Asst Geologist in the Geology and mining Subordinate Service

AGLY

Booklet Series **A**

Register Number

2007
GEOLOGY

Time Allowed : 3 Hours] **[Maximum Marks : 300**

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Booklet has a cover (this page) which should not be opened till the invigilator gives signal to open it at the commencement of the examination. As soon as the signal is received you should tear the right side of the booklet cover carefully to open the booklet. Then proceed to answer the questions.
2. This Question Booklet contains **200** questions.
3. Answer **all** questions. **All** questions carry equal marks.
4. The Test Booklet is printed in *four* series *e.g.* [A] [B] [C] or [D] (See Top left side of this page). The candidate has to indicate in the space provided in the Answer-sheet the series of the booklet. For example, if the candidate gets [A] series booklet, he/she has to indicate in the side 2 of the answer-sheet with Blue or Black Ink Ball point pen as follows :

[A] ■ [B] [C] [D]

5. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
6. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Register No. and other particulars on side 1 of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.
7. You will also encode your Register Number, Subject Code etc., with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, your Answer Sheet will not be evaluated.
8. Each question comprises *four* responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
9. In the Answer Sheet there are **four** brackets [A] [B] [C] and [D] against each question. To answer the questions you are to mark with Ball point pen ONLY ONE bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. *e.g.* If for any item, (B) is the correct answer, you have to mark as follows :

[A] ■ [C] [D]

10. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
11. **Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.**
12. Do not tick-mark or mark the answers in the Question Booklet.

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1. The seismic shear waves are slowed and attenuated in

A) lithosphere B) asthenosphere

C) low-velocity zone D) upper mantle.

2. Steep-sided domes that form in the craters or calderas of certain strato-volcanoes are called

A) cinder cone B) cumulo domes

C) tholoids D) nuée ardente.

3. A belt of negative gravity anomalies coincides with the

A) Sunda trench B) Kurile trench

C) Kamchatka trench D) Sumatra trench.

4. The term "Isostasy" was proposed by

A) Dutton, an American Geologist, in 1889

B) Sir George Airy, the Astronomer Royal, in 1855

C) Archdeacon Pratt, in 1855

D) R. A. Daly, in 1940.

5. Volcanoes are more numerous around

A) Atlantic Ocean B) Antarctic Ocean

C) Indian Ocean D) Pacific Ocean.

6. The discontinuity which separates mantle and core is

A) Moho-discontinuity B) Conrad-discontinuity

C) Gutenberg-discontinuity D) Ingleman-discontinuity.

7. The Hawaiian name "pahoehoe" actually means

A) glassy lava B) mud-like lava

C) rough lava D) satiny lava.

8. The term 'lithosphere' includes

A) crust and mantle

B) crust only

C) crust and part of the upper mantle

D) none of these.

9. Consider the following statements :

Assertion (A) : The velocity of seismic waves generally increases from crust to mantle-core boundary.

Reason (R) : Density of rocks increases from crust to core.

Select the correct answer :

A) Both (A) and (R) are correct, (R) is the explanation for (A)

B) Both (A) and (R) are correct, but (R) is not the reason for (A)

C) Only (A) is correct, but (R) is false

D) Both (A) and (R) are false.

10. In the Richter scale the energy released by an earthquake of magnitude 2 as compared to magnitude 1 is about

A) twice B) 10 times

C) 30 times D) 100 times.

11. An alluvial fan is formed due to

A) Fluvial erosion B) Fluvial deposition

C) Eolian erosion D) Eolian deposition.

12. Which of the following is a group of coral islands with a deep central lagoon ?

A) Faros B) Shelf atolls

C) Oceanic atolls D) Guyots.

13. Roche Moutonnee is

I. small asymmetrical mounds on the glacial valley floor ornamented with striation.

II. giant glacier found to occur in Iceland.

III. drift that accumulates upon the glacial valley floor.

IV. landform carved out of the bed rock by the moving glacier.

Of the statements :

A) I alone is correct B) II and III are correct

C) I and IV are correct D) I and III are correct.

14. The coastal zone where the ground slopes away from the shore line is called

A) Berm B) Beach face

C) Offshore point D) Surf zone.

15. Tombolos are formed

A) along straight coastal shores B) in backwater shores

C) between two islands D) around an island.

16. The drainage pattern where streams diverge from a common area is called

A) Centripetal B) Braided

C) Dendritic D) Radial.

17. A longitudinal dune, parallel to windward direction, is known as

A) Barchans B) Seif

C) Parabolic dunes D) Fore dunes.

18. New oceanic crust is formed at

A) subduction zone B) spreading centre

C) collision zone D) hot spot zone.

19. The maximum measured rate of sea floor spreading is about

A) 2 cm/ year B) 6 cm / year

C) 12 cm / year D) 16 cm / year.

20. Polished and faceted surfaces produced by wind abrasion are

A) Serirs B) Yardangs

C) Ventifacts D) Loess.

21. Ripple marks are essentially

A) Aeolian B) Aeolian and fluvial

C) Fluvial D) Aeolian and glacial.

