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120 MINUTES

- Among the following which one will **not** affect the interference colour of the mineral?
A) Thickness of the section B) Orientation of the section
C) Birefringence D) Refractive index of the mineral
- Which three minerals are the primary sources of Rare Earth Elements (REE)?
A) Monazite, zircon, ilmenite
B) Bastnaesite, monazite and xenotime
C) Monazite, Bastnaesite, garnet
D) Bastnaesite, monazite and zircon
- “Free air correction” is applied to the data in ----- method.
A) Gravity B) Magnetic
C) Electromagnetic D) Electrical Resistivity
- Among the following which one gives the maximum reduction ratio?
A) Jaw crushers B) Cone crusher
C) Gyratory crushers D) Compound crusher
- As per BIS 105000 Standard for Drinking Water, the maximum permissible limit of Iron as Fe is -----.
A) 0.3 mg/l B) 0.1 mg/l C) 1.0 mg/l D) 1.5 mg/l
- Baratang island in the Andaman group of islands is known for its -----.
A) Hot springs B) Active stratovolcano
C) Dormant stratovolcano D) Mud volcano
- Lobelia inflata, Viola sagittata, Salvia pitcheri are accumulator plants for ----.
A) Cobalt B) Molybdenum
C) Copper D) Zinc
- Which one of the following crystal classes has no open forms?
A) Rhombic-Dipyramidal class
B) Hexagonal Scalenohedral class
C) Dihexagonal - Dipyramidal class
D) Hexoctahedral class
- The bauxite deposits of Shevaroy Hills, near Salem in Tamil Nadu, is derived from -----.
A) Charnockite B) Khondalite C) Granite D) Basalt

10. Solid fragments of the volcano that form when an explosive eruption shatters the pre-existing rocks
 A) Volcanic Bombs B) Tephra
 C) Volcanic blocks D) Pyroclasts
11. The three most abundant raw materials for making cement:
 A) Limestone, Iron oxide and Gypsum
 B) Limestone, Gypsum and Feldspar
 C) Limestone, Silica and Bauxite
 D) Limestone, Silica and Garnet
12. Name the only state in India where pyrite is mined:
 A) Bihar B) Jharkhand
 C) Karnataka D) Madhya Pradesh
13. Match List I with List II:

List I	List II
a. Corundum	1. Liquid immiscibility
b. Pyrite	2. Early Magmatic
c. Native Sulphur	3. Metamorphism
d. Kyanite	4. Sublimation

 A) a-2, b-1, c-4, d-3 B) a-1, b-3, c-2, d-4
 C) a-3, b-1, c-2, d-4 D) a-2, b-1, c-3, d-4
14. Assertion (A) : Index fossils are very useful for inter-regional correlation
 Reason (R): Index fossils have wide geographical distribution, narrow stratigraphic range and are often not influenced by ecological conditions

 A) Both A and R are true and R explains A
 B) Both A and R are true but R does not explain A
 C) A is true but R is false
 D) A is false but R is true
15. The lunar crust is mainly made up of anorthosite and -----.
 A) gabbroic anorthosite B) amphibolite
 C) dunite D) pyroxenite
16. What type of River is Godavari?
 A) Subsequent B) Antecedent
 C) Consequent D) Obsequent

25. Assertion (A) : Ankaramite is a mafic plutonic rock
Reason (R): It is a dark porphyritic variety of basanite containing abundant pyroxene and olivine phenocrysts
- A) Both A and R are true and R explains A
B) Both A and R are true but R does not explain A
C) A is true but R is false
D) A is false but R is true
26. Which of the following minerals are soluble in HCl with the evolution of H₂S?
1. Pyrite 2. Tetrahedrite 3. Pyrolusite 4. Rhodonite
- A) 1 & 2 only B) 2 & 3 only C) 1 & 4 only D) 1, 2 & 3 only
27. Marialite and Meionite are end members of the ----- series.
A) Epidote B) Riebeckite C) Scapolite D) Spodumene
28. Which among the following had the largest brain size?
A) Homohabilis B) Neanderthals
C) Australopithecus D) Homo erectus
29. ----- is a crescent-shaped depositional feature made of alluvium that accumulates on the inside bend of rivers below the slip-off slope
A) Longitudinal bar B) Foreset beds
C) Point bar D) Mouth bar
30. Which of the following is **not** true about stereographic projections as used in solving structural geology?
A) The outer circle functions as a compass; with North properly oriented, all bearings and strike directions are read from it
B) Dip is measured from the centre of the projection toward the outside
C) Poles to planes can be constructed by allowing a point representation of a plane
D) Lines of parallel, except for the centre parallel, do not pass through the centre of the projection and thus cannot be used.
31. Selenium is a pathfinder for -----.
A) Sulphides of epigenetic origin
B) Copper associated with porphyry
C) Auriferous vein in schists
D) Lead, Zinc-Silver deposits
32. Gophering is associated with:
A) Opencast mining B) Underground mining
C) Alluvial Mining D) Quarrying

