called :
- (A) Radial
 (B) Dendritic
 (C) Parallel
 (D) Trellis
48. Critical angle for partially jointed rocks vary from :
- (A) 45° to 67°
 (B) 60° to 90°
 (C) 60° to 120°
 (D) 35° to 70°
49. The change in the shape or volume of a rock body due to applied forces :
- (A) Strain
 (B) Stress
 (C) Rigid body deformation
 (D) Co-axial stress
50. Hade of a fault is :
- (A) $90 + \text{dip}$
 (B) $90 - \text{dip}$
 (C) Plunge + rake
 (D) Plunge + dip
51. The change in the shape of a rock body due to applied stresses :
- (A) Dilation
 (B) Hydrostatic stress
 (C) Co-axial stress
 (D) Distortion
52. In a region, where two continents collide, one continent may be forced beneath the other. The process is called :
- (A) Overthrusting
 (B) Underthrusting
 (C) Thrusting
 (D) None of the above
53. New Crust is formed at the :
- (A) Constructive plate boundary
 (B) Destructive plate boundary
 (C) Conservative plate boundary
 (D) None of the above

54. Which of the following features is associated with a convergent plate boundary ?
- Earthquakes
 - Deep sea trench
 - All the above
 - None of the above
55. Vibrations radiate from focus in all directions as :
- Seismic waves
 - Transverse waves
 - Longitudinal waves
 - None of the above
56. Hess's Sea-floor spreading was confirmed by using :
- Different fossils on continents
 - Geometric fit of continents
 - Apparent polar wander paths
 - Magnetic anomalies of the sea floor
57. Which of the following geological formations do not belong to the Dharwar Super Group ?
- Charnockites
 - Clsepet Granite
 - Peninsular Gneiss
 - Chair Formation
58. The most common rocks of the Vindhyan Supergroup are :
- Granite
 - Basalt
 - Gneiss
 - None of the above
59. The second largest time unit in the Geological time scale is :
- Period
 - Eon
 - Era
 - Epoch
60. In the Karewas of Kashmir, Hirpur Formation contains three members, which one is correct sequence from top to bottom ?
- Methawoin Member; Rambiarra Member, Dubjan Member
 - Dubjan Member, Rambiarra Member, Methawoin Member
 - Methawoin Member, Dubjan Member, Rambiarra Member
 - All of the above

1. Trilobites belong to phylum :
 - (A) Arthropods
 - (B) Brachiopods
 - (C) Graptolites
 - (D) Foraminifera
2. Clay and calcium carbonate nodules are found in which horizon of an ideal soil profile ?
 - (A) A horizon
 - (B) B horizon
 - (C) C horizon
 - (D) O horizon
3. Evolution of horse dates back in which geological time period ?
 - (A) Cretaceous
 - (B) Eocene
 - (C) Devonian
 - (D) Pleistocene
4. In Orthorhombic crystal system the relative lengths and the orientation of the crystallographic axes are :
 - (A) $a = b = c; \alpha \neq \beta \neq \gamma$
 - (B) $a = b = c; \alpha = \beta = \gamma$
 - (C) $a \neq b \neq c; \alpha = \beta = \gamma$
 - (D) $a = b = c; \alpha = \beta \neq \gamma$
5. In albite law, commonly found in plagioclase, the twinning occurs perpendicular to which crystallographic axis ?
 - (A) b-axis
 - (B) a-axis
 - (C) c-axis
 - (D) All of these
6. Which of the following is not the polymorph of quartz ?
 - (A) Coesite
 - (B) Cristobalite
 - (C) Tridymite
 - (D) Andalusite
7. Which of the following is not a mineraloid ?
 - (A) Limonite
 - (B) Allophane
 - (C) Wollastonite
 - (D) Volcanic glass
8. The Diopside-Hedenbergite series belongs to which mineral family ?
 - (A) Ortho-pyroxenes
 - (B) Clino-pyroxenes
 - (C) Clino-amphiboles
 - (D) Ortho-amphiboles
9. Which of the following statements is true ?
 - (A) The refractive index is the ratio of ordinary and extraordinary ray
 - (B) The refractive index of the anisotropic minerals is not dependent on the direction of travel of the light
 - (C) The refractive index of the anisotropic minerals is dependent on the direction of travel of the light
 - (D) The mineral behaves similarly in both plane light and under crossed nicols
10. A black cross-shaped pattern seen in an interference figure is known as :
 - (A) Isogyre
 - (B) Isomorph
 - (C) Isopleth
 - (D) Isochrome
11. A rock without quartz mineral is :
 - (A) Dacite
 - (B) Granite
 - (C) Rholite
 - (D) Basalt

12. Which of the following is not silica under-saturated rock ?
- Nephelene
 - Andesite
 - Syenite
 - Sodalite
13. Very large intrusive igneous rock bodies with their bases rarely exposed :
- Batholith
 - Lopolith
 - Laccolith
 - Stock
14. Soft-sediment deformation structure comprising rounded masses of clastic sediment set in similar or finer-grained matrix :
- Diapir
 - Slump
 - Pseudonodule
 - Ripple marks
15. A detrital sedimentary rock containing > 20 % feldspar :
- Grewacke
 - Sandstone
 - Arkose
 - Quartz arenite
16. A metamorphic process in which the chemical composition of a rock is changed significantly as a result of fluid flow :
- Metasomatism
 - Anataxis
 - Diamorphism
 - Migmatite
17. Which of the following is not a Lithophile ?
- Os, Ir, Pt
 - Li, Na, K, Rb
 - Si, Ti, Zr, Cs
 - H, F, Cl, Sr
18. A metamorphic rock formed by the contact between mudstone/shale, or other clay-rich rock, and a hot igneous body :
- Greenschist
 - Hornfels
 - Eclogite
 - Charnokite
19. Streak of pyrite is :
- White
 - Green
 - Greenish Black
 - Yellow
20. Natural concentration of heavy minerals caused by the gravity separation during sedimentary processes :
- Hydrothermal deposits
 - Vein deposits
 - Evaporite deposits
 - Placer Deposits
21. Mineral Kyanite is formed as a result of :
- Magmatism
 - Metamorphism
 - Diagenesis
 - Recrystallization
22. Which of the following is the obducted part of the oceanic crust ?
- Batholith
 - Flysch
 - Ophiolite
 - Mollass

23. Which of the following metamorphic rocks is non foliated ?
- Schist
 - Phyllite
 - Slate
 - Quartzite
24. Banded Iron Formation occur mostly in :
- Precambrian rocks
 - Lower Paleozoic rocks
 - Cretaceous rocks
 - All of these
25. Which of the following is the best reservoir rock of petroleum ?
- Sedimentary rocks
 - Igneous rocks
 - Metamorphic rocks
 - All of these
26. Most of the coal is found in :
- Achaean Formations
 - Gondwana Formations
 - Miocene Formations
 - Quaternary Formations
27. Following are the dominant constituents of coal :
- C, H, N, Fe, S
 - C, H, Fe, S, As
 - C, H, N, S, O
 - C, H, S, O, Au
28. Which of the following sedimentary basins in India are dominant producers of oil and gas ?
- Cambay basin
 - Assam shelf
 - Krishna Godavari basin
 - All of these
29. Darcy's law says :
- The rate of groundwater flow is directly proportional to head loss and inversely proportional to hydraulic conductivity
 - The rate of groundwater flow is directly proportional to head loss and inversely proportional to distance of flow path
 - The rate of groundwater flow is directly proportional to hydraulic conductivity and inversely proportional to head loss
 - All of these
30. A portion of groundwater joining the stream flow is called :
- Interflow
 - Overflow
 - Baseflow
 - Channel flow
31. Which of the following statements is correct ?
- Soil moisture is a part of groundwater
 - Water table and piezometric surface are synonymous
 - Groundwater is more than the river water
 - The groundwater is recharged by glaciers only
32. The geophysical method not used for groundwater exploration :
- Seismic reflection method
 - Seismic refraction method
 - Resistivity method
 - Gravity method
33. The inner core of the earth is :
- Ductile
 - Semisolid
 - Brittle
 - Liquid

34. Most of the deep focus earthquakes are concentrated along :
- Subduction zones
 - Mid oceanic ridges
 - Platforms
 - Shields
35. S-waves do not pass through :
- Crust
 - Mantle
 - Inner Core
 - Outer Core
36. The velocity of body waves in the Earth :
- Decrease with the depth
 - Decreases at LVZ
 - Increase up to mantle and decrease in core
 - Decrease up to mantle and increase in core
37. In electromagnetic spectrum the region from 0.7 to 1000 μm is called :
- Visible light
 - UV light
 - X-rays
 - Infrared waves
38. Which of the following is(are) not naturally created greenhouse gas(es) with a strong impact on the climate of the earth ?
- CFCs
 - O_2
 - H_2
 - N_2O
39. Which of the following statements is false ?
- Landslides can cause seismic disturbances
 - Landslides can result from seismic disturbance
 - Landslides can result from flooding
 - Landslides can result from tornadoes
40. The prediction of which of the following disasters is most difficult ?
- Floods
 - Earthquakes
 - Tornadoes
 - Cyclones
41. Total area of the earth under land mass is :
- 29.22%
 - 16.14%
 - 41.22%
 - 18.41%
42. Long winding ridges of sand and gravel found in pre glaciated regions and originating within or beneath the ice, either from continuous deposition at the mouth of a subglacial stream as the ice retreated or from infilling of the tunnels of these streams before recession are known as :
- Drumlins
 - Roches moutonees
 - Eskers
 - Chatter Marks
43. Hanging valleys are created by :
- Ice sheets
 - Mountain Glaciers
 - Landslides
 - GLOF
44. The deepest parts of the ocean are generally found along the :
- Subduction zone
 - Mid Oceanic Ridges
 - Continental rise
 - Abyssal Plain

