

MIZORAM PUBLIC SERVICE COMMISSION

**COMPETITIVE EXAMINATION FOR RECRUITMENT TO THE POST OF
GEOLOGIST UNDER COMMERCE & INDUSTRIES DEPARTMENT,
GOVERNMENT OF MIZORAM, OCTOBER-2024**

GEOLOGY PAPER - II

Time Allowed : 2 hours

FM : 200

All questions carry equal mark of 2 each.

Attempt all questions.

- In the 14 Bravais lattice, which of the following crystal system produce rhombohedral lattice?
 - Triclinic System
 - Hexagonal System
 - Isometric System
 - Orthorhombic System
- Which one of the following point group is having the maximum number of symmetry?
 - $4/m\bar{3}2/m$
 - $6/m2/m2/m$
 - $4/m2/m2/m$
 - 442
- If a $\text{CuK}\alpha$ radiation having $\lambda = 1.5418\text{\AA}$ strike halite on $\{111\}$ planes of atom at $\theta = 13.70^\circ$, let $n = 1$, the value of d -spacing calculated using Bragg's equation will yield -
 - 0.814\AA
 - 1.085\AA
 - 1.627\AA
 - 3.255\AA
- Which of the following statement is correct for birefringence of minerals?
 - Directions of light parallel to the optic axis show zero birefringence.
 - Higher the interference colour of a mineral, the lower is its birefringence.
 - Birefringence equal to the value $(n_f - n_s)$ where n_f is fast ray, n_s is slow ray.
 - Interference colour and birefringence has no relationship.
- A geometric figure that shows the index of refraction and vibration direction for passing any direction through a material is called -
 - Optical indicatrix.
 - Isogyre.
 - Melatopes.
 - isochromes.
- _____ is another name for triclinic.
 - Pinacoidal
 - Dome
 - Sphenoids
 - Prisms
- Type of bonds in diamond.
 - Metallic bonds
 - ~~Covalent~~ ^{ionic} bonds
 - Covalent bonds
 - Hydrogen bonds
- The end members of orthopyroxenes are -
 - Enstatite and jaedite.
 - Diopside and augite.
 - Diopside and hedenbergite.
 - Ferrosilite and enstatite.

9. Oxides of alkalis in AFM diagram is having component of -
(a) FeO+MgO (b) Na₂O+K₂O
(c) FeO+Al₂O₃ (d) Na₂O+Al₂O₃
10. Double refractions are never observed in mineral which crystallizes on -
(a) Triclinic system (b) Monoclinic system
(c) Isometric system (d) Tetragonal system
11. The chemical formula of olivine is -
(a) (Mg, Fe)₂SiO₄ (b) Mg₃Al₂(SiO₄)₃
(c) CaTiOSiO₄ (d) (Mg, Fe)₂Si₂O₆
12. In EPMA analysis, the sample is prepared in the form of -
(a) Dissolved solution (b) Powdered forms
(c) Carbon coated thin section (d) Polished section impregnated in resins.
13. When the minimum radius ratio, R_A:R_X is 1.0, the Coordination Number for packing geometry with corners of a cuboctahedron (close packing) is -
(a) C.N. 4 (b) C.N. 6
(c) C.N. 8 (d) C.N. 12
14. The most abundant element with reference to bulk geochemical composition of the earth's crust is -
(a) Silicon (b) Aluminium
(c) Oxygen (d) Iron
15. Which one is not a member of clinopyroxene?
(a) Augite (b) Diopside
(c) Enstatite (d) Jadeite
16. Hardness of apatite on Moh's scale is -
(a) 2 (b) 3
(c) 4 (d) 5
17. Which decay isotope does not produce radiogenic heat?
(a) Uranium (b) Carbon
(c) Thorium (d) Potassium
18. Pyroxenes have different cleavage planes that intersect at -
(a) 67° and 93° (b) 87° and 93°
(c) 87° and 103° (d) 67° and 103°
19. Which of the following clay mineral is used for dating by Rb-Sr method?
(a) Glaucofanane (b) Rutile
(c) Chlorite (d) Glauconite
20. Dominant composition of Fuller's earth is -
(a) Calcite (b) Montmorillonite
(c) Quatz (d) Dolomite
21. Which of the following is assumed to be the parent material of primary basalt?
(a) Undersaturated alkaline olivine-basalt magma. (b) Saturated alkaline olivine-basalt magma.
(c) Thleitic magma. (d) Komatiite.
22. The factor which influence magma generation include -
(a) lowering T at constant P. (b) viscosity contrast.
(c) adiabatic compression. (d) unchanging of phase.