22. The dip of a stratum is the angle between the bedding and a horizontal plane. It is measured in a

A) vertical plane that strikes at 90° to the strike of the bedding

B) horizontal plane that strikes at 90° to the strike of the bedding

C) vertical plane that strikes at 45° to the strike of the bedding

D) oblique plane that strikes at 90° to the strike of the bedding.

23. Strike and dip of a geologic formation can be measured with the help of

A) Brunton compass B) seismogram

C) caliper logging D) planimeter.

24. A fold in which both limbs are overturned is called

A) Box fold B) Chevron fold

C) Fan fold D) Recumbent fold.

25. A thrust fault is a

A) low angle reverse fault B) high angle reverse fault

C) low angle normal fault D) high angle normal fault.

26. In which type of unconformity, are the older rocks of plutonic origin ?

A) Angular unconformity B) Non-conformity

C) Disconformity D) Local unconformity.

27. Salt domes are the best examples of

A) Diapiric fold B) Reclined fold

C) Drag fold D) Pericline fold.

28. Find the odd man out :

A) Pseudotachylite B) Mylonite

C) Breccia D) Gouge.

29. The Eparchaean unconformity in South India is a / an

I. angular unconformity

II. disconformity

III. regional unconformity

IV. non-conformity.

Of the statements :

A) II only is true B) II and III are true

C) III and IV are true D) IV only is true.

30. Tight folds that are present in unfolded beds with fold axis parallel to the bedding are called

A) Disharmonic folds B) Intra-folial folds

C) Convolute folds D) Tight isoclinal folds.

31. An Orthophoto is an aerial photograph that has been modified so that its scale is

A) uniform throughout

B) irregular throughout

C) uniform in most places, but requiring corrections

D) irregular in some places, and requiring corrections.

32. A lens characteristic that causes resultant images to appear brighter in the centre than around the edges is defined as

A) Resolution B) Vignetting

C) Lens distortion D) Decentering.

33. The order of pattern, height and shadow is the elements of photo-interpretation in the order of

A) primary B) secondary

C) tertiary D) higher.

34. Manual interpretation of CIR film often provides good information about vigor and distribution of vegetation whose significance in the chlorophyll absorption spectra is

A) Green shift
B) Blue shift
C) Red shift
D) Infrared shift.

35. The attenuation co-efficient (k) describes the rate at which light becomes dimmer as depth of water column increases. If E_O is the brightness at the surface, then the brightness at depth z, as E_z is given by

A) $E_z = E_O * e * k * z$
B) $E_z = E_O * e^{-kz}$
C) $E_z = E_O * k^{ez}$
D) $E_z = E_O * e^{kz}$.

36. Topographic mapping using photogrammetry was introduced to North America in 1886 by

A) Francois Argo, a Geodesist
B) Louis Daguerre of France
C) Edward Deville of Canada
D) Colonel Aimé Laussedat, French Army.

37. A device that automatically trips the shutter and actuates the camera cycle as required by the flight plan is

A) gyroscopic device
B) gyro-stabilized aerial camera
C) intervalometer
D) multicollimator.

38. Which of the following consists of a regular series of precise index marks which appear in the image, and whose co-ordinates are accurately known from calibration ?

A) Fiducial marks
B) Reseau
C) Phodis
D) Multi-camera calibration marks.

39. The method of converting a digital image to the frequency domain or vice-versa is called

A) SSC
B) ACF
C) FCC
D) DFT.

40. Shades of gray ranging from black to white are the records of a remote sensing system due to

A) green energy from 0·5 to 0·6 μm

B) red light energy from 0·6 to 0·7 μm

C) near infrared energy from 0·7 to 0·92 μm

D) infrared energy above 0·92 μm.

41. Index fossil is characterized by

A) wide geographic distribution and short range in time

B) wide geographic distribution and wide range in time

C) short geographic distribution and short range in time

D) short geographic distribution and wide range in time.

42. To prepare a thin section of a larger foraminifera, which of the following is used ?

A) Carborundum powder only B) Canada balsam only

C) Glass slide only D) All of these.

43. Application of Micro-paleontology in oil exploration is achieved by which of the following ways ?

A) Assigning age to the strata

B) Knowing the environment of deposition of sediments

C) Correlation of different strata

D) All of these.

44. The Graptolites

A) were exclusively marine organisms

B) were found in carbonaceous shales and clayey rocks

C) exhibit excellent evolution with stratigraphic importance (index fossils)

D) all the above statements are correct.

45. The microfossil (Textularia) belongs to

A) Ostracoda B) Foraminifera

C) Bryozoa D) Radiolaria.

46. The characteristic feature of the plant fossil *Glossopteris* is

A) presence of compound leaves B) absence of mid-rib

C) presence of prominent mid-rib D) rectangular shape of the leaves.

47. Removal of microfossils from chert and from other silicaceous sediments is achieved by disaggregating through

A) Hydrochloric acid B) Hydrofluoric acid

C) Nitric acid D) Sulphuric acid.

48. The typical ammonite of the Paleozoic was

A) Ceratites B) Dactilioceras

C) Goniatites D) Tornoceras.

49. Graptolites belong to the class

A) Hydrozoa B) Actinozoa

C) Scyphozoa D) Ctenophora.