33. Which is the youngest among the following?
 A) Pir Panjal Traps B) Sylhet Traps
 C) Rajmahal Traps D) Deccan traps
34. ----- coefficient relates the concentration of trace element to that of the major element for which it substitutes.
 A) Distribution B) Chemical Fractionation
 C) Bulk Distribution D) Partition
35. Among the given brachiopods phosphatic skeleton is characteristic of -----.
 A) Terebratula B) Lingula C) Spirifer D) Athyris
36. Match List I with List II:

List I	List II
a. Age of marine invertebrates	1. Silurian to Devonian
b. Age of reptiles	2. Cambrian and Ordovician
c. Age of amphibians.	3. Carboniferous and Permian
d. Age of fishes	4. Mesozoic

 A) a-2, b-4, c-3, d-1 B) a-3, b-4, c-2, d-1
 C) a-4, b-1, c-3, d-2 D) a-4, b-2, c-3, d-1
37. Board and Pillar method is used in ----- mining.
 A) Iron ore B) Coal C) Limestone D) Gold
38. Assertion (A) Permeability is the ability of a fluid to flow through porous solid
 Reason (R): Permeability is solely controlled by the effective porosity of a rock
 A) Both A and R are true and R explains A
 B) Both A and R are true but R does not explain A
 C) A is true but R is false
 D) A is false but R is true
39. Tarns are associated with:
 A) Arid regions B) Glaciers
 C) Volcanoes D) Streams
40. Under which metamorphic facies the silica polymorph coesite is expected to be stable?
 A) Greenschist B) Blueschist
 C) Amphibolite D) Eclogite

41. "Darcy's law is valid as long as the Reynolds number, based on average grain diameter, does not exceed some value between -----"
- A) 10 and 100 B) 1 and 10
C) 100 and 1000 D) 1000 and 2000
42. Which of the following is **not** true about Scanning Electron Microscopy (SEM)?
- A) Most SEMs are comparatively easy to operate
B) Solid, liquid and gaseous samples can be analysed
C) Many applications require minimal sample preparation
D) For many applications, data acquisition is rapid
43. Which of the following is **not** a primary air pollutant?
- A) Nitrogen dioxide B) Particulates
C) Carbon dioxide D) Sulphur dioxide
44. The most common natural acid on the Earth's surface:
- A) Sulphuric acid B) Carbonic acid
C) Nitric acid D) Hydrochloric acid
45. Most of the water discharged from continental hot springs:
- A) Juvenile water B) Meteoric water
C) Vadose water D) Magmatic water
46. Match the following:
- | | |
|-------------------|-----------------|
| List I | List II |
| a. Malanjkhand | 1. Chromite |
| b. Sukhinda | 2. Sphalerite |
| c. Rajpura-Dariba | 3. Coal |
| d. Talchir | 4. Chalcopyrite |
- A) a-4, b-3, c-1, d-2 B) a-4, b-1, c-3, d-2
C) a-3, b-4, c-1, d-2 D) a-4, b-1, c-2, d-3
47. ----- can be rectified by grouting during the construction of tunnels.
- A) Laminations B) Faults C) Joints D) Folds
48. Specific yield of confined aquifers can be obtained from ----- logs.
- A) Calibrated Neutron B) Natural Gamma
C) Caliper D) Sonic
49. Morganite is a gem variety of -----.
- A) Zircon B) Corundum C) Beryl D) Olivine