23. Which of the following phase diagram is referred as a fairly realistic mantle analogue?
(a) Di-Fo-Si (b) Fo-Di-En
(c) Fo-An-Si (d) Di-An-Ab
24. The CIPW norm calculates mineral composition assuming the magma were -
(a) hydrous and at high pressure. (b) hydrous and at low pressure.
(c) anhydrous and at high pressure. (d) anhydrous and at low pressure.
25. The peritectic temperature of crystallization of melts in the system Di-Fo-Si is -
(a) 1150 °C (b) 1557 °C
(c) 1540 °C (d) 1247 °C
26. When plagioclase is totally surrounded by pyroxene grains, it is termed as -
(a) Pegmatitic texture (b) Ophitic texture
(c) Phaneritic texture (d) Pyroclastic texture
27. Lamprophyres generally occurs as -
(a) Laccolith (b) Plutons
(c) Dykes (d) Batholith
28. Igneous rock having more than 90% olivine content by volume is -
(a) Dunite (b) Rhyolite
(c) Kimberlite (d) Granite
29. If fine microlites of feldspars are dispersed in a glassy groundmass of basalt, the texture is called -
(a) Pilotaxitic texture (b) Hyalopilitic texture
(c) Ophitic texture (d) Intersertal texture
30. Which of the following textures indicate simultaneous crystallization at the close of crystallization of alkaline magma?
(a) Granophyric texture (b) Myrmekitic texture
(c) Trachytic texture (d) Spherulitic texture
31. In IUGS classification of igneous rocks, anorthosite is represented by the composition of-
(a) more than 90 % olivine with hornblende and clinopyroxene.
(b) more than 90 % plagioclase with other mafic minerals.
(c) more than 90 % hornblende with plagioclase and orthopyroxene.
(d) more than 90 % pyroxene with olivine and hornblende.
32. Which of the following is a high-Mg, high-temperature volcanic rocks extruded during the early Precambrian time?
(a) Tholeiite (b) Melteigite
(c) Komatiite (d) Basanite
33. The igneous rock that contain more than 50 % of carbonate minerals are known as -
(a) Melilitites (b) Tephrites
(c) Phonolites (d) Alvikites
34. Bronzite is common in -
(a) Gabbro and norite (b) Pegmatite and peridotite
(c) Diabase and lopolith (d) Pillow basalt and dolerite dyke
35. Plutonic rocks chemically undersaturated with respect to silica is -
(a) Granite (b) Granodiorite
(c) Tonalite (d) Nepheline Syenite

