

**Combined Geo-Scientist (P) Examination 2021**

**Paper-II (Geology)**

1.

The principle of uniformitarianism states that:

- (a) The same external and internal processes that we recognize today have been operating consistent throughout most of earth's history
- (b) The rate of external and internal processes that we recognize today have been operating consistent throughout most of earth's history
- (c) The rate of rock cycles have been constant throughout the earth's history
- (d) The rate of rock cycles have changed through the different periods of earth's history

2.

Which one of the following is the most widely accepted model of the "evolutionary theories of solar system"?

- (a) Nebular hypothesis
- (b) Planetesimal hypothesis
- (c) Gaseous tidal hypothesis
- (d) Gas dust cloud hypothesis

3.

The boundary between the sial and sima is called:

- (a) Gutenberg discontinuity
- (b) Mohorovicic discontinuity
- (c) Conrad discontinuity
- (d) Gutenberg-Weichert discontinuity

4.

The main cause of blowing wind across the earth surface is:

- (a) Wind blows from oceans to the land masses under the influence of sea-motion
- (b) Heating of atmosphere, land and oceans, accompanied by changes in air pressure
- (c) Wind blows from the higher elevation to the lower elevation derived by elevation difference
- (d) Wind blows from low pressure area to high pressure area due to pressure difference

5.

Megathrust earthquakes are the most damaging and deadly of all earthquakes, these megathrusts are located:

- (a) At the continent rift and transform plate boundary
- (b) In the divergent plate boundary zone
- (c) Along the contact between the subducting plate and the overriding plate
- (d) Along the contact between mid-oceanic ridges and transform fault

6.

The term '*Somma*' refers to:

- (a) The highly saturated chlorous volcanic compounds comprising sodium, potassium and iron
- (b) The rim of the semi-destroyed old volcanic crater, inside which another cone may rise by subsequent eruptions
- (c) The enlargement of crater of volcanoes by various eroding agents
- (d) The depression on the slopes of volcanic cones

7.

Mid-ocean ridges contain '*black smokers*' which are:

- (a) Volcanic smoke that contains mainly carbon in particulate form under deep sea
- (b) Hydrothermal vents from where hot water laden with fine grained sulfide minerals jets out into the cold sea water
- (c) Deep seated vents that pours out magma continuously in small amount
- (d) Deepest part of mid oceanic ridges which are largely inactive

8.

Trench rollback is:

- (a) Subduction of continental plate into asthenosphere and bounce back by the magmatic pressure
- (b) Spreading of oceanic plate and subduction into another trench
- (c) Subduction of oceanic plate into asthenosphere and bend toward the island arc
- (d) Bending of the subducting oceanic plate away from the island arc at deeper levels

9.

In glacier, the debris which is carried at the surface of ice is termed as:

- (a) Abrasion
- (b) Englacial transport
- (c) Supraglacial transport
- (d) Subglacial transport

10.

During the process of sand transport by aeolian action, the mechanical wear and tear of the sand particles among themselves is known as:

- (a) Abrasion
- (b) Attrition
- (c) Sandblasting
- (d) Deflation

11.

A stream emerging from a steep, narrow valley onto a broader lowland may build up a gently sloping conical deposit with an apex at the mouth of the narrow valley. Such a deposit is called:

- (a) Topset beds
- (b) Delta
- (c) Foreset beds
- (d) Alluvial fan

12.

Mineral quartz survives as sand grains in beaches, sand dunes, river and soil because:

- (a) It is the first mineral to crystallize in Bowen's reaction series, so it is an abundant mineral in the earth crust
- (b) It is resistant to chemical weathering as it crystallizes late according to Bowen's reaction series
- (c) It is resistant to chemical weathering as it allows easy substitution in its crystal structure
- (d) It is resistant to physical weathering, as it survives under frost wedging in low temperature condition

13.