50. Fossils of Lower Gondwana include

A) Glossopteris B) Gangamopteris

C) Vertabraria D) All of these.

51. A remarkable geologic event known as Cenomanian Transgression was occurred during

A) Paleocene B) Cretaceous

C) Jurassic D) Triassic.

52. Age of the Niniyur stage of Cretaceous formation is

A) Danian B) Maestrichtian

C) Senonian D) Turonian.

53. The thickest group in the Deccan Traps is

A) Upper Traps B) Middle Traps

C) Lower Traps D) Recent Traps.

54. Radiometric age determination method seems to show that the Deccan Traps range in age from

A) Upper Cretaceous to Eocene
B) Lower Eocene to Upper Eocene
C) Cenomanian to Senonian
D) Mesozoic to Tertiary.

55. Cretaceous succession of Trichirapalli can be divided into four stages. The order of stages from youngest is

A) Ariyalur, Trichirapalli, Uttatur and Niniyur
B) Niniyur, Ariyalur, Trichirapalli and Uttatur
C) Uttatur, Niniyur, Ariyalur and Trichirapalli
D) Trichirapalli, Uttatur, Niniyur and Ariyalur.

56. Quartz veins of Mysore (Dharwar System) which support the most important gold mines namely Kolar Gold Mines belong to

A) Ordovician
B) Cambrian
C) Upper Pre-Cambrian
D) Lower Pre-Cambrian and Archaean.

57. In the Cuddapah System, Tadipatri shales are found in

A) Kistna Series
B) Nallamalai Series
C) Cheyair Series
D) Papaghni Series.

58. In Cuddapah supergroup, a cyclic deposition of which of the following sediments is deposited ?

A) Coarse grained quartzites succeeded by fine grained shales
B) Coarse grained conglomerates succeeded by fine grained slates
C) Both (A) and (B) types of rocks
D) None of these.

59. Which one of the following successions is true for Cuddapah supergroup of rocks from older to younger ?

A) Cheyair - Papaghni - Nallamalai - Kistna

B) Papaghni - Cheyair - Kistna - Nallamalai

C) Papaghni - Nallamalai - Cheyair - Kistna

D) Papaghni - Cheyair - Nallamalai - Kistna.

60. Which concept has been stated in "the present is the key to the past" ?

A) Principle of faunal succession
B) Law of universal catastrophism
C) Law of superposition
D) Principle of uniformitarianism.

61. Match **List - I** correctly with **List - II** and select your answer from the codes given below :

List I		**List II**
a)	6/m; 2/m; 2/m	1. Isometric normal class
b)	2/m; 2/m; 2/m	2. Tetragonal normal class
c)	4/m; 2/m; 2/m	3. Hexagonal normal class
d)	4/m; $\bar{3}$; 2/m	4. Orthorhombic normal class.

Codes :

	a	**b**	**c**	**d**
A)	2	4	1	3
B)	1	2	3	4
C)	3	4	2	1
D)	1	3	2	4.

62. The minerals belonging to olivine group crystallize in

A) Tetragonal system
B) Orthorhombic system
C) Hexagonal system
D) Monoclinic system.

63. In monoclinic system the *'b'* axis is known as the ..... and the *'a'* axis is known as the ..... respectively.

A) Ortho axis, Clino axis
B) Clino axis, Ortho axis
C) Clino axis, Brachy axis
D) Ortho axis, Macro axis.

64. The minerals belonging to Mica Group exhibit which of the following silicate structures ?

A) Nesosilicate B) Sorosilicate

C) Inosilicate D) Phyllosilicate.

65. Who gave the idea that a crystal may be used as a grating for *X*-rays ?

A) Lava B) Bravis

C) Bragg D) Miller.

66. The *I*-operation is also referred to as

A) centre of symmetry B) plane of symmetry

C) axis of symmetry D) glide symmetry.

67. The geometrical operation involved in roto inversion, rotation and plane of reflection can be designated as

A) 432 B) 2 mm

C) $\bar{4}2$ m D) $\frac{6}{m}$.

68. The class $\frac{2}{m}\frac{2}{m}\frac{2}{m}$ is also called

A) Bipyramidal class B) Rhombic-bipyramidal class

C) Pinacoidal class D) Rhombic class.

69. The Ditetragonal prism is in the normal class of Tetragonal system due to

A) *hkl* B) *oko*

C) *ool* D) *hko*.

70. *X*-rays have made it possible to measure the distance between successive

A) molecular planes B) atomic planes

C) cleavage planes D) twin planes.

71. Which of the following statements is FALSE ?

A) Plagioclase feldspars may twin parallel to crystallographic faces.

B) Plagioclase feldspars may twin around a crystallographic axis, which then becomes a twin axis.

C) Plagioclase feldspars may twin simultaneously, both on a simple and a parallel law.

D) Plagioclase feldspars do not twin parallel to crystallographic faces.

72. The presence and intensity of pleochroism in individual pyroxenes depend upon the simultaneous substitutions of

A) Fe^{+2} in *Y*-sites and Al in both *Y* and *Z* sites

B) Fe^{+3} in *Y*-sites and Al in both *Y* and *Z* sites

C) Fe^{+2} in *Z*-sites and Al in both *Y* and *Z* sites

D) Fe^{+3} in *Z*-sites and Al in both *X* and *Y* sites.