50. Greensands contain good amount of -----.
- A) Diopside B) Malachite C) Epidote D) Glauconite
51. Which is **not** correct about corals?
- A) They do not live in waters which are deeper than 200m
 B) Their growth is nearly impossible in muddy and silty water
 C) They are exclusively marine
 D) They are confined to the tropical belt
52. The fundamental unit of pedostratigraphic classification is -----.
- A) Synthem B) Pedosol C) Flow D) Geosol
53. Terra Rossa soil is found in ----- terrains.
- A) Basalt B) Laterite C) Granite D) Limestone
54. Assertion (A): China clay of Thonnakkal, Kerala is used in manufacturing fiber glass
 Reason (R): China clay of Thonnakkal, Kerala has high alumina content
- A) Both A and R are true and R explains A
 B) Both A and R are true but R does not explain A
 C) A is true but R is false
 D) A is false but R is true
55. A Reclined Fold is one in which the axial surface is -----.
- A) Moderately inclined and hinge line is steeply plunging
 B) Nearly horizontal and hinge line is non-plunging
 C) Near vertical and hinge line is gently plunging
 D) Upright and hinge line is horizontal
56. The Himalayan orogeny began ----- years ago.
- A) 20 million B) 5 million
 C) 70 million D) 165 million
57. ----- is a process in which each pixel value on a raster map is replaced with a new value, provided that a condition or a set of conditions is satisfied.
- A) Interpolation B) Buffering
 C) Rubber sheeting D) Filtering
58. The S I unit of Poisson's Ratio is:
- A) Cubic meters per second B) Newtons per square metre
 C) Pascal D) No unit

59. Which one of the following features is **not** true about Hotspots?
 A) Most oceanic hotspots are characterized by gravity lows.
 B) Most hotspots have high heat flow.
 C) In ocean basins, hotspots form topographic highs with 500 to 1200m.
 D) Many hotspots are capped by active or recently active volcanoes.
60. The tectonic setting in which ophiolites are found:
 A) Oceanic plateaus B) Transform faults
 C) Rift valleys D) Back-arc basins
61. The main mineral composition of Calc-alkaline plutonic rocks:
 A) Feldspar and quartz
 B) Quartz and amphiboles
 C) Felspars and feldspathoids
 D) Felspars and pyroxenes
62. Match the List I (Type of rock) with List II (Rock name):
- | List I | List II |
|---|---------------|
| a. Argillaceous limestone | 1. Rudite |
| b. Rock with angular fragments | 2. Arkose |
| c. Limestone of organic origin | 3. Marl |
| d. Arenaceous sediment with at least 25% feldspar | 4. Biolithite |
- A) a-1, b-3, c-2, d-4 B) a-3, b-1, c-4, d-2
 C) a-2, b-4, c-1, d-3 D) a-1, b-3, c-4, d-2
63. The type of plate boundary found in Java-Sumatra:
 A) Divergent B) Convergent
 C) Collision D) Conservative
64. Tertiary coal is mined at -----.
 A) Darrangiri (Garo Hills), Meghalaya
 B) Korba (Korba district), Chattisgarh
 C) Neyveli (South Arcot district), Tamil Nadu
 D) Giral (Barmar district), Rajasthan
65. Gleization is a pedogenic process associated with -----.
 A) Tropical climate
 B) Poor drainage
 C) Poor water content in the soil
 D) Extreme climate condition

74. Which one of the following did **not** form in marine environment?
 A) Sylhet Limestone Formation
 B) Karewa Formation
 C) Patcham Formation
 D) Hedenstroemia Beds
75. Which one is a Sorosilicate?
 A) Hemimorphite B) Glaucophane
 C) Sodalite D) Tourmaline
76. The Aravalli Mountain Ranges are mainly made up of ----- of rocks.
 A) Aravalli Supergroup
 B) Aravalli Supergroup and Delhi Supergroup
 C) Aravalli Supergroup and Gwalior Group
 D) Aravalli Supergroup and Vindhyan Supergroup
77. Which of the following statement/s about the solar system is/are true?
 1. The Sun contains over 99.8% of the mass of the system, but only 2% of the angular momentum
 2. A large majority of the planets rotate about their axes in the same directions as their direction of revolution around the Sun
 3. The planets show a regular spacing as expressed by Kepler's law
 4. The major part of the angular momentum of the solar system is concentrated in the planets, not in the Sun, in spite of the concentration of mass in the Sun
- A) 1 only B) 1 & 3 only
 C) 2 & 3 only D) 1, 2 & 4 only
78. Assertion (A): Tourmaline shows piezoelectricity
 Reason (R): Tourmaline crystallizes in a crystal class that lacks centre of symmetry and thus have polar axes
- A) Both A and R are true and R explains A
 B) Both A and R are true but R does not explain A
 C) A is true but R is false
 D) A is false but R is true
79. Find the **mismatch**:
 A) Caledonian orogeny - Silurian - Carboniferous
 B) Hercynian orogeny - Devonian-Carboniferous
 C) Alpine orogeny - Palaeogene-Neogene
 D) Appalachian orogeny - Middle Ordovician-Permian