45. Alteration and breakdown of minerals and rocks, when they are exposed to the atmosphere is called :
- Scree
 - Regolith
 - Weathering
 - Erosion
46. Which of the following is the characteristic feature of aeolian erosion ?
- Driekantars
 - Ventifacts
 - Yardangs
 - All of these
47. Landscapes which are produced by the dissolution of carbonate rocks by water :
- Terrarosa
 - Point bars
 - Levees
 - Morains
48. Which of the following is/are the typical identification feature(s) of a fault ?
- Mylonite
 - Gouge
 - Slickenside
 - All of these
49. The slow downhill movement of soil as a result of the alternate freezing and thawing of the contained water :
- Creep
 - Debris flow
 - Solifluction
 - Avalanche
50. A line joining points of same altitude with respect to mean sea level or a datum plane is :
- Isobath
 - Contour
 - Isopleth
 - Isograd
51. A low angle fault where the hanging wall has potential to transport longer distances with respect to footwall is called :
- Sinistral strike slip Fault
 - Dextral strike slip Fault
 - Thrust Fault
 - Reverse Fault
52. Which of the following statements is true ?
- Maximum stretch is perpendicular to minimum stress direction
 - Maximum stretch is perpendicular to maximum stress direction
 - Maximum stretch is perpendicular to intermediate stress direction
 - Minimum stretch is parallel to minimum stress direction
53. The continental slope is made up of :
- Oceanic crust
 - Peridotites
 - Eclogites
 - Continental crust
54. As per the concept of sea floor spreading the new crust is generated at :
- Mid Oceanic Ridges
 - Subduction zones
 - Strike slip boundaries
 - All of these
55. Which of the following is the strongest evidence of continental drift ?
- Jigsaw fit
 - Geological fit
 - Fossil evidence
 - All of these

56. Which of the following is correct in Geological Time Scale ?
- (A) Era > Eon > Epoch
 - (B) Eon > Era > Epoch
 - (C) Epoch > Era > Eon
 - (D) Eon > Epoch > Era
57. The lowest and uppermost Member/Formation of the Karewas are :
- (A) Dubjan and Pampur
 - (B) Dubjan and Methowian
 - (C) Dubjan and Dilpur
 - (D) Pampur and Dilpur
58. Age of Upper Siwaliks is :
- (A) Pleistocene to Pliocene
 - (B) Pleistocene to Lower Miocene
 - (C) Pliocene to Lower Miocene
 - (D) Lower Miocene to Oligocene
59. Papaghani and Cheyair series constitute the :
- (A) Upper Cuddapah
 - (B) Upper Vindhyan
 - (C) Lower Cuddapah
 - (D) Lower Vindhyan
60. Stegodon Clifti and Stegodon Insignis found in the Upper Siwaliks are fossils of :
- (A) Fish
 - (B) Elephant
 - (C) Primates
 - (D) Birds

Series B
Hand No (11)

Sr. No.197.....

ENTRANCE TEST-2017

SCHOOL OF EARTH & ENVIRONMENTAL SCIENCES

APPLIED GEOLOGY

Question Booklet Series

A

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. :

--	--	--	--	--	--

Instructions for Candidates :

1. Write your Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be 'Negative Marking' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheets provided with the question booklet.
12. OMR Answer sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

SEAL

1. How much is the total land area of the earth?
 (A) 19.4%
 (B) 39.1%
 (C) 49.2%
 (D) 29.2%
2. Two most dominant chemical elements in Bulk Earth are
 (A) O and Si
 (B) Si and Fe
 (C) O and Fe
 (D) Ca and Mg
3. The process of determining numerical ages and dates for Earth materials and events is known as:
 (A) Geochemistry
 (B) Geochronology
 (C) Sedimentology
 (D) Gemmology
4. Submerged flat topped volcanic peaks are known as:
 (A) Guyots
 (B) Seamounts
 (C) Abyssal
 (D) Ocean ridges
5. The downslope movement of rock, regolith, and soil under the direct influence of gravity is called
 (A) Weathering
 (B) Mass wasting
 (C) Rockfall
 (D) Debris fall
6. A circular depression found mostly in karst areas with a few meters to hundreds of meters in size is known as
 (A) Sinkhole
 (B) Shaft
 (C) Terra Rosa
 (D) Kerren field
7. Mass movement of water saturated soils in high altitudes due to alternate freezing and thawing:
 (A) Avalanche
 (B) Mud flow
 (C) Creep
 (D) Solifluction
8. A step like feature on the surface of the earth caused by slip on the fault:
 (A) Cuesta
 (B) Fault scarp
 (C) Hogback
 (D) Lapis
9. The strike of a sedimentary bed is measured in:
 (A) Horizontal plane
 (B) Vertical and Horizontal plane
 (C) Vertical plane
 (D) Inclined plane
10. The change in the shape of a rock body due to applied stresses
 (A) Dilation
 (B) Hydrostatic stress
 (C) Distortion
 (D) Co-axial stress
11. A depression bounded by normal faults:
 (A) Canyon
 (B) Horst
 (C) Wrench
 (D) Graben
12. Which of the following is used as an evidence of faulting?
 (A) Boudins
 (B) Mylonite
 (C) Sausage
 (D) Foliation

13. The ocean trenches are formed at
 (A) Mid Oceanic Ridge
 (B) Seamounts
 (C) Subduction Zones
 (D) Oceanic Islands
14. The plate boundary where oceanic crust is neither created nor destroyed
 (A) Mid oceanic ridge
 (B) Strike-slip fault
 (C) Subduction zones
 (D) All of these
15. Aleutian type orogenic belt is created at the convergence of which plate boundaries?
 (A) Oceanic-Oceanic
 (B) Oceanic-continental
 (C) Continental-continental
 (D) All of these
16. Which of the following statement is not correct?
 (A) Himalayas are formed due to continent-continent collision
 (B) Continents crust is lighter than oceanic crust
 (C) Lithosphere is more brittle than asthenosphere
 (D) Mantle is liquid
17. Which of the following is the largest unit of geological time period?
 (A) Epoch
 (B) Period
 (C) Eon
 (D) Era
18. The age of Siwaliks is:
 (A) Tertiary
 (B) Quaternary
 (C) Mesozoic
 (D) Permo-carboniferous
19. Which of the following geological formations do not belong to the Dharwar Super Group?
 (A) Charnockites
 (B) Clsepet Granite
 (C) Peninsular Gneiss
 (D) Chair Formation
20. In which of the following geological formations, the Coal is found in Kashmir?
 (A) Karewas
 (B) Triassic Limestone
 (C) Syringothyris Limestone
 (D) Fenestella Shale
21. Vertebrate fossils are found in geological formation of time period
 (A) Permian
 (B) Devonian
 (C) Siwaliks
 (D) Archaen
22. Trilobites became extinct in which geological period?
 (A) Permian
 (B) Miocene
 (C) Eocene
 (D) Oligocene
23. Life appeared on the surface of Earth
 (A) 1 million years BP
 (B) 1 billion years BP
 (C) 2 million years BP
 (D) 2 billion years BP
24. Which of the following evidences does not favour the theory of continental drift?
 (A) Jigsaw fit of eastern South America and West Africa
 (B) Continuous geology of eastern South America and West Africa
 (C) Continuity of fossils across these continents
 (D) Continuity of ocean basins

25. Polysynthetic twinning is commonly found in:
- Olivine
 - Kyanite
 - Wollastonite
 - Plagioclase
26. Which of the following mineral does not show polymorphism?
- Carbon
 - Al_2SiO_5
 - ZrSiO_4
 - SiO_2
27. Which of the following mechanisms result in pseudomorphism?
- Substitution
 - Encrustation
 - Alteration
 - All of these
28. In triclinic system
- All the axes are equal
 - All the axes are unequal
 - All the angles between the axes are equal
 - Two axes are equal
29. Augite is a member of
- Garnet family
 - Mica family
 - Pyroxene family
 - Olivine family
30. In Moh's scale the hardness of quartz is:
- 7
 - 5
 - 6
 - 8
31. With analyzer inserted, the mineral grain of any orientation remains extinct or dark during complete 360° rotation of the microscopic stage:
- Anisotropic
 - Uniaxial
 - Isotropic
 - Biaxial
32. Conchoidal fracture is commonly exhibited by
- Calcite
 - Quartz
 - Kyanite
 - Olivine
33. Which of the following minerals is not found in Granite?
- K-feldspar
 - Quartz
 - Biotite
 - Olivine
34. Soft-sediment deformation structure internally folded into broader synclines and sharp anticlines with lower and upper contacts planer:
- Ball and Pillow structures
 - Convolute bedding
 - Pseudonodule
 - Cross bedding
35. A detrital sedimentary rock containing >20% feldspar
- Grewacke
 - Sandstone
 - Arkose
 - Quartz arenite
36. Which of the following is not an intrusive rock?
- Basalt
 - Granite
 - Peridotite
 - Diorite

37. The most abundant element in the Earth's Core is:
- Ni
 - O
 - Si
 - Fe
38. The hornfels and granulite rocks are formed due to:
- Metamorphism with Low T and P
 - Metamorphism with Low T and high P
 - Contact metamorphism
 - Metamorphism with high T and P
39. Based on the chemical affinity of the elements in the earth, the elements concentrated in the sulphide phase are:
- Siderophile
 - Chalcophile
 - Lithophile
 - Atmophile
40. Which of the following is a typical metamorphic mineral?
- Kyanite
 - Olivine
 - Smectite
 - Montmorillonite
41. Natural accumulation of valuable minerals caused by the gravity separation during sedimentary processes
- Hydrothermal deposits
 - Vein deposits
 - Evaporite deposits
 - Placer deposits
42. Manganese nodules are found in
- Upper continental crust
 - Sea bed
 - Ophiolites
 - Mollass
43. Which of the following is the largest producer of mica in the world?
- Pakistan
 - India
 - China
 - England
44. Most of the major iron deposits occur in Banded Iron Formation which were originally deposited in:
- Precambrian period
 - Lower Paleozoic Period
 - Cretaceous Period
 - Tertiary Period
45. Which of the following statement is correct?
- Hydrocarbons are found in igneous rocks
 - Petroleum and gas are always found in association with water
 - Most of the source rocks of petroleum are calcareous, dolomitic, siliceous or phosphatic shales or argillaceous limestones
 - Sandstones are very good trap rocks
46. The correct order of degree of alteration and maturation of coal is:
- Lignite > bituminous > peat > anthracite
 - Peat > lignite > bituminous > Anthracite
 - Peat > bituminous > lignite > anthracite
 - Peat > lignite > anthracite > bituminous
47. Anthracite has:
- Higher C and lower moisture
 - Higher C and high moisture
 - Lower carbon and low moisture
 - Lower C and higher moisture
48. Which of the following sedimentary basins in India are dominant producers of oil and gas?
- Cambay basin
 - Assam shelf
 - Krishna Godavari basin
 - All of these

49. The highest reservoir of fresh water on the Earth:
- Lakes
 - Streams
 - Groundwater
 - Oceans
50. The permeability is high in:
- Sandstone
 - Granite
 - Basalt
 - Claystone
51. The water trapped in the sedimentary formations, which remain cut off from the active hydrological cycle:
- Soil moisture
 - Juvenile water
 - Groundwater
 - Connate water
52. Which of the following statements is not correct?
- Fresh groundwater occurs in geological formations with high hydraulic conductivity
 - Water table is the saturated surface in unconfined aquifer
 - Hydrological cycle is stimulated by the internal heat of the earth
 - The height of the piezometric surface is also due to hydrostatic pressure
53. The average geothermal gradient near the surface of the earth is
- 5°/km depth
 - 25°/km depth
 - 15°/km depth
 - 35°/km depth
54. The deep focus earthquakes mostly occur at:
- Subduction zones
 - Shields
 - Oceanic ridges
 - Ocean floor
55. According to Airy's theory of isostasy:
- Mountains have roots and ocean basins have antiroots
 - Topography is produced due to the varying density of crustal blocks
 - Depth of crustal blocks terminate at uniform level
 - All of these
56. The core-mantle boundary, which marks the termination of shear waves, is known as:
- Conrad discontinuity
 - Lehman discontinuity
 - Mohorovicic discontinuity
 - Gutenberg discontinuity
57. Which of the following is not a satellite sensor ?
- ERDAS
 - LANDSAT
 - ASTER
 - MODIS
58. The dominant greenhouse gas in the earth's atmosphere is
- CH₄
 - N₂O
 - CO₂
 - CFC
59. Which of the following is a volcanic hazard?
- Crevasse
 - Solifluction
 - Tephra
 - Rockfall
60. Tsunamis are generated due to:
- Storms
 - Earthquakes
 - Tornados
 - Cyclones

Sr. No.197.....