73. The uniaxial Indicatrix of Positive crystals is

A) a prolate spheroid of revolution B) an oblate spheroid of revolution

C) a circular D) all of these.

74. Crystals exhibiting two different colours or two different shades of a colour in two different vibration directions are termed as

A) Dichroic B) Dichromatic

C) Pleochroic D) Panchromatic.

75. In normally zoned olivines, from Mg-rich core to Fe-rich margin, the birefringence

A) decreases from the centre to the periphery in sections perpendicular to α

B) increases from the centre to the periphery in sections perpendicular to α

C) increases from the periphery to the centre in sections paralled to α

D) decreases from the periphery to the centre in sections parallel to β.

76. The number of twin-laws observed in plagioclase feldspars is

A) 22 B) 18

C) 16 D) 12.

77. The universal stage was chiefly developed by

A) Johannsen B) Winchell

C) Federov D) Tschermak.

78. Which of the following from Prof. Reinhard's plates is used for determining the anorthite content ?

A) Plate 2 B) Plate 3

C) Plate 4 D) Plate 5.

79. Consider the following statements :

Assertion (A) : The biaxial crystals are crystallizing in orthorhombic monoclinic and triclinic systems.

Reason (R) : The crystallographic axes are not equal and perpendicular in biaxial crystals.

Select the correct answer :

A) Both (A) and (R) are true, but (R) is not the correct explanation of (A)

B) Both (A) and (R) are true, (R) is the correct explanation of (A)

C) (A) is true, but (R) is false

D) (R) is true, but (A) is false.

80. Which of the following is correctly matched ?

A) Isogyre — The black area of an Interference figure

B) Birefringence — Pleochroism

C) Indicatrix — Ray velocity surface

D) Melatope — Accessory plate.

81. Chemical composition of the pure calcium-feldspar end member namely, anorthite is

A) $CaAl_2Si_2O_8$ B) $NaAlSi_3O_8$

C) $(NaK)AlSi_3O_8$ D) $Fe_3Al_2Si_3O_8$.

82. In Nepheline, the substitution of Na by K is accompanied by an increase in which of the lattice parameters ?

A) (a) and (b) B) (a) and (c)

C) (b) and (c) D) (a), (b) and (c).

83. Which of the following felspathoid minerals is found in metamorphosed limestone ?

A) Nepheline B) Cancrinite

C) Laucite D) Lazurite.

84. Lepidolite mica is

A) Cr-bearing B) Fl-bearing

C) Li-bearing D) Fe-bearing.

85. The general formula which describes the chemical composition of mica is $X_2 Y_{4-6} Z_8 O_{20} (OH, F)_4$ where X is mainly

A) Si or Al but also Mn, Cr, Ti

B) K, Na or Ca but also Ba, Rb, Cs etc.

C) Al, Mg or Fe but also Mn, Cr, Ti, Li etc.

D) Si or Al but perhaps also Fe^{+3} and Ti.

86. The mineral having chemical composition of $Fe_2 SiO_4$ is

A) Fayalite B) Forsterite

C) Augite D) Bronzite.

87. Which one of the following is an example of orthorhombic pyroxene ?

A) Clinoenstatite B) Rhodonite

C) Enstatite D) Pectolite.

88. Schillerization is characteristic of

A) Diopside B) Hypersthene

C) Enstatite D) Hedenbergite.

89. Which is an orthorhombic amphibole ?

A) Anthophyllite B) Tremolite

C) Riebeckite D) Cossyrite.

90. Hornblende is the mineral of

A) Feldspar Group B) Amphibole Group

C) Pyroxene Group D) Feldspathoid Group.

91. Cordierite can be distinguished from both quartz and feldspar by

A) small negative optic axial angle B) pleochroic halos

C) sensitization D) none of these.

92. Zircon is a common accessory mineral of

A) Granites B) Gabbro

C) Lavas or Extrusive rocks D) Metasomatic rocks.

93. Much of the Sillimanite of regional metamorphism is derived from

A) breakdown of Muscovite and Biotite

B) reaction between Muscovite and Quartz

C) breakdown of Staurolite and Quartz

D) reaction between Biotite and Quartz.

94. Which statement is true for Zeolites ?

A) They are hydrous minerals B) They are aluminosilicates

C) They have open structure D) All these are true.

95. The perfect cleavage of chlorite minerals is parallel to

A) (001) B) (101)

C) (100) D) (010).

96. Match **List - I** correctly with **List - II** and select your answer using the codes given below :

	List I		**List II**
a)	Fe-bearing Tourmaline	1.	achroite
b)	Mg-bearing Tourmaline	2.	elbaite
c)	Li-bearing Tourmaline	3.	schorl
d)	White-coloured Tourmaline	4.	dravite.

Codes :

	a	**b**	**c**	**d**
A)	1	2	3	4
B)	3	4	2	1
C)	2	4	3	1
D)	1	3	4	2

97. Hardnesses of the Kyanite mineral are

A) 3 and 6 B) 2 and 4

C) 5 and 7 D) 1 and 3.