36. The last minerals to crystallize in Bowen's reaction series include -
(a) Olivine (b) Pyroxene
(c) Quartz (d) Plagioclase
37. In the four zones of the Bushveld Complex of S. Africa, the main critical series (MCR) is constituted by-
(a) diorite and granophyres. (b) two-pyroxene gabbros.
(c) plagioclase-bronzite-chromite rock. (d) peralkaline rocks.
38. The typical feldspar found in low-K Rhyolite is -
(a) Sanidine (b) Anorthoclase
(c) Microcline (d) Plagioclase
39. Kimberlite rock is -
(a) Basic igneous rocks. (b) Ultrabasic igneous rocks.
(c) Intermediate igneous rocks. (d) Felsic igneous rocks.
40. On a phase diagram, the solidus curve is -
(a) Temperature above which only solid is stable. (b) Temperature below which only solid is stable.
(c) Pressure above which only solid is stable. (d) Pressure below which only solid is stable.
41. Rocks prone to directed pressure and often show severest degree of metamorphic changes -
(a) situated near the plate boundaries. (b) situated at the center of plates.
(c) situated inside the plates. (d) degree of severity is same everywhere.
42. Large scale metamorphism associated with increases in both temperature and pressure best defines-
(a) Chlorite and biotite zones (b) Garnet and staurolite zones
(c) Kyanite and sillimanite zones (d) Biotite and staurolite zones
43. In mafic rocks, the greenschist-amphibolite facies transition is designated by the appearance of-
(a) Hornblende and Ca-rich plagioclase. (b) Actinolite and Na-rich plagioclase.
(c) Olivine and clinopyroxene. (d) Orthopyroxene and nepheline.
44. Which of the following statement is correct in terms of the concept of metamorphism?
(a) Metamorphism do not brought about change in phase of mineral stability.
(b) Metamorphic grade pure representation of dynamic change in temperature.
(c) Metamorphism results in mineralogic and textural change in solid state.
(d) Metamorphic isograd is assumed to provide absolute values for P, T and composition.
45. Scheme for describing and classifying metamorphic rocks on the basis of their mineralogy is -
(a) Metamorphic facies (b) Metamorphic grades
(c) Metamorphic zones (d) Metamorphic isograd
46. The initiation of low grade metamorphism in volcanic and sedimentary rocks is indicated by -
(a) formation of glaucophane and lawsonite.
(b) recrystallization of alumina rich minerals to zeolite.
(c) recrystallization of quartz forming quartzites.
(d) formation of tremolite-actinolite.
47. The total succession of minerals preserved in a metastable state in the structure of metamorphic rock is designated as -
(a) mineral paragenesis. (b) mineral assemblage.
(c) mineral association. (d) coexisting minerals.
48. Which one of the following is not regarded as cataclastic rocks?
(a) Pseudotachylite (b) Fault gouge
(c) Fault breccia (d) Mylonites

49. A metasomatic Ca-Fe-Mg-(Mn)-silicate rock formed by the interaction of a carbonate and a silicate system in mutual contact is known as -
- (a) Skarn (b) Restite
(c) Rodingite (d) Metapsamite
50. Phyllite is a _____ metamorphic rocks.
- (a) Foliated (b) Lineated
(c) Schistose (d) Gneissic
51. Which one is a product of high-grade metamorphism?
- (a) Khondalite (b) Quartzite
(c) Hornfels (d) Talc
52. The Barrovian facies series of eastern Scottish Highlands are characteristic for -
- (a) high-pressure metapelite. (b) medium-pressure metapelite.
(c) low-pressure metapelite. (d) high-pressure eclogite.
53. The concept of metamorphic zone in progressive regional metamorphism was introduced by-
- (a) A. Harkar (b) F. F. Grout
(c) G. Barrow (d) F. Becke
54. Which of the following phase diagrams proved extreme suitability to show mineralogic relationship in metapelites?
- (a) ACF diagram (b) AKF diagram
(c) AFM diagram (d) Both ACF and AKF diagrams
55. Which of the following metamorphic reactions results in an abrupt appearance or disappearance of minerals from metamorphic rocks?
- (a) Dehydration reactions (b) Solid-solid reactions
(c) Univariant reactions (d) Divariant reactions
56. Orthopyroxene-bearing rocks with igneous texture and granitic composition, irrespective of whether the rock is igneous or metamorphic are known as -
- (a) enderbyite (b) mangerite
(c) charnockite (d) jotunite
57. Which facies represent highest grade of metamorphism?
- (a) Granulite facies (b) Greenschist facies
(c) Blueschist facies (d) Amphibolite facies
58. The diagnostic mineral assemblages in Granulite facies of *ultramafic rocks* is represented by
- (a) Opx + Qtz (b) En + Fo + Di + Spl
(c) Omp + Grt ± Qtz (d) Pl + Cpx + Grt
59. The key mineral in high-grade metapelites at low- to medium-pressure is -
- (a) Cordierite (b) Garnet
(c) Spinel (d) Sapphirine
60. Which of the following mineral assemblages indicate the transition of facies from granulite to eclogite facies?
- (a) $Ab + Tr = Ed + 4Qtz$ (b) $Pg = Jd + Ky + H_2O$
(c) $Py + Fo = 2En + Spl$ (d) $Spl + Qtz = Crd$
61. Radiolarian and diatomaceous oozes are both types of -
- (a) Carbonaceous oozes (b) Phospatic oozes
(c) Siliceous oozes (d) Calcareous oozes