ENTRANCE TEST-2016

FACULTY OF PHYSICAL & MATERIAL SCIENCE

M.Sc. APPLIED GEOLOGY

Question Booklet Series

A

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. :

--	--	--	--	--	--	--	--	--	--

Instructions for Candidates :

1. Write your Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be 'Negative Marking' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive Score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheets provided with the question booklet.
12. OMR Answer sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

1. Seismic waves arrive in the following order :

- (A) P, S, Surface (B) P, Surface, S
(C) S, Surface P (D) S, P, Surface

2. Talus is an accumulation of :

- (A) calcium carbonate in horizon B of pedocals
(B) angular rock fragments at the base of a slope
(C) valuable minerals formed by selective removal of soluble substances
(D) debris produced mostly by the activities of organisms

3. The dry lake beds in many deserts are :

- (A) playas (B) pediments
(C) bajadas (D) mesas

4. The process of identifying one rock layer with another one far away is called :

- (A) correlation (B) connection
(C) correspondence (D) collation

5. In meandering rivers, the point bars occur at the :

- (A) inside bends of a river channel
(B) outside bends of a river channel
(C) both inside and outside bends of a river channel
(D) middle of the river

6. Which of the following is an example of deposition by groundwater ?

- (A) caves (B) stalactites
(C) caverns (D) sink holes

7. An element whose major ore is a type of soil :

- (A) iron (B) zinc
(C) aluminum (D) uranium

8. Match the following :

- | | |
|------------------|---------------------|
| 1. initial stage | i. alluvial fans |
| 2. youth stage | ii. V-shaped valley |
| 3. mature stage | iii. pot holes |
| 4. old stage | iv. flood-plains |
- (A) 1-i, 2-ii, 3-iii, 4-iv
(B) 1-ii, 2-i, 3-iv, 4-iii
(C) 1-iv, 2-iii, 3-ii, 4-i
(D) 1-iii, 2-ii, 3-i, 4-iv

9. The strike of a rock layer is :

- (A) the hardness relative to other rocks layers
(B) the compass direction of a line formed by the intersection of an inclined plane and a horizontal plane
(C) the angle at which the layer intercepts a horizontal plane
(D) the angle at which the layer plunges into the axis of a fold

10. Foliation is :

- (A) unrelated to folds
(B) cuts across folds
(C) tends to parallel the axial planes of folds
(D) none of the above

11. How do normal and reverse faults differ ?

- (A) normal faults are caused by extension of the crust, reverse faults by compression
(B) reverse faults are caused by extension of the crust, normal faults by compression
(C) reverse faults are left-lateral, normal faults are right-lateral
(D) reverse faults are right-lateral, normal faults are left-lateral

12. An overturned fold is one in which :

- (A) both limbs dip in the same direction
(B) the axial plain is vertical
(C) the axis is inclined
(D) the strata in one limb are horizontal

13. Orogenies (mountain-building) are connected with :
- (A) transforms faults (B) mid-ocean ridges
(C) subduction zones (D) ocean basins
14. According to plate tectonics, the San Andreas Fault is :
- (A) an obduction zone (B) a subduction zone
(C) a transform plate boundary (D) none of these
15. The driving mechanism of plate movement is believed to be :
- (A) rotation of the earth (B) magnetism
(C) tidal effects (D) thermal convection
16. The oceanic crust :
- (A) is the same age throughout a given ocean basin
(B) ranges in age from Paleozoic to Mesozoic
(C) becomes progressively older toward the mid-ocean ridges
(D) becomes progressively younger toward the mid-ocean ridges
17. Two rock units which are located in different areas are probably related, if the fossils that they contain are :
- (A) members of the same fossil assemblage
(B) members of two different fossil assemblages
(C) members of fossil groups having two different ages
(D) none of these
18. The group which does not show a correct sequence of the geologic column is :
- (A) Paleocene, Eocene, Oligocene
(B) Devonian, Ordovician, Silurian
(C) Paleozoic, Mesozoic, Cenozoic
(D) Triassic, Jurassic, Cretaceous
19. Which fundamental geological principle states that the oldest layer is on the bottom of a vertical succession of sedimentary rocks and the youngest is on top ?
- (A) lateral continuity (B) superposition
(C) fossil succession (D) original horizontality

20. In Vindhyan System gypsum beds are associated with :
- (A) Semri Series (B) Kaimur Series
(C) Rewa Series (D) Bhandar Series
21. The Foraminifers that live on the sea-bottoms are called as :
- (A) benthonic Foraminifers (B) planktonic Foraminifers
(C) dwarf Foraminifers (D) none of these
22. Geological age of Terebratulla Brachiopoda is :
- (A) Ordovician to Silurian (B) Silurian to Permian
(C) Eocene to Pliocene (D) Triassic to Jurassic
23. In some genera of Gastropods, the inner sides of the successive whorls are fused together in the form of a solid pillar, which is known as :
- (A) Apical (B) Peristome
(C) Umbilicus (D) Columella
24. Arca is an example of :
- (A) Heterodont Lamellibrachia (B) Isodont Lamellibrachia
(C) Dysodont Lamellibrachia (D) Taxodont Lamellibrachia
25. Mark the correct statement regarding 'isotropic' substances :
- (A) all same light velocity in all directions
(B) wave surface is sphere
(C) wave form is circle
(D) all the above are correct
26. Which crystal systems are optically uniaxial ?
- (A) Hexagonal and Monoclinic (B) Monoclinic and Tetragonal
(C) Hexagonal and Tetragonal (D) Cubic and Orthorhombic
27. Quartz mineral belongs to :
- (A) Sorosilicates (B) Inosilicates
(C) Cyclosilicates (D) Tectosilicates

28. Sapphire is a blue transparent variety of :
 (A) Diamond (B) Quartz
 (C) Topaz (D) Corundum
29. Graphite crystallizes in :
 (A) Tetragonal system (B) Hexagonal system
 (C) Cubic system (D) Orthorhombic system
30. The normal class of monoclinic system is :
 (A) Barite type (B) Beryl type
 (C) Gypsum type (D) Axinite type
31. 'Schillerization' is characteristic of :
 (A) Diopside (B) Hypersthene
 (C) Enstatite (D) Hedenbergite
32. Andalusite and Sillimanite crystallizes in :
 (A) Monoclinic system (B) Triclinic system
 (C) Orthorhombic system (D) Hexagonal system
33. What coarse-grained plutonic rock consists of abundant calcic plagioclase, pyroxene and olivine ?
 (A) Syenite (B) Lamprophyre
 (C) Peridotite (D) Gabbro
34. The most abundant sedimentary rock found in the Earth's crust is :
 (A) Shale (B) Sandstone
 (C) Limestone (D) None of the above
35. Which of the following pairs of igneous rocks have the same mineral composition ?
 (A) Granite – Diorite (B) Basalt – Gabbro
 (C) Andesite – Rhyolite (D) Peridotite – Granodiorite
36. Which of these environments can produce cross beds ?
 (A) sand dunes (B) river deltas
 (C) alluvial fans (D) all the above

37. What is the correct metamorphic sequence of increasingly coarser grain size ?
- (A) phyllite => slate => gneiss => schist
 (B) slate => phyllite => schist => gneiss
 (C) gneiss => phyllite => slate => schist
 (D) schist => gneiss => phyllite => slate
38. Which type of metamorphism produces the majority of metamorphic rocks ?
- (A) contact metamorphism (B) dynamic metamorphism
 (C) lithostatic metamorphism (D) regional metamorphism
39. To which of the following groups do most minerals in the earth's crust belong ?
- (A) oxides (B) halides
 (C) carbonates (D) silicates
40. Phase rule can be expressed as :
- (A) $F = C + P - 2$ (B) $F = C - P + 2$
 (C) $C = P + F - 2$ (D) $F = C - P - 2$
41. Banded Iron Formation (BIF) of Kudremukh (Karnataka) belongs to :
- (A) Sager Group (B) Bababudan Group
 (C) Chitradurga Group (D) Ranibonnur Group
42. Chromite deposits are product of segregation during :
- (A) early magmatic crystallization (B) late magmatic crystallization
 (C) residual liquid segregation (D) contact metasomatism
43. Match the following :
- | | |
|-----------------|----------------------------|
| 1. Hematite | i. white streak |
| 2. Chalcopyrite | ii. black streak |
| 3. Pyrite | iii. greenish-black streak |
| 4. Siderite | iv. cherry-red streak |
- (A) 1-ii, 2-iii, 3-iv, 4-i (B) 1-iv, 2-iii, 3-ii, 4-i
 (C) 1-iii, 2-i, 3-ii, 4-iv (D) 1-i, 2-ii, 3-iii, 4-iv

44. Which state is the largest producer of black mica ?

- (A) Bihar
- (B) Odisha
- (C) Madhya Pradesh
- (D) Maharashtra

45. Proximate analysis of coal determines :

- (A) moisture content and volatile content
- (B) ash percentage
- (C) fixed carbon and heating value
- (D) all of the above

Q. 45
Q. 46
Q. 47
Q. 48
Q. 49
Q. 50
Q. 51

46. Lignite deposit of Kashmir Valley is associated with :

- (A) Muree Group
- (B) Siwalik Group
- (C) Karewa Group
- (D) None of the above

47. The conditions necessary for the formation of an oil pool are :

- (A) migration and accumulation
- (B) suitable reservoir and cap rocks
- (C) suitable traps and retention
- (D) all of the above