98. Corundum is expressed chemically as

A) Fe_2O_3 B) Al_2O_3

C) As_2O_3 D) Bi_2O_3.

99. Sillimanite in thin section is distinguished from Andalusite by its

A) red colour

B) inclined extinction

C) positive elongation & higher birefringence

D) all of these.

100. Beryl in thin section, shows which of the following colours ?

A) Bluish red, yellow, rose or red

B) Yellow, rose, white or violet

C) Rose, white, bluish red or orange

D) White to pale green or yellowish green.

101. In Strickenson *QAPF* classification 81974, an igneous rock containing 60% to 90% *Q* is called as

A) Granite B) Granodiorite

C) Alkali feldspar granite D) Quartz-rich granitoid.

102. In Tabular classification of igneous rocks, which of the following rocks is an over-saturated rock ?

A) Dolerite B) Tachylite

C) Lamprophyre D) Aplite.

103. Identify the monomineralic rocks from the list :

List

I. Nephelinite

II. Leucitite

III. Anorthosite

IV. Danite.

A) III and IV only B) I, II and III only

C) I, III and IV only D) II, III and IV only.

104. Carbonatites are called Sovites if they are

A) coarse grained calcite-carbonatite

B) fine grained calcite-carbonatite

C) fine grained dolomite-carbonatite

D) coarse grained iron-rich carbonatite.

105. The igneous rocks that have more than 70% of Mafics are called as

A) Melanocratic rocks B) Mesocratic rocks

C) Leucocratic rocks D) Hypermelanic rocks.

106. Trondhjemite is a variety of

A) Granite B) Syenite

C) Lamprophyre D) Diorite.

107. Highly calcic plagioclase is found in

I. Massif-type anorthosite

II. Stratiform-type anorthosite

III. Layered anorthosite

IV. Lunar anorthosite.

Of the statements :

A) II alone is correct B) I and IV are correct

C) II and IV are correct D) IV alone is correct.

108. The crystallization of granites can be explained using

A) Albite-anorthite-diopside system

B) Albite-anorthite-solid solution system

C) Leucite-silica system

D) Albite-orthoclase-silica system.

109. Early deep-seated granites were formed by

A) metasomatism

B) the process of hydrothermal action

C) anatexis

D) palingenesis.

110. Alkaline rocks are not frequent in

A) continental rifts B) oceanic islands

C) island arcs D) mid-oceanic ridge.

111. An undersaturated melt in the system Forsterite-Silica with effective fractional crystallization

I. cannot alter the course of crystallization

II. can be made to crystallize at 1543°C

III. can result in the simultaneous crystallization of quartz and clino-enstatite

IV. can complete its crystallization at 1557°C only.

Of the statements :

A) IV alone is correct
B) II and III are correct
C) I alone is correct
D) I and III are correct.

112. The temperature at which first mineral crystallizes and temperature at which the melt solidifies in a melt with 50% anorthite and 50% diopside respectively are

A) 1550°C and 1270°C
B) 1328°C and 1270°C
C) 1550°C and 1391°C
D) 1550°C and 1328°C.

113. In a liquid with 90% plagioclase with $Ab_{18}An_{82}$ and 10% diopside, the first mineral that crystallizes is

A) diopside
B) plagioclase with $Ab_{10}An_{90}$
C) plagioclase with Ab_5An_{95}
D) both diopside and plagioclase.

114. In discontinuous series the ratio Si / Al varies from

A) 0 – 1
B) 0 – 3
C) 1 – 3
D) 1 – 0.

115. In Bowen's Reaction Principle Ca-pyroxenes come in

A) continuous series
B) discontinuous series
C) neither continuous nor discontinuous
D) intermediate series.

116. Viscosity of magma depends on

I. temperature only

II. pressure and silicon content

III. silicon content

IV. volatile content.

Of the statements :

A) (I) and (II) are correct B) (II) and (III) are correct

C) (III) and (IV) are correct D) all of these are correct.

117. In a differentiated series of rocks, when orthopyroxene changes from enstatite to ferrosilite, the clinopyroxene changes from

A) hedenbergite to diopside

B) diopside to hedenbergite

C) diopside to wollastonite

D) hedenbergite to wollastonite.

118. When a granitic magma assimilates in which one of the following rocks, major changes in mineralogy of the resulting rock is observed ?

A) Gabbro B) Sandstone

C) Shale D) Limestone.

119. Consider the following statements :

Assertion (A) : Fractional crystallization of basaltic magma leads to progressive change in composition.

Reason (R) : The minerals crystallizing and magma have different compositions.

Select the correct answer :

A) (A) and (R) are true, but (R) is not the correct explanation of (A)

B) (A) is true, but (R) is false

C) (A) is false, but (R) is true

D) (A) and (R) are true, (R) is the correct explanation of (A).

120. Rocks that differ widely in mineralogical and chemical composition are produced by

A) gravitational differentiation B) magma mixing

C) liquid immiscibility D) filter pressing.

121. The only chemically and physically durable mineral of plutonic rocks to accumulate in great volume is

A) Ilmenite B) Rutile

C) Quartz D) Garnet.

122. Pure dolomite is a good source of

A) Sodium B) Manganese

C) Magnesium D) Potassium.