62. Based on the Phi scale formula, the grain diameter of 2mm is -
(a) 0ϕ (b) -1ϕ
(c) -2ϕ (d) $+1\phi$
63. Which of the following clay minerals is swelling clay?
(a) Kaolinite (b) Illite
(c) Chlorite (d) Smectite
64. The primary criterion used in Dunham's classification of limestone is -
(a) Texture (b) Framework
(c) Grain size (d) Mineral composition
65. Which of the following sandstone types is likely to form by the intense weathering and mechanical weathering of Granite?
(a) Arkose (b) Greywacke
(c) Quartz arenite (d) Litharenite
66. Which of the following sedimentary structures is not related to typical Bouma Sequence?
(a) Lamination (b) Graded bedding
(c) Ripple marks (d) Large scale cross-bedding
67. Which of the following is a flow axis indicator in palaeo-current analysis?
(a) Cross-lamination (b) Groove cast
(c) Cross-bedding (d) Flue cast
68. Lithosome is -
(a) a rock body that has single occurrence in a single geologic unit.
(b) a mass of rock of irregular character, characterized by geometry, composition, and internal structure.
(c) a kind of rock body that has multiple occurrences in a single geologic unit.
(d) a mass of rock of irregular geometry characterized by deposition and internal structure.
69. In which environment is limestone most likely to form?
(a) Shallow, calm, warm marine waters (b) Shallow, calm, cold marine waters
(c) Deep, calm, cold marine waters (d) Deep, calm, warm marine waters
70. The textural characteristic likely to be observed in glacial till is -
(a) well sorted. (b) moderately sorted.
(c) poorly sorted. (d) texturally mature sediments.
71. Which of the following features indicate transportation and deposition by fluvial process?
(a) Ripple marks (b) Graded bedding
(c) Mud-clasts (d) Laminations
72. Which type of cross-bedding is formed by tidal current?
(a) Herringbone cross-stratification (b) Hummocky cross-bedding
(c) Tabular cross-bedding (d) Trough cross-bedding
73. Which of the following zones is called *carbonate factory*, where the photosynthetic organisms flourish?
(a) Neritic zone (b) Photic zone
(c) Hadal zone (d) Littoral zone
74. What type of sediment is deposited in the deepest part of the ocean floor?
(a) Hemipelagic sediments (b) Pelagic clays
(c) Chemogenic minerals (d) Fine-grained clastic and nonclastic sediments