48. Source rock in the Bombay High oil field is :

- (A) Limestone
- (B) Sandstone
- (C) Shale
- (D) Clay

49. Zone of saturation is also known as :

- (A) Vadose zone
- (B) Capillary zone
- (C) Phreatic zone
- (D) Aeration zone

50. Permeability of a material is a measure of :

- (A) voids available in the material
- (B) voids and solid particles available in the material
- (C) its capacity to transmit water through its interstices
- (D) its capacity to retain water in the material

51. Darcy's law is :

- (A) The discharge is inversely proportional to head loss
- (B) The discharge is inversely proportional to head loss and directly proportional to the length
- (C) The discharge is directly proportional to head loss and inversely proportional to area of flow and to the length of the path
- (D) The discharge is directly proportional to head loss and area of flow and inversely proportional to the length of the path

52. A geophysical method, which is most applicable for surface investigation of ground water is :

- (A) electrical resistivity method (B) seismic refraction method
(C) seismic reflection method (D) gravity method

53. Approximate thickness of lithosphere ranges between :

- (A) 1-2 km (B) 5-10 km
(C) 50-100 km (D) 100-200 km

54. The scale for measuring earthquake intensity is :

- (A) Mercalli scale (B) Richter scale
(C) Moh's scale (D) Wentworth's scale

55. The deepest earthquakes are found in which of the following tectonic locations ?

- (A) mid-oceanic ridge (B) subduction zone
(C) mountain range (D) deep ocean

56. The asthenosphere :

- (A) lies beneath the lithosphere
(B) is composed primarily of Peridotite
(C) behaves plastically and flows slowly
(D) all of these

57. The arrangement of terrain features which provides attributes : the shape and size of objects, is called :

- (A) spectral variation (B) spatial variation
(C) temporal variation (D) none of these

58. Remote sensing techniques are being usefully employed for the purpose of :

- (A) natural resource management
(B) land use
(C) protection of the environment
(D) all of these

59. A stream discharge is :

- (A) influenced by channel width, depth, stream gradient, channel shape and channel roughness
- (B) the product of a stream's velocity and channel cross-sectional area
- (C) the volume of water passing a fixed point per unit time
- (D) all of these

60. A seismic gap is :

- (A) a large chasm opened by an earthquake
- (B) the center of a tectonic plate where earthquakes rarely occur
- (C) a segment of an active fault where earthquakes have not occurred for a long time
- (D) the time between large earthquakes

1. Flat-topped seamounts are known as :
(A) Submarine volcanoes (B) Guyots
(C) Groynes (D) Terraces
2. Stromatolites are :
(A) Green algae (B) Organo-sedimentary structures
(C) Blue algae (D) Sedimentary structure
3. The average gravitational force of the earth is :
(A) 98 cm/s^2 (B) 980 cm/s^2
(C) 9800 cm/s^2 (D) 980 cm/s
4. Exfoliation is a form of :
(A) Chemical weathering (B) Biological weathering
(C) Biochemical weathering (D) Physical weathering
5. Coral reefs are generally found in the latitudinal extensions of :
(A) $20^\circ\text{N} - 20^\circ\text{S}$ (B) $30^\circ\text{N} - 30^\circ\text{S}$
(C) $60^\circ\text{N} - 60^\circ\text{S}$ (D) $45^\circ\text{N} - 45^\circ\text{S}$
6. Soils in which sand, clay and humus are found more or less in equal proportions are called :
(A) Loamy soils (B) Regur
(C) Chernozem (D) Pedalfar
7. Flat-topped hills or small mountains formed by stream action are called :
(A) Mesas (B) Buttes
(C) Cuestas (D) Stream terraces

8. 'Natural levee' is an example of :
- (A) Point-bar deposits (B) Channel-fill deposits
(C) Flood plain deposits (D) Flood basin deposits
9. The clinometers compass can be used to find the structural trend of rocks containing the minerals :
- (A) Magnetite, Pyrite & Sphalerite
(B) Galena, Sphalerite & Gold
(C) Chromite, Magnetite & Galena
(D) None of the above
10. Find the odd man out :
- (A) Lamination (B) Slaty cleavage
(C) Schistosity (D) Foliation
11. Stress is expressed as : ($P = \text{Load}$ & $A = \text{Area}$) :
- (A) P/A (B) A/P
(C) $A \times P$ (D) $A/P \times 100$
12. Shear strain is defined as :
- (A) Change in angle between planes at right angle
(B) Distortion of fiber
(C) Change in angle between two angles
(D) Strain that normally occurs
13. According to the Wegener the vast master continent was named :
- (A) Panthalassa (B) Pangaea
(C) Gondwana (D) Laurasia
14. According to plate tectonics theory the Himalayas were formed because of the :
- (A) Southward movement of the Chinese-plate against Indian-plate
(B) Eastward movement of the Chinese-plate and westward movement of the Indian-plate
(C) Northward movement of the Indian-plate against Chinese-plate
(D) None of these

15. The Himalaya may be divided into four successive zones from south to north are :
- (A) Higher Himalaya, Lesser Himalaya, Sub-Himalaya and Trans-Himalaya
 - (B) Trans-Himalaya, Lesser Himalaya, Higher Himalaya and Sub-Himalaya
 - (C) Sub-Himalaya, Lesser Himalaya, Higher Himalaya and Trans-Himalaya
 - (D) Sub-Himalaya, Higher Himalaya, Lesser Himalaya and Trans-Himalaya
16. The zone of deep and intermediate earthquakes associated with fault zones dipping obliquely into the mantle often called :
- (A) Orogenic zone
 - (B) Bode zone
 - (C) Benioff zone
 - (D) Keta zone
17. Consider the following Statements :
1. Palaeozoic era started about 600 million years ago
 2. Reptiles evolved during Carboniferous Period
 3. Permian was the longest period in Palaeozoic era
- Which of the statements given above are correct ?
- (A) 1 and 2 only
 - (B) 2 and 3 only
 - (C) 1 and 3 only
 - (D) 1, 2 and 3
18. Source of famous Makrana Marble belongs to the :
- (A) Delhi Super Group
 - (B) Dharwar Super Group
 - (C) Bhilwara Super Group
 - (D) Gondwana Super Group
19. Iron Ore Group of Singhbhum is equivalent to :
- (A) Bijawar Group
 - (B) Shillong Group
 - (C) Vanivilas Group
 - (D) Bababudan Group
20. Representative plant fossil of Upper Gondwana is :
- (A) Ptilophyllum
 - (B) Glossopteris
 - (C) Gangamopteris
 - (D) Vertebraria
21. Dimorphic in foraminifera means :
- (A) Two parts of a single test
 - (B) Two chambered test
 - (C) Two forms of the same species
 - (D) None of the above

22. The Trilobites are confined to the :
- (A) Azoic (B) Palaeozoic
(C) Mesozoic (D) Tertiary
23. Three toes are the characteristics of :
- (A) Eohippus (B) Mesohippus
(C) Pliohippus (D) All of the above
24. Lamellibranchia is the name of :
- (A) Phylum (B) Class
(C) Order (D) Sub-order
25. Quartz mineral belongs to :
- (A) Sorosilicates (B) Inosilicates
(C) Cyclosilicates (D) Tectosilicates
26. Olivine mineral is crystallized in :
- (A) Monoclinic system (B) Triclinic system
(C) Hexagonal system (D) Orthorhombic system
27. Garnets are characterized by their :
- (A) Rhombodecahedron form (B) Trapezohedron form
(C) Octahedron form (D) Both (A) & (B)
28. Match the following correctly :
- | I | II |
|------------------------|------------------|
| 1. Isometric system | i. Galena-type |
| 2. Hexagonal system | ii. Beryl-type |
| 3. Tetragonal system | iii. Zircon-type |
| 4. Orthorhombic system | iv. Barytes-type |
- (A) 1-i, 2-ii, 3-iii, 4-iv
(B) 1-ii, 2-iii, 3-iv, 4-i
(C) 1-iii, 2-iv, 3-i, 4-ii
(D) 1-iv, 2-i, 3-ii, 4-iii
29. Acicular habit is shown by :
- (A) Calcite (B) Orpiment
(C) Natrolite (D) Zircon

30. Which type of extinction is often shown by Quartz mineral ?
 (A) Straight (B) Oblique
 (C) Symmetrical (D) Wavy
31. Schillerization is shown by :
 (A) Plagoclase (B) Augite
 (C) Hypersthene (D) Diamond
32. What is the hardness of mineral Staurolite ?
 (A) 5 – 5.5 (B) 5 – 6
 (C) 6 – 6.5 (D) 7 – 7.5
33. The crystallization of magma is governed by the factor/factors :
 (A) Temperature and pressure (B) Composition of magma
 (C) Viscosity of magma (D) All the above
34. Plutonic igneous rocks are formed under :
 (A) Deep seated and moderate temperature-pressure conditions
 (B) Near the earth's surface and high temperature pressure conditions
 (C) Deep seated high temperature pressure and fast cooling conditions
 (D) Deep seated high temperature-pressure and slow cooling conditions
35. Well rounded, well sorted sediments are said to be :
 (A) Texturally mature (B) Compositionally mature
 (C) Texturally immature (D) Compositionally immature
36. Sandstone containing considerable proportion of feldspar derived from the rapid weathering of granite mass is known as :
 (A) Arkose (B) Graywacke
 (C) Arenite (D) Sub-Graywacke
37. Hornfelses are the example of _____ metamorphism.
 (A) Dynamic (B) Thermal
 (C) Dynamo-thermal (D) All of the above

38. Process of metamorphism causes _____ of rock material.
- (A) Crystallization (B) Recrystallization
(C) Lithification (D) Diagenesis
39. Deccan traps are predominantly tholeiitic in nature and characterized by :
- (A) Higher Fe and Ti (B) Lower Fe and Ti
(C) Higher Al and Ca (D) Higher Mg and Na
40. Elements with an affinity for sulphur are termed as :
- (A) Chalcophile (B) Siderophile
(C) Atmophile (D) None of the above
41. Minerals in which a country has total inadequacy and depend upon foreign sources for its needs are described as :
- (A) Strategic minerals (B) Critical minerals
(C) Essential minerals (D) Expendable minerals
42. Chalcocite is a/an _____ of copper.
- (A) Oxide (B) Sulphide
(C) Carbonate (D) Hydroxide
43. Most of the copper deposits have been formed by :
- (A) Hydrothermal process (B) Magmatic concentration
(C) Contact metamorphism (D) Supergene enrichment
44. The biggest iron ore field of India is situated in the :
- (A) Singhbhum distt. (B) Mayurbhanj distt.
(C) Cuttack distt. (D) Kalahandi distt.
45. The conditions necessary for the formation of an oil pool :
- (A) Source Rock (B) Migration and accumulation
(C) Suitable reservoir and Trap (D) All of the above
46. Proximate analysis of coal determines :
- (A) Moisture content and volatile matter
(B) Ash percentage
(C) Fixed carbon and heating calorific value
(D) All of the above