The angular shear in a deformed rock body is described as:

- (a) Total degree of deflection of two lines which were originally at an certain angle before deformation
- (b) Angular relationship between alignments of two points change after a distortion deformation
- (c) The degree to which two originally perpendicular lines are deflected from  $90^\circ$
- (d) The angle change between two parallel lines after the deformation

14.

The appropriate mathematical expression for total strain (S) in a creep is:

(where S = total strain, t = time, A, B and C are constants, D = strain during tertiary creep)

- (a)  $S = A + B \log t - Ct - D$
- (b)  $S = A + B \log t + Ct - D$
- (c)  $S = A - B \log t + Ct + D$
- (d)  $S = A + B \log t + Ct + D$

15.

Class-1 folds are distinguished by:

- (a) Dip isogons that converge downward, signifying that the curvature of the outer arc is less than that of inner arc
- (b) Parallel folds with curvatures of the outer arc and inner arc of the fold being identical
- (c) Fold marked by dip isogons that diverge downward as outer arc curvature exceeds inner arc curvature
- (d) Folds marked by modest thickening on the hinge and modest thinning on the limbs

16.

'Throw' in a fault is defined as:

- (a) Angle between the fault plane and a horizontal plane
- (b) Angle between strike of a fault plane and strike of regional structure
- (c) Angle between fault plane and a vertical plane
- (d) Thickness of stratigraphic interval between two beds that are brought into contact by faulting

17.

Which of the following type of folds are classified on the basis of mechanism of folding?

- (a) Flexure-slip folds
- (b) Plunging and reclined folds
- (c) Symmetrical and recumbent folds
- (d) Parallel and similar folds

18.

The assembly of tilted blocks, half grabens, grabens and horsts is called:

- (a) Strike-slip landscape
- (b) Pull-apart basins landscape
- (c) Fault-block landscape
- (d) Gully landscape

19.

The value of normal stress and shear stress on each fault plane ( $\sigma_N$ ) and shear stress ( $\sigma_S$ ) on each fault plane in the Mohr envelope of failure is reflected by:

- (a) The coordinates of the point making the intersection of each circle with its radius
- (b) The tangential reflection of each circle with X-axis
- (c) The coordinates of the point making the intersection with its applied stress
- (d) The tangential projection of  $\sigma_1$  with applied stress along Y-axis

20.

Riecke's principle of recrystallization for plastic deformation is expressed as:

- (a) The rock crystallized according to orientation of their glide plane
- (b) The intergranular recrystallization takes place because of intergranular displacement between the individual grains
- (c) The preferred orientation in rocks are the product of guided recrystallization under high confining pressure and temperature
- (d) The solution in the pore spaces of the rocks dissolve that portion of the crystal which is under greatest stress and at the same time there is precipitation on that portion of the crystal which is subjected to the least stress

21.

Cataclastic flow is the result of:

- (a) Dislocation by the pressure solution
- (b) Displacement along the dislocation planes
- (c) Flow along the crystallographic planes of weakness
- (d) Frictional sliding along the interconnected microcracks

22.

The outcrop pattern of beds that dip downstream at an angle less than the gradient of the stream forms a 'V' which points:

- (a) In upstream direction
- (b) In downstream direction
- (c) Perpendicular to the direction of river flow
- (d) In strike direction of the beds parallel to flow of river

23.

In a structural contour map 'homoclines' are distinguished by:

- (a) Inclined contour lines that cross cut a bedding plane with regular elevation interval
- (b) Subparallel contour lines that steadily decrease or increase in elevation value across the face of the map
- (c) Subparallel contour lines that always runs orthogonal to the bedding planes
- (d) Parallel contour lines that also run parallel to the bedding planes

24.

Rake can be defined as:

- (a) Geometrical relationship between the plane in which line is found with respect to regional structures
- (b) Angle between the plane and horizontal datum line
- (c) Angle between a line and the strike line of the plane which contains that line
- (d) Angle between a line and a plain

25.