123. Aeolian ripples are characterized by the presence of

A) coarser grains on the crests

B) finer grains on the crests

C) uniformly even grains on the crests and the troughs

D) none of these.

124. Which one of the following is correctly matched ?

A) Peakedness — Skewness B) Symmetry — Kurtosis

C) Sorting — Dispersion D) Average — Mode.

125. The Udden scale is not suited to the analysis of

A) poorly sorted sediments B) moderately sorted sediments

C) very well sorted sediments D) well sorted sediments.

126. The metamorphic rocks, mainly composed of Feldspar chlorite & epidote, formed by low temperature regional metamorphism of basic rocks are in general known as

A) amphibolites B) pyroxenites

C) eclogites D) green schists.

127. ACF diagram is used only for rocks containing

A) P_2O_5 B) S

C) SiO_2 D) TiO_2.

128. Which of the following rocks are completely unfoliated ?

A) Slates B) Schists

C) Phyllites D) Hornfels.

129. Consider the following statements :

I. An isograd may be defined as a line joining points where the rocks have suffered metamorphism under similar pressure-temperature conditions.

II. An isograd must be the intersection of an inclined isogradic surface with the surface of the earth.

III. There are chlorite isograds, biotite isograds are present.

IV. A line marking the first appearance of an index mineral is termed as isograd.

Of the statements :

A) (I) and (II) are correct B) (I) alone is correct

C) (III) & (IV) are correct D) All are correct.

130. The highest grade of metamorphism commonly produces

A) Charnockite B) Marble

C) Migmatite D) Magnesite.

131. Supergene sulphide enrichment occurs

A) below the water table

B) above the water table

C) independent of water table

D) both below and above water table.

132. Genetic schemes of ore mineral classification culminated in Lindgren's method of classification are

A) deposits by mechanical process

B) deposits by chemical process

C) deposits in magmas of differentiation

D) all of these.

133. Which one of the following is NOT a clay mineral ?

A) Anauxite B) Bauxite

C) Kaolinite D) Nacrite.

134. In India, important Uranium bearing mineral deposit occurs in

A) Kudremukh of Karnataka B) Kolar of Karnataka

C) Manavalakkurichchi of Tamil Nadu D) Singhbhum belt of Bihar.

135. The process of building up of an ore deposit by deposition of successive layers in cavities is called

A) Crustification B) Breccia filling

C) Pore space filling D) Saddling.

136. Consider the following statements :

I. Eluvial placers are formed by stream action.

II. Eluvial placers are formed by wind action.

III. Eluvial placers are found in meanders.

IV. Eluvial placers are formed without stream action.

Of the statements :

A) all are correct B) only (I) and (III) are correct

C) only (II) and (IV) are correct D) only (IV) is correct.

137. Consider the following statements :

Chrysotile asbestos is formed from the alteration of

I. Dunites & Peridotites

II. Dolomites.

Of the statements :

A) both (I) and (II) are correct B) only (I) is correct

C) only (II) is correct D) both (I) & (II) are false.

138. Which of the following Indian states is leading producer of iron ore lumps and fines ?

A) Madhya Pradesh B) Maharashtra

C) Andhra Pradesh D) Rajasthan.

139. Jet black very hard compact coal which has a good semi-metallic lustre and which ignites slowly and burns with short blue flame is called

A) Cannel coal B) Anthracite coal

C) Bituminous coal D) Lignite coal.

140. Bronze is an alloy formed using copper and

A) tin B) zinc

C) coal D) aluminium.

141. Which among the following states in India is the largest producer of Amphibole Asbestos ?

A) Rajasthan B) Andhra Pradesh

C) Bihar D) Manipur.

142. The sedimentary iron ore deposits at Noamundi have a minimum Fe content of

A) 66 - 67% B) 58 - 60%

C) 63 - 65% D) 53 - 55%.

143. Pick out the correct ascending order of the different types of coal depending on their carbon content :

A) Peat, Lignite, Bitumen, Anthracite

B) Lignite, Peat, Anthracite, Bitumen

C) Peat, Lignite, Anthracite, Bitumen

D) Peat, Bitumen, Lignite, Anthracite.

144. In cavity-filling, the mineral that lines the walls of the cavity and grows inward with the development of crystal faces is

A) Amethyst B) Zinc-blende

C) Quartz D) Lead.

145. What is the chemical composition of Malachite ?

A) $CuSiO_2 . 2H_2O$ B) $CuCO_3 . Cu(OH)_2$

C) $CuFe S_2$ D) $Cu_3As S_4$.

146. The early formed ore minerals in the early magmatic deposits occur as

A) disseminated in the enclosing rock

B) residual liquid segregation

C) residual liquid injection

D) immiscible liquid segregation.

147. The most objectionable impurity in iron ores is

A) magnesium B) titanium

C) arsenic D) manganese.

148. Which of the following is a good non-conductor of heat and electricity ?

A) Aluminium B) Asbestos

C) Nickel D) Tungsten.

149. Identify the common order of formation of ore minerals by contact metasomatism.

A) Pyrite – Pyrrhotite – Chalcopyrite – Galena

B) Pyrrhotite – Pyrite – Chalcopyrite – Galena

C) Chalcopyrite – Galena – Pyrite – Pyrrhotite

D) Galena – Chalcopyrite – Pyrite – Pyrrhotite.