47. Coal has :
- | | |
|------------------------|------------------------|
| (A) Sedimentary origin | (B) Metamorphic origin |
| (C) Igneous origin | (D) None of the above |
48. Source rock in the Bombay High oil field is :
- | | |
|---------------|---------------|
| (A) Limestone | (B) Sandstone |
| (C) Shale | (D) Clay |
49. Presence of fluoride in water greater than permissible level of 1.5 mg/lit. causes :
- | | |
|----------------------------|-----------------------|
| (A) Cardiovascular disease | (B) Methemoglobinemia |
| (C) Hepatitis | (D) Dental fluorosis |
50. Which seismic method is/are more commonly used for groundwater surveys ?
- | |
|--|
| (A) Seismic reflection |
| (B) Seismic refraction |
| (C) Both seismic refraction and seismic reflection |
| (D) Seismic reflection with gravity method |
51. Permeability of a material is a measure of :
- | |
|--|
| (A) Voids available in the material |
| (B) Voids and solid particles available in the material |
| (C) Its capacity to transmit water through its interstices |
| (D) Its capacity to retain water in the material |
52. The zone which is found below the water table is known as :
- | | |
|----------------------|------------------------|
| (A) Zone of aeration | (B) Zone of saturation |
| (C) Vadose zone | (D) Capillary zone |
53. The P-wave velocities are highest in :
- | | |
|----------|-------------|
| (A) Air | (B) Water |
| (C) Sand | (D) Granite |
54. Earthquakes whose depth of focus ranges between 300—700 km are known as :
- | | |
|-------------------------------|------------------------------------|
| (A) Shallow focus earthquakes | (B) Intermediate focus earthquakes |
| (C) Deep focus earthquakes | (D) Normal earthquakes |

55. A plate comprises :
- (A) Crust only
 - (B) Crust and upper portion of mantle
 - (C) Crust and middle portion of mantle
 - (D) Crust and whole of the mantle
56. What may be the causes of plate motion ?
- (A) The gravitational difference
 - (B) The difference between heat flow values
 - (C) The convection-current condition in the mantle zone
 - (D) All the above
57. Which region of the electromagnetic spectrum is known for all-weather remote sensing ?
- (A) Visible
 - (B) Microwave
 - (C) Thermal
 - (D) Hyperspectral
58. Which one of the following is a geostationary satellite ?
- (A) Landsat
 - (B) Insat
 - (C) IRS
 - (D) SPOT
59. A stream's discharge is :
- (A) influenced by channel width and depth, stream gradient, channel shape, and channel roughness
 - (B) the product of a stream's velocity and channel cross-sectional area
 - (C) the volume of water passing a fixed point per unit time
 - (D) all of these
60. The process of fluidizing water-saturated soil during an earthquake is known as :
- (A) Gelatinization
 - (B) Quick sand
 - (C) Liquefaction
 - (D) None of these

1. Which of the following is not a mineral ?
(A) Amethyst (B) Augite
(C) Phlogopite (D) Coprolite
2. A stable part of the Earth's crust that has been little deformed for a prolonged period :
(A) Island arc (B) Ocean floor
(C) Craton (D) Foreland basin
3. The process of jumping, bouncing and drifting action of sand particles.
(A) Hydraulic action (B) Saltation
(C) Siltation (D) Solifluction
4. Which of the following is not correct ?
(A) The present is key to past
(B) Age of the Earth is 4.6 Ga
(C) Crust is the topmost layer of Lithosphere
(D) Volcanoes are restricted to Ocean floor
5. A mass of soil or other material sliding along a curved and rotational surface :
(A) Slump (B) Solifluction
(C) Creep (D) Debris flow
6. Which of the following belongs to Karst topography ?
(A) Lapis (B) Hogback
(C) Cuesta (D) All of the above
7. Which of the following is not a structural landform ?
(A) Scarp (B) Terra Rosa
(C) Graben (D) Cuesta

8. Which of the Soil horizons is also called the zone of Eluviation ?
(A) O Horizon (B) A Horizon
(C) B Horizon (D) R Horizon
9. The angle between the bedding surface with the horizontal in vertical plane :
(A) Dip (B) Rake
(C) Heave (D) Hade
10. The stress component which inhibits sliding :
(A) Shear stress (B) Normal stress
(C) Effective stress (D) Both (A) and (B)
11. The angle between the limbs of isoclinal fold is :
(A) 90 (B) 45
(C) 180 (D) 0
12. Which of the following structures place older rocks over the younger ones ?
(A) Folds (B) Unconformities
(C) Thrusts (D) Normal Faults
13. The discontinuity between lower and upper continental crust is known as :
(A) Conrad Discontinuity (B) MOHO
(C) Lehman Discontinuity (D) Gutenberg Discontinuity
14. Ophiolites are found at :
(A) Mid Oceanic ridges (B) Pacific type of orogeny
(C) Collision Mountain Belts (D) Andean type orogeny
15. The velocity of S-waves is lowest in :
(A) Upper Crust (B) Outer Core
(C) Mantle (D) Inner Core

16. Pratt's hypothesis assumes :
- (A) Constant depth to the base of outermost shell of the Earth
 - (B) Density of the outer shell of the Earth varies with topography
 - (C) Both (A) and (B)
 - (D) None of the above
17. Which of the following statements is not true ?
- (A) The origin of surface water is meteoric
 - (B) Groundwater is found in the porous media
 - (C) Piezometric surface is the water level in confined condition
 - (D) Water below the ground surface is groundwater
18. Hydraulic conductivity of a rock is dependent on :
- (A) Effective porosity
 - (B) Fluid viscosity
 - (C) Hydraulic gradient
 - (D) Both (A) and (B)
19. Which of the following lithologies is a good aquifer ?
- (A) Sand stone
 - (B) Limestone
 - (C) Mudstone
 - (D) Granite
20. The maximum permissible limit of Fluoride in water for drinking purposes :
- (A) 3.0 mg/L
 - (B) 3.5 mg/L
 - (C) 2.5 mg/L
 - (D) 1.5 mg/L
21. The reservoir rocks of petroleum are generally :
- (A) Igneous rocks
 - (B) Metamorphic rocks
 - (C) Sedimentary rocks
 - (D) All of the above
22. Coal is constituted of:
- (A) C, O, N
 - (B) C, H, O, S, N, H₂O
 - (C) C, H, O, S, N
 - (D) C, H, S, H₂O

23. Primary migration of oil from the source rock is mostly due to :
- (A) Decrease in permeability of source rock
 - (B) High pressure of source rock
 - (C) Compaction of source rock
 - (D) All of the above
24. Carbon content is maximum in :
- (A) Anthracite
 - (B) Sub-bituminous
 - (C) Bituminous
 - (D) Lignite
25. The point of origin of earthquakes is known as :
- (A) Epicenter
 - (B) Magnitude
 - (C) Focus
 - (D) Release point
26. Most of the earthquakes are concentrated along :
- (A) Mid-ocean ridges
 - (B) Subduction zones
 - (C) Strike slip faults
 - (D) All of the above
27. S-waves do not pass through :
- (A) Crust
 - (B) Mantle
 - (C) Outer core
 - (D) Inner core
28. The density of continental crust is :
- (A) 2.7 gm/cm³
 - (B) 3.3 gm/cm³
 - (C) 0.7 gm/cm³
 - (D) 1.7 gm/cm³
29. Which of the following statements is not correct ?
- (A) Metamorphic rocks are formed due to high P and T
 - (B) Amphibolite, Phyllite and Quartzite are metamorphic rocks
 - (C) Andalusite is a high P and T mineral
 - (D) Sillimanite is a high P and T mineral

30. The rock with porphyroblastic texture is :
- (A) Gneiss (B) Schist
(C) Quartzite (D) Marble
31. The relative abundance of the most abundant elements in the earth's crust in decreasing order :
- (A) O, Si, Al, Fe, Ca, Na (B) Si, O, Fe, Al, Ca, Na
(C) O, Si, Ca, Al, Fe, Na (D) Si, O, Al, Fe, Ca, Na
32. Fe, Co, Ni, Pt, Re :
- (A) These elements are chalcophile (B) These elements are lithophile
(C) These elements are atmophile (D) These elements are siderophile
33. Oligocene Epoch belongs to the Series :
- (A) Paleogene (B) Neogene
(C) Quaternary (D) Cretaceous
34. Which of the following is Eon ?
- (A) Paleozoic (B) Mesozoic
(C) Phanerozoic (D) Oligocene
35. The age of Muth quartzite of Kashmir :
- (A) Carboniferous (B) Devonian
(C) Cambrian (D) Silurian
36. Semri Group belongs to the Super Group :
- (A) Aravalli (B) Cuddapa
(C) Dharwar (D) Vindhyan
37. The symbol of form basal pinacoid is :
- (A) 010 (B) 011
(C) 001 (D) 101

38. The crystal system with $a \neq b \neq c$ and $\alpha = \gamma = 90^\circ$; $\beta \neq 90^\circ$:
- (A) Triclinic (B) Monoclinic
(C) Cubic (D) Rhombohedral
39. Most common triclinic minerals that show twinning :
- (A) Albite (B) Orthoclase
(C) Sanidine (D) All of the above
40. Polymorph of Al_2SiO_5 :
- (A) Andalusite (B) Sillimanite
(C) Kyanite (D) All of the above
41. Which of the following mineral belongs to ortho-pyroxene ?
- (A) Augite (B) Diopside
(C) Enstatite (D) Hedenbergite
42. The phenomenon of double refraction is found in :
- (A) Isotropic minerals (B) Uniaxial minerals
(C) Both (A) and (B) (D) None of the above
43. The shape of the indicatrix of optically positive mineral is :
- (A) Spherical (B) Oblate spheroid
(C) Oval (D) Prolate spheroid
44. Tourmaline belongs to :
- (A) Cyclosilicates (B) Sorosilicates
(C) Ionosilicates (D) Phyllosilicates
45. Glomeroporphyritic texture is found in :
- (A) Diorite (B) Dolerite
(C) Basalt (D) Charnockite
46. The primary minerals of Granite are :
- (A) Quartz, Olivine, Plagioclase, Pyroxene
(B) Quartz, K-feldspar, Biotite
(C) Quartz, Pyroxene, Biotite
(D) Biotite, K-feldspar, Olivine