Which one of the following coal constituents is hard, compact and has granular texture?

- (a) Vitrain
- (b) Durain
- (c) Clarain
- (d) Fusain

26.

If the indices of any crystal face are rational numbers and are determined by dividing the intercepts of any face into the intercepts of the parametral plane and clearing fraction, that with intercepts a, b and c. The indices will be:

- (a) (101)
- (b) (111)
- (c) (001)
- (d) (100)

27.

Bauxite is a mixture of:

- (a) Aegirine and Jadeite
- (b) Steatite, Aphrite, Mullite and Enstatite
- (c) Gibbsite, Diaspore and Boehmite
- (d) Tremolite, Glaucophanes and Riebeckite

28.

A few non-metallic minerals are often found associated with an ore mineral. These have to be separated from the ore before the same is processed for extraction of the metal. These associated minerals are called:

- (a) Ore minerals
- (b) Gangue minerals
- (c) Syngenetic minerals
- (d) Supergene minerals

29.

Which one of the following group of minerals are classified within sulphides?

- (a) Bromides
- (b) Fluorides
- (c) Arsenates
- (d) Arsenides

30.

Opal is a mineral that displays iridescence or play of colours when rotated or observed from different direction because of:

- (a) Interference of the ray of light by minute globules of water trapped in the outer layer of crystal lattice
- (b) Interference of the ray of light by the distortions in crystal lattice
- (c) On account of mineral inclusions
- (d) Interference of light reflected from thin plates of other minerals enclosed or exsolved in parallel planes within the crystal

31.

“Pleochroism” representing change of colours upon rotation of microscope stage under plane polarized light in some minerals is characterized by:

- (a) Two extremes of colour seen twice during a complete 360° rotation
- (b) Four extremes of colour seen twice during a complete 360° rotation
- (c) Two extremes of colour seen twice during a 90° rotation
- (d) Four extremes of colour seen twice during a 90° rotation

32.

In alkali feldspar a 'coupled substitution' occurs when:

- (a) Addition of one silicon ion in the framework structure to make a covalent bond in alkali feldspar
- (b) One aluminum ion plus one sodium ion enter the framework structure and replace one silicon ion and, in addition, fill a vacant site
- (c) One silicon ion is replaced by the one sodium ion to balance one ion of oxygen
- (d) One oxygen ion in addition enter in the framework structure to balance the charge of silicon and alumina

33.

Garnet in-situ deposits are generally associated with:

- (a) Sedimentary rocks only
- (b) Igneous rocks only
- (c) Metamorphic rocks
- (d) Sedimentary and igneous rocks

34.

Variation in the refractive index in  $Al_2SiO_5$  polymorphs is due to:

- (a) Polarization of some light in the form of interference colour
- (b) Ferric iron and manganese entering structure
- (c) Thickness of thin section that retard velocity of light
- (d) Transmission of light with equal velocity in all direction

35.

The ray velocity surface of an anisotropic crystal is an ellipsoid because anisotropic crystals:

- (a) Transmit light with same velocities in different directions
- (b) Transmit light with different velocities in different directions
- (c) Absorb all the transmitted light
- (d) Have lower refractive index than air

36.

Mineral Quartz shows twinning according to Brazil law (twin plane  $11\bar{2}0$ ) and Dauphiné law (twin axis is  $c$ -axis) but this twinning is not detectable under the microscope because:

- (a) Twin plane ( $11\bar{2}0$ ) is always perpendicular to the twin axis ( $c$ -axis)
- (b) Both  $11\bar{2}0$  and  $c$ -axis are in extinction position in twin plane direction
- (c) Optic orientation in both twin parts is identical in both types of twin
- (d) Optic orientation in both twin parts is not identical in both types of twin

37.

When basaltic lava enters into water bodies, it tends to form large sack-like bodies called:

- (a) Pahoehoe lavas
- (b) 'aa' lavas
- (c) Pillow lavas
- (d) Lahars

38.