150. India is ranking first in producing which mineral in the world ?

A) Baryte B) Kyanite – Sillimanite

C) Mica D) Manganese ore.

151. In DTH hammer drilling technique, drilling is achieved by

A) rotating the drill bit only

B) hammering the drill bit only

C) rotating and hammering the drill bit

D) pumping compressed air and water.

152. The sodium adsorption ratio (SAR) is given by

A) $\frac{K}{\sqrt{(Ca + Mg)/2}}$ B) $\frac{Na}{\sqrt{(Ca + Mg)/2}}$

C) $\frac{Na}{\sqrt{(K + Ca)/2}}$ D) $\frac{K}{\sqrt{(Na + K)/2}}$.

153. Consider the following statements :

Assertion (A) : Under steady-state flow conditions elastic storage remains unchanged.

Reason (R) : Drawdown under steady-state conditions is time-dependent.

Select the correct answer :

A) Both (A) & (R) are correct and (R) is the correct explanation of (A)

B) Both (A) & (R) are correct, but (R) is not the reason for (A)

C) (A) is correct, but (R) is incorrect

D) Both (A) & (R) are incorrect.

154. Darcy's law applies to

A) non-laminar flow in porous media

B) laminar flow in porous media

C) dimensionless ratio of inertial to viscous forces

D) ratio of inertial to viscous forces.

155. The most abundant divalent cations that cause hardness in ground water are

A) Ca and Mg B) Ca and Na

C) Na and K D) Mg and K.

156. The volume of water drained by gravity from unit volume of aquifer material is

A) specific yield B) specific storage

C) storativity D) specific capacity.

157. Darcy's experiment shows that

I. Rate of flow through porous medium is proportional to length of flow.

II. Rate of flow through porous medium is inversely proportional to head loss.

Of the statements :

A) Both (I) and (II) are correct B) Both (I) and (II) are false

C) (I) is correct, but (II) is false D) (II) is correct, but (I) is false.

158. Well efficiency is the ratio of

A) well yield to drawdown

B) drawdown to well yield

C) theoretical specific capacity to measured specific capacity

D) measured specific capacity to theoretical capacity.

159. Match **List - I** correctly with **List - II** and select your answer using the codes given below :

List I		**List II**
a)	Aquifer	1. A rock which contains no interstices.
b)	Aquiclude	2. A rock which transmits the water at a very low rate.
c)	Aquifuge	3. A rock having sufficient saturated permeability
d)	Aquitard	4. A porous but poorly permeable bed.

Codes :

	a	**b**	**c**	**d**
A)	1	2	3	4
B)	3	4	1	2
C)	2	3	4	1
D)	4	3	2	1.

160. Darcy is a

A) standard unit of porosity B) standard unit of permeability

C) standard unit of lamellar flow D) standard unit of turbulent flow.

161. Which one of the following is the most troublesome of all the rocks as far their suitability for foundation is concerned ?

A) Sandstones B) Shales

C) Limestones D) Quartzites.

162. Scour at bridge piers and abutments occurs due to

A) weak bed rocks

B) variation in flow velocity

C) the horse-shoe vortex at the upstream face of the piers and abutments

D) shallow depth of foundation of the structure.

163. Which of the following sites are generally not suitable for construction of dams ?

A) Where the beds with gentle upstream dip are present

B) Where the beds are vertical

C) Where the beds with steep upstream dip are present

D) Where the beds with gentle downstream dip are present.

164. High siltation in the reservoir will affect

A) Permeability B) Dam life

C) Storage capacity D) All of these.

165. Which one of the following is not correctly matched ?

A) Bhakra Dam — Tallest dam in India

B) Hirakud Dam — Longest dam in India

C) Idduki Dam — Arch dam

D) Koyna Dam — Largest dam.

166. In which of the following types of drilling, tools are rotated by prime mover and simultaneous application of the pressure ?

A) Percussion drilling B) Churn drilling

C) Diamond drilling D) Rotary drilling.

167. Ground sluicing is a mining method of

A) Alluvial mining B) Open-cast mining

C) Underground mining D) Coal mining.

168. An excavation made parallel to the strike of the ore body, within itself, is called

A) Cross-cut B) Level

C) Drive D) Adit.

169. The term 'inferred ore' is applied when the estimates of reserves are based on

A) general and broad observation of a qualitative nature of deposit

B) data obtained in exposures, excavation drilling etc.

C) both (A) and (B)

D) none of these.

170. Which of the following is used for accumulating the heavier fractions in ground sluicing ?

A) Riffle boxes B) Rockers

C) Long toms D) Pans.

171. Resistivity of rock formation decreases with

I. increasing sand content in clay

II. increasing salinity of pore water

III. increasing clay content in sand.

Of the statements :

A) all are correct

B) only (I) and (II) are correct

C) only (II) and (III) are correct

D) only (I) and (III) are correct.

172. In Vertical Electrical Sounding (VES), field measured data for curve matching technique is plotted on

A) Linear Graph B) Semi-logarithmic Sheet

C) Double Logarithmic Sheet D) None of these.