47. The distinguished identification tool of Arkose is :
- (A) Presence of cleavage (B) Absence of cleavage
(C) Presence of feldspar (D) Absence of feldspar
48. Cross bedding is found in sedimentary rocks deposited in :
- (A) Alluvial fans (B) Point bars
(C) Levees (D) All of the above
49. The Spectral resolution of thermal IR image of LandSat 8 is :
- (A) 30 m (B) 50 m
(C) 100 m (D) 70 m
50. Which of the following remote sensing application is suitable for locating deforestation ?
- (A) Thermal IR (B) Color IR
(C) Microwave (D) Radar
51. Which of the following statements is not correct ?
- (A) Landslides pose a great threat to human life in plains
(B) The eruption of volcanoes is restricted to specific areas
(C) Earthquakes do not kill people but the buildings do
(D) Flood disaster is due to encroachment of flood plains
52. Tsunami is caused due to :
- (A) Excessive rainfall and flooding (B) Volcanic activity
(C) Earthquakes (D) Ocean storms
53. The largest mica deposits are found in :
- (A) Karnataka (B) Jharkhand
(C) Orissa (D) Goa
54. Geologically the Porphyry copper deposits occur in :
- (A) Intrusive rocks (B) Extrusive rocks
(C) Veins (D) All of the above

55. Epithermal deposits occur mainly as :
- (A) Nuggets (B) Basalts
(C) Sedimentary rocks (D) Veins
56. Which of the following minerals contain Thorium ?
- (A) Uraninite (B) Pyrite
(C) Monazite (D) Tourmaline
57. Brachiopods were abundant in :
- (A) Paleozoic (B) Mesozoic
(C) Cenozoic (D) Present
58. The Siwaliks are known for the following fossils :
- (A) Trilobites (B) Vertebrates
(C) Dinosaurs (D) All of the above
59. The earliest known fossil horse is :
- (A) Epihippus (B) Orohippus
(C) Meshippus (D) Megahippus
60. Which of the following is not a Lower Gondwana plant fossil ?
- (A) Gangamopteris (B) Glossopteris
(C) Dicroidium (D) Rhizomaspora

1. The statement "Present is key to the past" describes which of the basic geological concepts :
 - (A) Catastrophism
 - (B) Uniformitarianism
 - (C) Principle of fossil succession
 - (D) Exoschism

2. Proponents of catastrophism envision the age of earth as :
 - (A) Much older than the current estimates
 - (B) Much younger than the current estimates
 - (C) Same as the current estimates
 - (D) They didn't address the age of earth

3. Resistivity surveying method is used to measure which of the following physical property :
 - (A) Dielectric constant
 - (B) Density
 - (C) Electrical conductivity
 - (D) Remanence

4. The boundary between the saturated zone and the unsaturated zone is called :
 - (A) Aquifer
 - (B) Water table
 - (C) Aquiclude
 - (D) Cone of depression

5. Which of the following is not a feature of the ocean floor ?
 - (A) Oceanic ridge
 - (B) Ocean trench
 - (C) Guyot
 - (D) Fjords

6. Choose the option that does not fit the pattern :
 - (A) Abyssal plain
 - (B) Seamount
 - (C) Oceanic ridge
 - (D) Continental slope

7. The Indian plate collided with Eurasian plate to form Himalayas approximately :
 - (A) 100 million years ago
 - (B) 200 million years ago
 - (C) 50 million years ago
 - (D) 500 million years ago

8. Choose the correct statement :
- (A) Anticlines dip towards each other
 - (B) Synclines dip away from each other
 - (C) Axial plane divides the fold into two unequal parts
 - (D) All of the above statements are wrong
9. What happens when accumulation of snow/ice exceeds its ablation in the glacier ?
- (A) Glacier recedes
 - (B) Glacier advances
 - (C) Maintains equilibrium
 - (D) Glacier fragments
10. Which of the following statement about the Water table is true ?
- (A) The water table is generally flat
 - (B) The water table follows topography
 - (C) The water table is always shallow
 - (D) The water table is below the land surface in lakes
11. Which one of the following is a sign of Karst ?
- (A) Sinkholes
 - (B) Caves
 - (C) Speleothems
 - (D) All of the above
12. The origin of simplest form of life is attributed to :
- (A) Archaean era
 - (B) Proterozoic era
 - (C) Cambrian era
 - (D) Carboniferous period
13. Caves tend to form in :
- (A) Granite rocks
 - (B) Basalt rocks
 - (C) Carbonate rocks
 - (D) All of the above
14. Shiva lingam in Holy Amarnath cave is an example of :
- (A) Icicle
 - (B) Stalagmite
 - (C) Cone of depression
 - (D) Speleothem
15. Jet Stream is a :
- (A) Warm current
 - (B) Ocean current
 - (C) Upper air westerlies
 - (D) Local wind

16. The solid rocky shell between the crust and the outer core is called :
- (A) Lithosphere (B) Mantle
(C) Continental shelf (D) Subduction zone
17. The sum total of all life on earth refers to :
- (A) Lithosphere (B) Biosphere
(C) Hydrosphere (D) Atmosphere
18. Which rocks originate at the surface of the solid earth ?
- (A) Metamorphic (B) Igneous
(C) Sedimentary (D) All of the above
19. Deep valleys eroded into the continental slope and shelf are called :
- (A) Submarine canyons (B) Abyssal valley
(C) Oceanic trenches (D) Oceanic ridge
20. Most of the volcanic activity on the seafloor takes place on :
- (A) Continental rises (B) Mid-oceanic ridges
(C) Abyssal plains (D) Continental shelves
21. Which of the following describes the build up and the release of stress during an earthquake ?
- (A) The Richter scale
(B) The Modified Mercalli scale
(C) The elastic rebound theory
(D) Moment magnitude scale
22. Earthquakes can occur with :
- (A) Normal faulting (B) Thrust faulting
(C) Reverse faulting (D) All of the above
23. The bulk modulus measures :
- (A) The resistance to change in electric field
(B) The resistance to change in volume
(C) The resistance to change in gravity field
(D) The resistance to change in electromagnetic field

24. During the passage of P and S waves through the rock, the rock particle move :
- (A) Back and forth parallel to the directions of the waves
 - (B) Perpendicular to the direction of waves
 - (C) In rolling elliptical and circulation motions
 - (D) Differently with respect to these two waves
25. Which of the following problems is associated with climate change ?
- (A) Carbon dioxide emissions
 - (B) Methane emissions
 - (C) Deforestation
 - (D) All of the above
26. Which of the following observations may indicate the forthcoming destructive earthquake ?
- (A) Crustal deformation and increase in the frequency of small earthquakes
 - (B) Abrupt increase in the river discharge
 - (C) Extreme weather conditions
 - (D) Landslides
27. Bouguer gravity anomaly refers to gravity observations adjusted for the :
- (A) Effects of sun and moon attractions
 - (B) Effects due to earth's rotation
 - (C) Effects due to Change in height
 - (D) All of the above
28. The most common structural element of the silicate mineral group is :
- (A) A silicon-aluminium tetrahedron
 - (B) A silicon-oxygen tetrahedron
 - (C) A silicon-oxygen octahedron
 - (D) A silicon-nitrogen tetrahedron
29. Which of the following is the most abundant cation in the continental crust ?
- (A) Silicon
 - (B) Aluminium
 - (C) Oxygen
 - (D) Iron

30. Which of the following statements regarding the density of minerals is true ?
(A) Density decreases with increasing temperature
(B) Density depends on the atomic weight of the ions in a mineral
(C) Density depends on the closeness of the atomic packing
(D) All of the above
31. Diamond is an example of what type of bonding ?
(A) Metallic (B) Bail
(C) Ionic (D) Covalent
32. The chemical formula $(\text{Mg, Fe})_2\text{SiO}_4$ describes which of the following minerals ?
(A) Pyroxene (B) Olivine
(C) Mica (D) Feldspar
33. The most common rock forming minerals are :
(A) Silicates (B) Carbonates
(C) Oxides (D) Sulphides
34. Remote sensing uses :
(A) Electric waves (B) Seismic waves
(C) Magnetic waves (D) Electro-magnetic waves
35. All the features on the surface of earth emit radiation that has :
(A) Longer wavelengths
(B) Shorter wavelengths
(C) Both short and long wavelengths
(D) Ultraviolet wavelengths
36. Which of the following is not a renewable energy source ?
(A) Solar (B) Hydropower
(C) Geothermal (D) Uranium
37. Which of the following rock types is most likely to be the best oil reservoir ?
(A) Shale (B) Sandstone
(C) Granite (D) Salt

38. A permeable rock that contains hydrocarbon fluid and gases is called :
- (A) Oil reservoir (B) Oil trap
(C) Source bed (D) Salt dome trap
39. The valley glaciers, most common in our state, are also known as :
- (A) Gorge glaciers (B) Upland glaciers
(C) Alpine glaciers (D) Lowland glaciers
40. Glaciation occurs due to :
- (A) precipitation and melting of snow
(B) burial and metamorphism of snow
(C) ablation and surge
(D) drift and movement of ice
41. Which of the following is a glacial deposit and not an erosional feature ?
- (A) A horn (B) A cirque
(C) An arte (D) A moraine
42. The loess paleosols of Kashmir Karewas preserve the climatic record of the region for about :
- (A) 65 million years (B) 4.6 billion years
(C) 1.6 million years (D) 0.65 million years
43. A gently sloping platform of bedrock that is left behind as a mountain front erodes is called :
- (A) Alluvial fan (B) Pediment
(C) Mesa (D) Erg
44. The oldest rocks of Kashmir Himalayas, known as Salkhala, are of :
- (A) Devonian (B) Ordovician age
(C) Silurian age (D) Pre-Cambrian age
45. The Muth quartzite is of :
- (A) Cambrian age (B) Permian age
(C) Jurassic age (D) Devonian age