Igneous rocks formed by gravity settling of the crystals in the magma chamber floor represent:

- (a) Pilotaxitic texture
- (b) Variolitic texture
- (c) Cumulophyric texture
- (d) Cumulate texture

39.

Which one of the following rocks contain nearly equal amount of alkali feldspar and plagioclase with approximately 10% quartz?

- (a) Quartz syenite
- (b) Quartz monzonite
- (c) Quartz monzodiorite
- (d) Monzosyenite

40.

During fractionation, separated crystals of pyroxene (augite) and intermediate plagioclase feldspar form a crystallized rock known as:

- (a) Websterite
- (b) Lherzolite
- (c) Pyroxenite
- (d) Gabbro

41.

Rhyolitic magmas tend to rise in large dome-like bodies known as:

- (a) Plinian plumes
- (b) Diatremes
- (c) Diapirs
- (d) Phreatoplinian

42.

When cooling of mineralizing liquid is slow, leucite inverts to kalsilite-K-feldspar intergrowth.

The intergrowth is termed as:

- (a) Perthite
- (b) Polyleucite
- (c) Pseudoleucite
- (d) Antiperthite

43.

In layered intrusions, variation in mineral composition is normally not evident until analysis has been done; such layering is called:

- (a) Modal layering
- (b) Comb layering
- (c) Cryptic layering
- (d) Ristic layering

44.

Desilication reaction occurs when a:

- (a) Carbonate sedimentary rock reacts with silicate magma and produces calcium magnesium silicates
- (b) Primary alkaline magma generated from primitive sub-alkaline basaltic magma
- (c) Low pressure crystal fractionation from sub-alkaline basaltic magma
- (d) Silica under-saturated primary magma generated at relatively high pressure and CO<sub>2</sub> concentration

45.

The magnesium number designated by 'M' is particularly used as:

- (a) Olivine control line
- (b) Evaluation of depleted or enriched mantle
- (c) Partial melting or enriched event
- (d) Differentiation index

46.

Nephelinite magma crystallizes to form which one of the following suite of igneous rocks?

- (a) Vogesite
- (b) Ijolite
- (c) Limbergite
- (d) Mugearite

47.

Which one of the following correctly represents the composition of kimberlite?

- (a) Nickel and calcium rich rock with garnet and biotite phenocrysts
- (b) Volatile-rich potassic ultramafic rock composed of phenocrysts of olivine and phlogopite
- (c) Sodium rich rock with high amount of biotite and hornblende
- (d) Dark coloured iron and magnesium rich rock associated with mid-oceanic ridges

48.

During rapid quenching when phenocryst is surrounded by glass, the texture is termed as:

- (a) Aphyric
- (b) Vitrophyric
- (c) Cumulophyric
- (d) Glomeroporphyritic

49.

Which one of the following is similar to slate but has a silky sheen on the cleavage surface?

- (a) Helicitic
- (b) Phyllite
- (c) Quartzite
- (d) Gneiss

50.

If the foliation is caused by a parallel arrangement of medium to coarse grained phyllosilicate minerals, it is called:

- (a) Poikiloblastic
- (b) Lineation
- (c) Helicitic
- (d) Schistosity

51.

With increasing metamorphic intensity, a granoblastic texture results in:

- (a) Increase in grain size
- (b) Decrease in grain size
- (c) No variation in grain size
- (d) Loss of fabric

52.

Armoured relics are:

- (a) Minerals as inclusion even though they are no longer present in the rock matrix
- (b) High density of inclusion similar to matrix mineral composition
- (c) Porphyroblasts with no inclusions
- (d) Replacement of pre-existing mineral grains by inclusion minerals

53.

In a 'snowball crystal' if internal schistosity is undisturbed in the centre of porphyroblast but becomes increasingly tightly folded towards the margins during the formation of crenulation cleavage, this feature represents:

- (a) Syntectonic growth pattern
- (b) Post-tectonic growth pattern
- (c) Pre-tectonic growth pattern
- (d) Increasing volume growth pattern

54.