80. ----- is famous for Guano deposits.
 A) Mauritius B) Peru C) Sicily D) Mexico
81. Which one is **not** an optically isotropic mineral?
 A) Fluorite B) Franklinite C) Sylvite D) Nepheline
82. The Great Boundary Fault of Rajasthan separates the -----.
 A) Precambrian rocks from the Cretaceous rocks
 B) Aravalli rocks from the Pre-Aravalli rocks
 C) Vindhyan rocks from the pre-Vindhyan rocks
 D) Delhi rocks from the Pre-Delhi rocks
83. Which one of the following statements is **not** true?
 A) Neodymium is a Light Rare Earth Element
 B) Samarium is a Heavy Rare Earth Element
 C) Cesium is a Large Ion Lithophile Element
 D) Niobium is a High Field Strength Element
84. Which is **not** true about Potassium-Argon system?
 A) ^{40}K by α decay form ^{40}Ca
 B) It is used in determining the ages of rocks a few thousand years old that are difficult to date by other techniques, as well as for older samples
 C) The half life of ^{40}K is 1.31×10^9 years
 D) The major sources of error in this system are old inherited argon and contamination by atmospheric argon during the analytical procedure
85. Which lamprophyre does **not** contain feldspar?
 A) Kersantite B) Vogesite
 C) Monchiquite D) Minette
86. Greisening is a post-magmatic process associated with the origin of -----.
 A) Melanocratic low silica gabbros
 B) Hypermelanic low silica dolerites
 C) Mesocratic medium silica diorites
 D) Leucocratic high silica granites
87. A flat-floored desert valley that drains to a playa:
 A) Bajada B) Zeugen C) Salar D) Bolson
88. Which one of the following is **not correct**?
 A) Sections perpendicular to the optic axes in biaxial minerals are isotropic
 B) All sections of minerals crystallizing in isometric system are isotropic
 C) Sections parallel to the optic axes in biaxial minerals are isotropic
 D) Basal sections of minerals crystallizing in tetragonal and hexagonal systems are isotropic

89. Which one of the following is a ternary system with congruently melting binary phases?
- A) Anorthite-Forsterite-Silica
 B) Diopside-Nepheline-Silica
 C) Albite-Silica-Orthoclase
 D) Albite-Anorthite-Orthoclase
90. In which part of the hydrosphere most of the fresh water is stored:
- A) Atmospheric moisture
 B) Rivers and Lakes
 C) Ground Water and soil water
 D) Icesheets and glaciers
91. Which one of the following is **not** an extensive property of a system?
- A) Volume
 B) Chemical potential
 C) Entropy
 D) Mass
92. Match List I with List II:
- | | |
|---|--|
| <p>List I</p> <p>a. Spinel Group</p> <p>b. Forsterite-Fayalite system</p> <p>c. Cristobalite</p> <p>d. Pyrrhotite</p> | <p>List II</p> <p>1. Omission solid solution</p> <p>2. Interstitial solid solution</p> <p>3. Isomorphism</p> <p>4. Atomic substitution</p> |
|---|--|
- A) a-3, b-4, c-2, d-1
 B) a-2, b-3, c-4, d-1
 C) a-3, b-2, c-1, d-4
 D) a-4, b-3, c-1, d-2
93. Which is the twin plane in Spinel Law?
- A) (111) B) (101) C) (021) D) (110)
94. What is the pH of sea water?
- A) 6.2 B) 8.1 C) 4.9 D) 10.3
95. Match List I with List II:
- | | |
|--|---|
| <p>List I</p> <p>a.. Archaean greenstones</p> <p>b. Cratons.</p> <p>c. Ophiolite</p> <p>d. Forearc basin</p> | <p>List II</p> <p>1. Hydrocarbons</p> <p>2. Podiform chromite</p> <p>3. Bauxite</p> <p>4. Au quartz veins</p> |
|--|---|
- A) a-4, b-3, c-1, d-2
 B) a-3, b-2, c-1, d-4
 C) a-2, b-3, c-4, d-1
 D) a-4, b-3, c-2, d-1