46. The rate of cooling of magma/lava is reflected by :
- | | |
|----------------------------|-------------------------|
| (A) Mineralogy of the rock | (B) Color of the rock |
| (C) Texture of the rock | (D) Density of the rock |
47. Which of the following minerals is the most abundant mineral in ultramafic rocks ?
- | | |
|------------------------|-------------|
| (A) Amphibole | (B) Olivine |
| (C) Sodium plagioclase | (D) Quartz |
48. The fine grained equivalent of granite is :
- | | |
|--------------|--------------|
| (A) Basalt | (B) Andesite |
| (C) Rhyolite | (D) Gabbro |
49. Which of the following minerals is least susceptible to chemical weathering ?
- | | |
|-------------|-----------------|
| (A) Quartz | (B) Calcite |
| (C) Olivine | (D) Plagioclase |
50. A feldspar rich sandstone is called :
- | | |
|--------------------|-----------------|
| (A) Shale | (B) Arkose |
| (C) Quartz arenite | (D) Litharenite |
51. Which mineral is responsible for the strong foliation in schist ?
- | | |
|------------|-------------|
| (A) Mica | (B) Calcite |
| (C) Quartz | (D) Foliate |
52. Metasomatism is :
- | |
|--|
| (A) The change in the bulk composition of a rock during metamorphism |
| (B) The parallel alignment of minerals in a metamorphic rock |
| (C) The metamorphism caused by nearby intrusions |
| (D) The metamorphism caused by tectonic movements along faults |
53. A talus cone is produced by a :
- | | |
|-----------------|----------------------|
| (A) Mud flows | (B) Rock fall |
| (C) Rock glides | (D) All of the above |
54. Which of the following mass movements is the fastest ?
- | | |
|----------------------|----------------|
| (A) Debris avalanche | (B) Soil creep |
| (C) Earthflow | (D) Mudflows |

55. A seamount is :
- (A) A submerged volcano
 - (B) A coral reef above a submerged volcano
 - (C) A small rise in the seafloor
 - (D) All of the above
56. Which of the following statements about crustal deformation is false ?
- (A) Hotter rocks are more likely to deform than cooler rocks
 - (B) Generally igneous rocks are less deformable than most sedimentary rocks
 - (C) Young sediments are easily deformed
 - (D) Rocks under low confining pressure are more likely to deform than rocks under high confining pressure
57. Upfolds of layered rock are called :
- (A) Faults
 - (B) Synclines
 - (C) Anticlines
 - (D) Unconformities
58. Which of the following radioactive isotopes has the shortest half-life ?
- (A) Rubidium-87
 - (B) Uranium-238
 - (C) Carbon-14
 - (D) Potassium-40
59. What causes the tsunami ?
- (A) Gravity
 - (B) Undersea event
 - (C) Ocean currents
 - (D) Wind
60. The last great ice age existed in :
- (A) Pleistocene
 - (B) Pliocene
 - (C) Triassic
 - (D) Miocene

1. Moho is deepest under :
 - (a) Himalaya
 - (b) Japan island arc
 - (c) Atlantic Ocean Ridge
 - (d) Cratons

2. Which of these crystal systems is also known as isometric crystal system ?
 - (a) Tetragonal system
 - (b) Cubic system
 - (c) Orthorhombic system
 - (d) Triclinic system

3. The largest reservoir of carbon on earth is :
 - (a) Oceans
 - (b) Atmosphere
 - (c) Carbonate rocks
 - (d) Biosphere

4. Which of the plate boundary is neither constructive nor destructive ?
 - (a) Ocean ridge
 - (b) Transform fault
 - (c) Subduction zone
 - (d) None

5. Trilobites belong to the phylum :
 - (a) Brachiopoda
 - (b) Mollusca
 - (c) Chordata
 - (d) Arthropoda

6. The earliest stage of metamorphic deformation is indicated by :
 - (a) Schistosity
 - (b) Phyllitic structure
 - (c) Slaty cleavage
 - (d) Gneissosity

7. Which of these erosional features is produced by wind action ?
 - (a) Yardangs
 - (b) Stack
 - (c) Cirque
 - (d) Potholes

8. Most of the banded iron formation was deposited :
 - (a) From 3.5 until 2.5 Ga
 - (b) At 1.8 Ga
 - (c) At 0.8 Ga
 - (d) 0.6 Ga

9. Thorium-rich monazite sand deposits in India are found in :
- (a) Gujrat (b) Kerala
(c) Maharashtra (d) Chhatisgarh
10. Identify the odd one :
- (a) Slickensides (b) Slickenlines
(c) Striations (d) Mylonite
11. Which of the following crystals shows polysynthetic twinning ?
- (a) Gypsum (b) Aragonite
(c) Fluorite (d) Quartz
12. Subduction zones metamorphism is characterized by :
- (a) High temperature and high pressure
(b) Low temperature and high pressure
(c) Low temperature and low pressure
(d) Options (a), (b) and (c) are all incorrect
13. Which has the highest heat content ?
- (a) Anthracite (b) Peat
(c) Semi-anthracite (d) Lignite
14. The rock with >90% olivine is called :
- (a) Pyroxenite (b) Dunite
(c) Gabbro (d) Diabase
15. A uniaxial mineral is optically +ve if :
- (a) O-ray is slow (b) O-ray is fast
(c) E-ray is fast (d) None of these
16. The age range of Cretaceous Period is :
- (a) 206 m.y. to 144 m.y. (b) 490 m.y. to 443 m.y.
(c) 248 m.y. to 206 m.y. (d) 144 m.y. to 65 m.y.

17. Which of the following is an inert gas ?
- (a) Chlorine (b) Hydrogen
(c) Argon (d) Fluorine
18. Conodonts first appeared in :
- (a) Late Cambrian (b) Middle Proterozoic
(c) Early Silurian (d) Late Triassic
19. When an erosional surface separates sequences of rock that are parallel to each other, the term used is :
- (a) Paraunconformity (b) Nonconformity
(c) Disconformity (d) Angular unconformity
20. Dendrochronology refers to :
- (a) Dating of tree rings (b) Glacial varves
(c) Pollen studies (d) Dating of cave deposits
21. Asthenosphere lies :
- (a) Between mantle and outer core
(b) Between outer core and inner core
(c) Within upper mantle
(d) Between upper mantle and lower mantle
22. Which of these stands more favorably for non-organic origin of petroleum ?
- (a) Presence of porphyrins
(b) Depletion in carbon-13
(c) Association of mud volcanoes with oil fields
(d) Presence of isoprenoids
23. Dripstone that rises from the floor of a cave in carbonate terrain is called :
- (a) Flow stone (b) Stalactite
(c) Dogtooth spar (d) Stalagmite

24. A confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer is termed :
- (a) Aquifer (b) Aquitard
(c) Aquifuge (d) Aquiclude
25. Chemical composition of agate is :
- (a) KAlSi_3O_8 (b) Mg_2SiO_4
(c) $\text{NaAlSi}_3\text{O}_8$ (d) SiO_2
26. Folds that maintain uniform layer thickness are called :
- (a) Similar folds (b) Concentric folds
(c) Cusped folds (d) Lobate folds
27. Folds that maintain uniform layer thickness are called :
- (a) Outlier (b) Nappe
(c) klippe (d) Inlier
28. Precipitation of calcium, sulfur and oxygen in marine conditions results in the deposition of:
- (a) Gypsum (b) Halite
(c) Limestone (d) Dolomite
29. Erosion by wearing down or rubbing away is termed :
- (a) Saltation (b) Abrasion
(c) Attrition (d) Regelations
30. Identify the glacial erosional feature among these :
- (a) Esker (b) Tillite
(c) Moraines (d) Cirque
31. Texture of a metamorphic rock composed of minerals bound by their own crystal faces is called :
- (a) Xenoblastic (b) Crystalloblastic
(c) Idioblastic (d) Poikiloblastic

32. Elastic rebound theory is an explanation for how energy is spread :
- (a) During earthquakes
 - (b) During glacier down-slope movement
 - (c) During volcanic eruption
 - (d) During flow of water down a waterfall
33. Water entrapped in the interstices of a sedimentary or extrusive igneous rock at the time of its deposition is called :
- (a) Connate water
 - (b) Meteoric water
 - (c) Magmatic water
 - (d) Juvenile water
34. Among the natural disaster during the year 2010 the maximum casualties were due to :
- (a) Floods
 - (b) Earthquakes
 - (c) Volcanic eruptions
 - (d) Heat waves
35. Sliding is caused by :
- (a) Normal stress
 - (b) Shear stress
 - (c) Both of these
 - (d) None of these
36. Kashmir Valley owes its origin to :
- (a) Main Central Thrust
 - (b) Panjal Thrust
 - (c) Murree Thrust
 - (d) Zaskar Thrust
37. Identify the odd one :
- (a) Pleistocene
 - (b) Neogene
 - (c) Holocene
 - (d) Oligocene
38. Genus *Trigonia* belongs to the phylum :
- (a) Arthropoda
 - (b) Mollusca
 - (c) Echinodermata
 - (d) Chordata

39. The angle between two crystal faces is :
- (a) Critical angle (b) Solid angle
(c) Interfacial angle (d) Refraction angle
40. When sedimentary laminae lying transverse to the main stratification planes of the strata, the structure is termed :
- (a) Cross bedding (b) Flaser bedding
(c) Laminar bedding (d) Drift bedding
41. The live example of continent-continent collision is provided by :
- (a) Rocky mountains (b) Andes mountains
(c) Japanese islands (d) Himalaya
42. Contour lines joining points of equal stratigraphic unit thickness is known as :
- (a) Isogon (b) Isocline
(c) Isobar (d) Isopach
43. Manebach Law, Carlsbad Law and Braveno Law are related to describing :
- (a) Twinning (b) Birefringence
(c) Optic axis (d) Interfacial angle
44. Rock flour is produced by :
- (a) Glacier erosion (b) Wind erosion
(c) River erosion (d) Faulting
45. Becke lens is used to view :
- (a) Interference figures (b) Pleochroic halos
(c) 2V angle (d) Optic axis
46. Goniatite, Ceratite and Ammonite suture patterns characterize :
- (a) Foramifera (b) Ostracoda
(c) Ammonoidea (d) Echinoidea

47. Damodhar River Valley accounts for three-fourths of India's :
- (a) Iron deposits (b) Zinc deposits
(c) Copper deposits (d) Coal deposits
48. Which of the following is Japanese Government remote sensing satellite mission ?
- (a) Landsat (b) IRS
(c) ASTER (d) MODIS
49. From the oldest to the youngest, the correct stratigraphic order for the Siwalik Group is:
- (a) Kamlial → Chinji → Nagri → Dok Pathan
(b) Chinji → Kamlial → Nagri → Dok Pathan
(c) Dok Pathan → Nagri → Chinji → Kamlial
(d) Nagri → Chinji → Kamlial → Dok Pathan
50. The age of Muth Quartzite of Kashmir Valley is :
- (a) Devonian (b) Cambrian
(c) Permian (d) Pliocene
51. Which of these is the main factor that determines the texture of an igneous rock ?
- (a) Diffusion rate (b) Nucleation rate
(c) Rate of magma cooling (d) Crystal growth rate
52. Upper Jurassic Umia Beds of Kutch are known for :
- (a) Trilobite fossils (b) Graptolite fossils
(c) Plant fossils (d) Dinosaurs eggs
53. A sedimentary sequence comprising sandstones, shales and conglomerates deposited in continental or shallow marine conditions in front of a rising mountain is termed :
- (a) Quartz arenite (b) Arkose
(c) Greywacke (d) Mollase