75. Limestone and bauxite show _____ structure.
- (a) Concentric (b) Spherical
(c) Oolitic (d) Pisolitic
76. _____ is the first model of sediment-laden gravity flows and represents the first predictive model in sedimentology.
- (a) Diagenesis (b) Bouma sequence
(c) Lithification (d) Ripple mark
77. If the rate of creation of accommodation is exactly balanced by the rate of sediment supply, which sedimentary sequence would you observe?
- (a) Retrogradation (b) Progradation
(c) Aggradation (d) Parasequence
78. Which of the following heavy minerals indicate basic igneous provenance?
- (a) Titanite (b) Diopside
(c) Tourmaline (d) Staurolite
79. The order of precipitation of minerals from sea water is -
- (a) Calcite, Anhydrite, Halite, Gypsum (b) Calcite, Gypsum, Anhydrite, Halite
(c) Dolomite, Anhydrite, Halite, Gypsum (d) Dolomite, Halite, Anhydrite, Gypsum
80. Though both breccia and conglomerates are clastic rocks, they differ in-
- (a) shape of clasts. (b) size of clasts.
(c) cementing material. (d) nature of deposition.
81. Mid latitude jet streams tend to be strongest near the -
- (a) Stratosphere (b) Thermosphere
(c) Tropopause (d) Mesosphere
82. Barren Island is famous for which activity?
- (a) Tsunami (b) Earthquake
(c) Volcanism (d) Coastal erosion
83. Which of the following is described in Concept II of the fundamental concept of Environmental Geology?
- (a) Population Growth. (b) Sustainability.
(c) Systems. (d) Limitation of Resources.
84. Which of the following contribute the highest rate in greenhouse effect?
- (a) CFC-12 (b) CFC-11
(c) N₂O (d) CH₄
85. Which of the following is the potential effect of global climate change?
- (a) Increase in particulates. (b) Climate pattern.
(c) El Nino. (d) Both (b) & (c)
86. Ozone depletion is due to -
- (a) the broken down of CFCs by UV radiations in the stratosphere.
(b) reaction between chlorine and CFCs.
(c) reaction between chlorine and O₃.
(d) reaction of ClO + O.
87. The two important nutrients released from human activities that can cause water pollution are -
- (a) Phosphorus and nitrogen. (b) Iron and magnesium.
(c) Calcium and potassium. (d) Nickel and manganese.

88. Aquifer contamination of groundwater in mainland can be attributed to -
(a) deforestation. (b) saline water intrusion.
(c) overpumping of groundwater. (d) water supply system for human use.
89. Which of the following chemicals does not cause water pollution?
(a) Arsenic (b) Copper
(c) Zinc (d) Calcium
90. Areas in risk of Tsunami are less than _____ feet above sea level.
(a) 15 (b) 25
(c) 35 (d) 45
91. The threshold of hearing is -
(a) the lowest sound level at which a person's ear can detect a sound.
(b) the loudest sound level at which a person's ear can detect a sound.
(c) the range of sound level for a person.
(d) the average sound level in Tier 1 city.
92. In soil horizons, the highly concentrated organic materials are encountered in -
(a) only in the *O* horizon. (b) *O* and *A* horizons.
(c) *B* and *C* horizons. (d) *K* and *R* horizons.
93. Which of the following poses high threat to soil quality?
(a) cadmium (b) sodium
(c) calcium (d) potassium
94. Which of the following is authorised by the Central Government to implement Noise Rules 2000 in the State of Mizoram?
(a) Chief Secretary (b) District Commissioner
(c) Chief Minister (d) Home Minister
95. Which one of the following is not normally dealt with in the EIA?
(a) Plan of project (b) Programme and policy of project
(c) Mitigation of impacts of project (d) Environmental audit procedure
96. Which of the following authorised the Central Government to protect and improve environmental quality, control and reduce pollution from all sources.
(a) The Environment (Protection) Act 1986.
(b) The Environment (Protection) Rule 1986.
(c) Hazardous waste (Management and Handling) Rules 1989.
(d) The National Environmental Tribunal Act 1995.
97. The most common natural hazards with reference to the State of Mizoram is -
(a) Forest fires (b) Landslide
(c) Earthquake (d) Flood
98. The maximum limit of nitrate in drinking water is-
(a) 15 ppm (b) 30 ppm
(c) 50 ppm (d) 70 ppm
99. The total number of scale in Modified Mercalli Intensity Scale of earthquake is-
(a) 16 (b) 14
(c) 12 (d) 10
100. Earthquake damages to buildings and other structures are caused by-
(a) P wave (b) S wave
(c) combinations of P and S waves (d) Surface waves