96. In ----- type of dentition in pelecypods the teeth are few in number, thick and sometimes grooved.
 A) Desmodont B) Taxodont C) Schizodont D) Dysodont
97. Which one mineral section gives extreme positive relief?
 A) Actinolite B) Almandine C) Epidote D) Rutile
98. Oscillation ripples are characteristic of ----- environment.
 A) Glacial B) Fluvial
 C) Shallow marine D) Aeolian
99. Section ----- of a biaxial mineral gives flash figure.
 A) perpendicular to the acute bisectrix
 B) oblique to the bisectrix
 C) parallel to the optic axial plane
 D) perpendicular to the optic axis
100. Identify the mineral which has the following properties- Occur in well-developed crystals, Allochromatic, Poor cleavage, Hardness in Moh's scale (H)- 7½, Streak- White, Specific gravity- 4.68
 A) Garnet B) Beryl C) Titanite D) Zircon
101. Which one of the following is **not** a dispersed element in minerals?
 A) Gallium B) Tellurium C) Strontium D) Rubidium
102. Walther's Law is concerned with:
 A) Sedimentary facies B) Metamorphic facies
 C) Igneous facies D) None of these
103. Surface Seismic waves that propagate on the earth's surface in a rolling motion similar to that of ocean waves:
 A) Rayleigh waves B) Love waves
 C) Stoneley waves D) Shear waves
104. Which of the following is true about a stress ellipsoid?
 A) The axes are proportional in length and parallel to the principal stress vectors
 B) The axes are proportional in length and perpendicular to the principal stress vectors
 C) The axes are proportional in length and parallel / perpendicular to the principal stress vectors
 D) The stress ellipsoid corresponding to the standard state of non-hydrostatic stress is a sphere

105. Where do the Western Ghats meet the Eastern Ghats?
 A) Anamalai Hills B) Nilgiri Hills
 C) Agasthyarkoodam Hills D) Palani Hills
106. Choose the Group which is exclusively marine
 A) Foraminifers B) Lamellibranchs
 C) Gastropods D) Echinoderms
107. Jhiri Shale Formation belongs to the ----- Group of Vindhyan Supergroup.
 A) Semri B) Rewa C) Bhandar D) Kaimur
108. In Rhombohedral symmetry the lattice points are found at -----.
 A) corners only
 B) corners and cell centre
 C) corners and centres of all faces
 D) corners and centres of ends
109. Guruvayoor Formation was deposited under----- conditions.
 A) Fluvio-marine B) Fluvial
 C) Palaeo-marine D) Aeolian
110. Which one is the youngest among the following?
 A) Katrol formation B) Uttatur formation
 C) Boka Bil formation D) Tatrot formation
111. A rivers which does **not** form a delta:
 A) Krishna B) Godavari C) Ganga D) Narmada
112. A rock characterized by significant negative 'Eu' anomaly:
 A) Plateau basalt B) Granite
 C) Norite D) Diorite
113. The beneficiation of ----- is commonly carried out using the following methods: gravity concentration, electro-magnetic and electrostatic separation, flotation.
 A) Cassiterite B) Chalcopryrite
 C) Ilmenite D) Magnetite
114. ----- period is considered to be the most severe of all of the Phanerozoic Mass Extinctions.
 A) Late Devonian B) Triassic-Jurassic
 C) End of the Cretaceous D) End of the Permian

115. Which one of the following is **not** a formal stratigraphic unit?
A) Bed B) Stage C) Zonule D) Eonothem
116. For an exothermic reaction, change in enthalpy (ΔH) will be -----.
A) Zero B) Positive
C) Negative D) None of these
117. The type of dam where the forces acting on the dam are transmitted onto the abutment rocks:
A) Embankment dam B) Arch dam
C) Cofferdam D) Gravity dam
118. In which type of texture there is more or less continuous grain-size variation from the smallest to the largest?
A) Porphyritic B) Seriate
C) Poikilitic D) Variolitic
119. Polymetallic nodules are found restricted to -----.
A) Continental shelf B) Guyots
C) Deep-sea floor D) Continental slope
120. Sinkhole, doline and dripstone are characteristic of:
A) Aeolian landform B) Basket of eggs topography
C) Fluvial landform D) Karst topography
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