Geology & Geophysics - 2010

M.Sc. Geology & Geophysics

- The angle subtended by the normals to two crystal faces is known as :
 - Critical angle
 - Interfacial angle
 - Solid angle
 - Refraction angle
- When an anticlinal fold lies on its side and limbs of the fold are equally inclined, the fold is described as :
 - Recumbent isoclinal anticline
 - Plunging anticline
 - Monocline
 - Ptygmatic fold
- The textural term for metamorphic minerals bounded by their own crystal faces is :
 - Xenoblastic
 - Idioblastic
 - Poikiloblastic
 - Porphyroblastic
- Laterite is formed by :
 - Weathering of a wide variety of rocks
 - Differentiation of alkaline magma
 - Hydrothermal metamorphism of limestone
 - Leaching of iron ores
- The erosional surface that separates sequences of rock that are parallel to each other is called :
 - Paraconformity
 - Nonconformity
 - Disconformity
 - Angular unconformity
- Asthenosphere is shallowest under :
 - Cratons
 - Ocean ridges
 - Island arcs
 - Mountain belts
- Ammonites became extinct same time as the :
 - Graptolites
 - Trilobites
 - Dinosaurs
 - Conodonts
- An internal sedimentary structure consisting of stratification at an angle to the principal bedding is known as :
 - Cross bedding
 - Flaser bedding
 - Drift bedding
 - Laminar bedding

9. Hawaiian islands are a typical example of :
- (a) Plume setting (b) Island arc tectonic setting
(c) Transform fault tectonics (d) Ocean ridge setting
10. Water occurring in the Unsaturated Zone between the land surface and :
- (a) Meteoric water (b) Connate water
(c) Juvenile water (d) Vadose water
11. Identify the one that is not covered under palynology :
- (a) Pollen (b) Diatoms
(c) Spores (d) Acritarchs
12. The thrust between Greater Himalayas and the Lesser Himalayas is :
- (a) ISZ (b) MBT
(c) HFT (d) MCT
13. The weak type of chemical bonding is :
- (a) Metallic bonding (b) Covalent bonding
(c) Residual bonds (d) Ionic bonding
14. Which is the correct stratigraphic order from oldest to the youngest ?
- (a) Semri→Rewa→Kaimur→Bhander
(b) Semri→Kaimur→Rewa→Bhander
(c) Kaimur→Semri→Bhander→Rewa
(d) Bhander→Rewa→Semri→Kaimur
15. Quartz belongs to the crystal system :
- (a) Trigonal (b) Monoclinic
(c) Tetragonal (d) Orthorombic
16. The time range of Carboniferous Period is :
- (a) 144 – 65 Ma (b) 490 – 443 Ma
(c) 433 – 417 Ma (d) 354 – 290 Ma
17. A fault on which the offset along the strike increases in one direction from an initial point and decreases in the other direction is called :
- (a) Reverse fault (b) Scissor fault
(c) Wrench fault (d) Transform fault

18. Major earthquake is the one that has Richter magnitude of :
- (a) 5.0 – 5.9 (b) 6.0 -- 6.9
(c) 7.0 – 7.9 (d) 8.0 – 8.9
19. Which of the following occurs core to the surface of earth ?
- (a) Graphite (b) Copper
(c) Iron (d) Diamond
20. The major coal deposits of India occur in :
- (a) Vindhyan Supergroup (b) Upper Gondwana deposits
(c) Dharwar Supergroup (d) Lower Gondwana deposits
21. Which of these is a sensor, not a satellite ?
- (a) Landsat (b) IRS
(c) MODIS (d) SPOT
22. Age of Karewa sediments of Kashmir is :
- (a) Miocene (b) Plio-Pleistocene
(c) Pleistocene (d) Miocene-Pleistocene
23. Which of the following mines are associated with nuclear power generation in India ?
- (a) Khetri mines (b) Zavar mines
(c) Jaduguda mines (d) Kolar mines
24. Carlsbad twinning is common in :
- (a) Orthoclase (b) Augite
(c) Plagioclase (d) Hornblende
25. Karst topography develops in :
- (a) Tectonically active terrain (b) Volcanically active terrain
(c) Sandstone terrain (d) Limestone terrain
26. Goniatic Suture and Ceratitic Suture are terms associated with the morphology of :
- (a) Brachiopod shell (b) Gastropod shell
(c) Cephalopod shell (d) Pelcepod shell

27. Modern horse is thought to have evolved from a small, dog-sized animal called :
- (a) *Miohippus* (b) *Hyracotherium or Eohippus*
(c) *Kalobatippus* (d) *Plesippus*
28. Of the following geophysical tools which one would provide direct evidence for iron ore deposit :
- (a) Gravity survey (b) Electromagnetic survey
(c) Magnetic survey (d) Electric-resistivity survey
29. Hydrological cycle begins with :
- (a) Precipitation (b) Evaporation
(c) Condensation (d) Runoff
30. Which of the statements is incorrect ?
- (a) Raster is pixel based; Vector is math-based
(b) Vector data is simpler to update and maintain whereas a raster image needs complete reproduction
(c) Vector file sizes are usually smaller than raster data
(d) Both raster and vector data permit easy overlay operations
31. Krishna-Godavari basin is known for :
- (a) High quality coal deposits (b) Natural gas reserves
(c) Uranium ore deposits (d) Petroleum reserves
32. Sand bar is a depositional feature of :
- (a) Wind action (b) River action
(c) Ocean currents (d) Glaciers
33. Which of these is intermediate between the metamorphic and the igneous rocks ?
- (a) Phyllite (b) Gneiss
(c) Migmatite (d) Schist
34. Which of the following is connate water ?
- (a) Meteoric water (b) Magmatic water
(c) Juvenile water (d) Fossil interstitial water

35. The most abundant element in the earth's crust is :
- (a) Oxygen (b) Silicon
(c) Hydrogen (d) Iron
36. Which is the plant root fossil ?
- (a) *Gangamopteris* (b) *Ptillophylum*
(c) *Glossopteris* (d) *Vertebraria*
37. Depth-wise ocean topography is :
- (a) Continental shelf-Continental rise-Continental slope-Abyssal plain
(b) Continental rise-Continental shelf-Continental slope-Abyssal plain
(c) Continental shelf-Continental slope-Continental rise-Abyssal plain
(d) Continental slope-Continental rise-Continental shelf-Abyssal plain
38. Identify the non-gas contributor to the earth's greenhouse effect :
- (a) Clouds (b) CFC
(c) CO₂ (d) CH₄
39. Which of these can provide point-source contaminants to potable water ?
- (a) Lithology (b) Municipal waste
(c) Industrial waste (d) Agricultural activity
40. The seismic discontinuity between lower mantle and outer is known as :
- (a) Mohorovičić discontinuity (b) Conrad discontinuity
(c) Gutenberg discontinuity (d) Lehman discontinuity
41. Which of the following erosional processes causes rounded and smooth rock surfaces ?
- (a) Attrition (b) Saltation
(c) Deflation (d) Abrasion
42. Which of the following metamorphic facies represents minimum P-T conditions ?
- (a) Greenschist facies (b) Sanidinite facies
(c) Zeolite facies (d) Glaucofane-schist facies
43. The term used for the ratio of the volume of void spaces to the total volume of rock or sediment is :
- (a) Hydraulic conductivity (b) Transmissivity
(c) Permeability (d) Porosity

44. Texturally and mineralogically immature sandstone that contain more than 15% clay minerals is called :
- (a) Quartz arenite (b) Arkose
(c) Greywacke (d) Lithic sandstone
45. The mineral to crystallize last from a mafic magma is :
- (a) Muscovite (b) Olivine
(c) Quartz (d) Orthoclase
46. Kerala beaches are known for :
- (a) Phosphatic deposit (b) Monazite sand
(c) Nickel deposit (d) Titanium deposit
47. Which of these is non-radiogenic dating technique ?
- (a) Potassium-argon dating (b) Carbon dating
(c) Luminescence dating (d) Uranium-lead dating
48. A map that shows areal extent and thickness variation of a stratigraphic unit is called :
- (a) Isobar map (b) Isotherm map
(c) Isoperm map (d) Isopach map
49. Which of the following is characterized by deep focus earthquakes ?
- (a) Pacific ring of fire (b) Pacific Rise
(c) African Rift Valley (d) Mid-Atlantic Ridge
50. When separate lateral moraines merge together they form :
- (a) Terminal moraine (b) End moraine
(c) Medial moraines (d) Reccessional moraine
51. A lime-rich mudstone which contains variable amounts of clays and aragonite is called :
- (a) Siltstone (b) Shale
(c) Mudstone (d) Marl
2. Crystal structure of Feldspar group of mineral is :
- (a) Framework silicate (b) Chain silicate
(c) Sheet silicate (d) Sorosilicate

53. Gradation of coking coal is done on the basis of:
- | | |
|----------------------|------------------------------|
| (a) Heat content | (b) Ash content |
| (c) Moisture content | (d) Ash and moisture content |
54. A layered limestone rock formed by the growth of blue-green algae (cyanobacteria) is called:
- | | |
|----------------|------------------|
| (a) Bioclasts | (b) Stromatolite |
| (c) Dolostones | (d) Ooides |
55. A smooth and rounded elongate mound of bedrock produced by glacial abrasion is called:
- | | |
|--------------|---------------------|
| (a) Aretes | (b) Roche moutonnee |
| (c) Moraines | (d) Drumlins |
56. Texture produced by exsolution lamelle of albite occurring in orthoclase or microcline is called:
- | | |
|-------------------------|------------------------|
| (a) Graphitic | (b) Perthitic texture |
| (c) Intersertal texture | (d) Myrmekitic texture |
57. When light enters a mineral its velocity decreases and the frequency:
- | |
|--|
| (a) Increases |
| (b) Decreases |
| (c) Remains same |
| (d) Initially increases and then decreases |
58. A mineral that appears in the form of another mineral is known as:
- | | |
|-----------------|---------------|
| (a) Isomorph | (b) Automorph |
| (c) Pseudomorph | (d) Polymorph |
59. Rapid growth in plants occurred in:
- | | |
|-------------------------|----------------|
| (a) Permo-Carboniferous | (b) Silurian |
| (c) Cambrian | (d) Ordovician |
60. Release of overburden produces:
- | | |
|---------------------|------------------------|
| (a) Columnar joints | (b) Exfoliation joints |
| (c) Conjugate joint | (d) Release joints |