173. The natural potential of the sub-surface rocks may be due to

A) Physico-chemical changes in rock

B) Local metamorphism taking place in rocks

C) Tectonic impulses taking place underneath the surface

D) Electrochemical reactions and the solution surrounding the sub-surface rocks.

174. The most common type of non-polarizable electrodes employed in electrical resistivity method makes use of

A) Copper rods B) Iron rods

C) Nickel rods D) Aluminium rods.

175. Reduction - Oxidation potential (REDOX) is measured in

A) ohmmeter B) volt

C) ampere per hour D) mhos.

176. A large area of dispersion is termed as

A) Hydrothermal phase
B) Leakage anomaly
C) Geochemical province
D) Mineral zoning.

177. The waveform is sinusoidal in

A) Transverse waves
B) Rayleigh waves
C) Longitudinal waves
D) Love waves.

178. Ground magnetic data have to be corrected for

I. Temperature
II. Diurnal
III. Elevation
IV. Terrain.

Of the statements :

A) all the four corrections
B) only (I) and (II)
C) only (III) and (IV)
D) only (I) and (III).

179. The depth of investigation in resistivity sounding as compared to the electrode separation :

A) increases with electrode separation
B) decreases with electrode separation
C) equals to the current electrode separation
D) not proportional to electrode separation.

180. Consider the following statements :

I. The unit of measurement in resistivity prospecting is μs/cm.
II. Apparent resistivity is measured in the field using resistivity meters.

Of the statements :

A) both (I) and (II) are correct
B) both (I) and (II) are false
C) (I) is correct, but (II) is false
D) (II) is correct, but (I) is false.

181. During the processing of Gold ore the toxic material used is

A) Cyanide B) Cadmium

C) Zinc D) Arsenic.

182. Consider the following statements :

I. Artificial levees constructed on river banks decrease discharge.

II. During very heavy floods the flood plain is flooded.

III. Levees protect the urban settlements in Mississippi delta.

IV. Levees decrease the risk of flooding in downstream areas.

Of the statements :

A) (I) and (IV) are correct B) (II) and (III) are correct

C) (I), (II) and (III) are correct D) (I) and (III) are correct.

183. The difference between high tide and low tide for commercial tidal power generation should be at least

A) 1 metre B) 8 metres

C) 2 metres D) 5 metres.

184. The environmental hazards associated with coal mining are

I. spontaneous combustion

II. acid mine drainage

III. radiation

IV. subsidence.

Of the statements :

A) (I) and (IV) are correct B) (I) and (II) are correct

C) (I), (II) and (III) are correct D) (I) and (III) are correct.

185. Fluctuations in stream stage or discharge over time are plotted on a

A) Discharge graph B) Funicular diagram

C) Semi-logarithmic graph D) Hygrograph.

186. The rapid movement of shallow non-cohesive or loose material down a steep slope following heavy rainfall is called

A) Debris avalanche B) Rock fall

C) Earth flow D) Soil creep.

187. The 'Chernobyl' accident in Russia was due to

A) Chemical industries B) Nuclear industries

C) Fertilizer industries D) Glass industries.

188. In the flat terrain areas such as Jharia, Raniganj and Singrauli coal fields strip mining involving cutting of trenches has resulted in

A) extensive deforestation

B) removal of soil

C) pollution of surface and ground water

D) all of these.

189. The most affected part in India due to flooding is

A) Godavari valley B) Mahanadi valley

C) Indo-Gangetic plain D) Brahmaputra valley.

190. Imperceptibly slow movements of a quasi-viscous mass manifest in tilting of trees and cracking of ground, is called

A) Creep B) Slump and Sheet slide

C) Debris avalanches D) Earth flow.

191. Vivekananda Rock Memorial built at Kanniyakumari is built of

A) Granite B) Charnockite

C) Gneiss D) None of these.

192. Cenomanian transgression, perhaps the most conspicuous of all marine floodings occurred during which of the following geologic times ?

A) End of Cainozoic B) End of Mesozoic

C) End of Proterozoic D) End of Paleozoic.

193. Tamil Nadu Magnesite Ltd. (Formerly Salem Magnesite Pvt. Ltd.) was taken over by the Government of Tamil Nadu in the year

A) 1960 B) 1962

C) 1969 D) 1979.

194. Chalk hill of Salem, Tamil Nadu is famous for the deposit of

A) Limestone B) Silica

C) Boron D) Magnesite.

195. Mohs's scale of hardness was devised in

A) 1822 B) 1812

C) 1802 D) 1832.

196. A good seam of Neyveli Lignite varies in thickness upto a maximum of

A) 34 m B) 24 m

C) 44 m D) 28 m.

197. Neyveli lignite deposit is associated with

A) Cretaceous of Trichirapalli B) Cuddalore sandstone

C) Barakar series D) Rajmahal series.

198. Manavalakkurichchi is known for

A) rare earth deposits B) oil fields

C) coal deposits D) iron ore deposits.

199. Graphite is found in

A) Neyveli B) Sivaganga

C) Salem D) Trichirapalli.

200. South Arcot lignite also contains small amounts of

A) metallurgical grade coal B) coking coal

C) anthracite D) montan wax.