In metamorphic rocks, when all grains are of the same size and have planar boundaries which are intersecting at approximately  $120^\circ$ , then the texture is known as:

- (a) Granoblastic polygonal texture
- (b) Decussate texture
- (c) Undulose extension
- (d) Ribbon texture

55.

In a zoned olivine crystal, *Fe* tends to diffuse away from the fayalite-rich portions towards the parts enriched in forsterite, while *Mg* will tend to diffuse in the opposite direction. This type of diffusion is known as:

- (a) Grain boundary diffusion
- (b) Flux diffusion
- (c) Self diffusion
- (d) Interdiffusion

56.

Which one of the following is defined as a line joining points where the rock have suffered metamorphism under similar pressure-temperature conditions?

- (a) Isograd
- (b) Grade
- (c) Facies
- (d) Zones

57.

An '*eclogite*' is:

- (a) A green coloured rock dominated by pyroxene with plagioclase
- (b) Red and green, dense rock, dominated by garnet and omphacitic pyroxene and lacking plagioclase
- (c) Red and green dense rock dominated by plagioclase, garnet and pyroxene
- (d) A rock with garnet and pyroxene with abundance of mica

58.

The granulite facies rocks that at high grades develop felsic segregations due to partial melting are called:

- (a) Migmatites
- (b) Paleosome
- (c) Anthracite
- (d) Paragonite

59.

The characteristic of granulite facies is:

- (a) Formation of hydrous Ca-Al silicate with zeolite, prehnite and pumpellyite
- (b) Presence of mineral garnet with metabasites
- (c) Extreme presence of Glaucophane without quartz
- (d) Development of both clinopyroxene and orthopyroxene commonly with quartz and plagioclase

60.

Which one of the following represents the location of metamorphic paired belts?

- (a) Along the divergent plates
- (b) Subduction zone beneath island arc and continental margins
- (c) Along transform plates
- (d) Along mobile belts

61.

Sediments which contain grains of various sizes in nearly equal amount are said to be:

- (a) Well assorted
- (b) Unassorted
- (c) Positively skewed
- (d) Composite

62.

Which one of the following is a variety of sandstone that is exceptionally rich in mica dispersed in parallel or subparallel layers?

- (a) Arkose
- (b) Flagstone
- (c) Freestone
- (d) Ganister

63.

A muddy, laminated and fissile rock capable of breaking into small flakes is called:

- (a) Augen gneiss
- (b) Sand stone
- (c) Micaceous quartzite
- (d) Shale

64.

Which one of the following explains the chelation process of weathering?

- (a) Breakdown of mineral due to the extraction of water molecules during the process of weathering
- (b) Bonding of metal ions to organic substances to form organic molecules and removal of cations from mineral lattice and keeping the cations in solution
- (c) Addition of water molecules into the mineral to form a new mineral
- (d) Chemical breakdown of mineral by the process of thermal expansion

65.

On account of the charged surfaces of clay minerals, their interaction with saline water leads to clumping into aggregates of randomly oriented clay flakes. This process is termed as:

- (a) Fissility
- (b) Flocculation
- (c) Lamination
- (d) Illitization

66.

Which one of the following beddings is markedly trough or scoop-shaped?

- (a) Festoon bedding
- (b) Massive bedding
- (c) Lenticular bedding
- (d) Laminated bedding

67.

Which one of the following is a grain-supported limestone that also contains some micrite mud matrix?

- (a) Grainstone
- (b) Packstone
- (c) Wackestone
- (d) Mudstone

68.

During diagenesis, the process of intrastratal solution leads to:

- (a) Dissolution of one mineral and precipitation of another mineral simultaneously
- (b) Selective dissolution of less stable framework grains or part of grains
- (c) Alteration of one mineral into other by the process of dewatering
- (d) Formation of two minerals of contrasting physical and chemical environment

69.

Which one of the following rock types may also be formed along planes of movement in the crust?

- (a) Conglomerates
- (b) Limestone
- (c) Breccia
- (d) Gravel

70.

Rip currents that occur near beach are localized in nature and:

- (a) Move seaward as a narrow, near surface current
- (b) Move in turbulent manner in shoaling zone with reduced velocity
- (c) Are the perennial currents in the sea driven by the circulation pattern of earth
- (d) Are deflection currents which play an important role in dispersal of sediment in wide area along beaches

71.

The replacement of dolomite rhombs by calcite is termed as:

- (a) Dolomitization
- (b) Dedolomitization
- (c) Recrystallization
- (d) Substitution

72.

The Dead Sea provides:

- (a) A single modern example of a deeper water evaporite environment
- (b) Most remarkable deposit of evaporite from the ancient past
- (c) Most modern evaporite deposit of marine sabkhas
- (d) An example of ancient sea which has disappeared now

73.

The organism is decomposed and it loses its nitrogen, oxygen and other volatile constituents, this process is known as:

- (a) Petrification
- (b) Carbonisation
- (c) Moulds
- (d) Impression

74.

The study of the process of fossilization is called:

- (a) Agronomy
- (b) Teronomy
- (c) Taxonomy
- (d) Taphonomy

75.

Paratype is a specimen, other than the holotype, which is formally designated by the author of a species as:

- (a) Having been used in the description of the species
- (b) A syntype which is subsequently singled out as the definitive type specimen for a species
- (c) Used for re-description of existing species
- (d) Depicting it as non-original type material which has been collected at the type locality

76.

In paleontology, subspecies is usually used to denote:

- (a) The extinction of one species by the expense of one species forms a subspecies
- (b) The morphological changes in a species that lead to transformation of one species to another
- (c) The evolution of new species from the mutation of old genera
- (d) The intermediate stage in the replacement of one species by another through phyletic transition

77.

Which one of the following statements regarding bivalve is correct?

- (a) Length is defined as the maximum linear dimension in an antero-posterior direction and height is defined as the maximum dimension perpendicular to the length
- (b) Length is defined as the maximum linear dimension in the radial direction while height is defined as the maximum dimension perpendicular to the length
- (c) Length is defined as the maximum linear dimension in posterior-anterior direction while height is perpendicular to the length
- (d) Length is the maximum area covered by bivalve shell in one linear direction while height is perpendicular to it

78.

The body part of which invertebrate can transversely and longitudinally be divided into distinct three parts?

- (a) Brachiopods
- (b) Gastropods
- (c) Trilobites
- (d) Cephalopods

79.

Brain size in different mammals generally tends to increase during the process of evolution by the powers of:

- (a)  $\frac{2}{3}$  of body size
- (b)  $\frac{3}{2}$  of body size
- (c)  $\frac{4}{3}$  of body size
- (d)  $\frac{1}{6}$  of body size

80.

Which one of the following is related to the 'missing link' between humans and their ape like ancestors?

- (a) *Proconsul africanus*
- (b) *Homo habilis*
- (c) *Homo erectus*
- (d) *Homo heidelbergensis*

81.

The genus *Orohippus* which represents the second stage in evolution of horse is popularly known as:

- (a) Dawn horse
- (b) Mountain horse
- (c) Browsing horse
- (d) Siwalik horse

82.

Large benthic foraminifera became abundant in diversity and quantity since:

- (a) Cretaceous
- (b) Eocene
- (c) Oligocene
- (d) Carboniferous

83.

Which one of the following plant fossils exhibit lanceolate pinnules type leaf with prominent mid-rib and veins?

- (a) *Ptilophyllum*
- (b) *Glossopteris*
- (c) *Lepidodendron*
- (d) *Thinnfeldia*

84.

Which one of the following foraminifera fossils is found in Ladakh and Kashmir?

- (a) *Fusulina*
- (b) *Globotruncana*
- (c) *Globorotalia*
- (d) *Lituotuba*

85.

The Permian rock formation of the Salt Range in Pakistan (*Productus* Limestone) is lithologically different from that of the Spiti area (*Productus* Shale) while having same relative age because:

- (a) Both the rock formations were deposited in same sedimentary basin but were altered later by different grades of deformation
- (b) Both the rock formations were deposited in different sedimentary basins in spite of the same relative age
- (c) In Pakistan, the *Productus* Limestone was deposited as vertical succession during sea transgression while in the Spiti area *Productus* Shale was deposited as lateral succession
- (d) In Spiti area, the *Productus* Shales have been deposited over the *Productus* Limestone and both the formations belong to different age groups

86.

In stratigraphic correlation, the term homotaxial refers to the formations:

- (a) Deposited at the same stage of the earth's evolutionary history
- (b) Deposited at different geological time
- (c) Having similar lithologic package
- (d) Bearing same fossil content despite in different time

87.

The Singhbhum Shear Zone is also known as:

- (a) Singhbhum Zinc Belt
- (b) Singhbhum Copper Belt
- (c) Singhbhum Silver Belt
- (d) Singhbhum Gold Belt

88.

The stratigraphic boundary demarcating the Archaean rocks from Closepet granite is termed as:

- (a) Non-conformity
- (b) Disconformity
- (c) Angular Unconformity
- (d) Eparchaeon Unconformity

89.

The sediments of the 'Dharwar Super-group' were deposited over a basement of:

- (a) Slates and phyllites
- (b) Marbles and Conglomerates
- (c) Sargur Schists and Peninsular Gniessic complex
- (d) Basalts and conglomerates

90.

The Chipli Ghat Group comprises:

- (a) Huge thickness of phyllites, slates and mica-schists
- (b) Rich manganese deposit
- (c) High grade metamorphic rocks of plutonic origin
- (d) Garnet-sillimanite schists termed as Khondalite rocks

91.

Vempalle shales and limestones belong to:

- (a) Kistna group
- (b) Nallamalai group
- (c) Cheyair group
- (d) Papaghni group

92.

Which one of the following is the characteristic feature of extrusive and intrusive phase of 'Malani Igneous Suite'?

- (a) It comprise mainly mafic magmatic activity which is in the form of numerous dykes
- (b) It represents one of the world's largest example of felsic magmatism
- (c) It is mainly composed of layered structures
- (d) Its rocks resemble Archaean basement by chemical composition and are considered to represent oldest known magmatic activity

93.

The oldest group of Cuddapah Super-group is:

- (a) Papaghni Group
- (b) Nallamalai Group
- (c) Chitravati Group
- (d) Kurnool Group

94.

The Cretaceous rocks exposed along the southern slopes of the Shillong Plateau have been grouped into:

- (a) Mahadek Formation
- (b) Longpar Formation
- (c) Dalmiapuram Formation
- (d) Lathi Formation

95.

The worldwide orogenic event which took place during Ordovician and Silurian period is known as:

- (a) Hercynian orogeny
- (b) Caledonian orogeny
- (c) Catalatic orogeny
- (d) Mesonian orogeny

96.

The linear Ophiolitic belt of Ladakh was formed as a consequence of:

- (a) Thick sediment deposition by transgression of Tethys sea
- (b) High rate of erosion of the rising Himalaya due to the northward drift of Indian plate
- (c) Emplacement of acidic volcanics in deep sea in association of marine sediment
- (d) Emplacement of basic volcanics in association with the deep marine sediment

97.

Which one of the following processes is most commonly associated with the fumaroles?

- (a) Metasomatism
- (b) Hypothermal
- (c) Sublimation
- (d) Mesothermal

98.

Which one of the following is commonly known as “black lead” but, lacks lead in its composition?

- (a) Sphalerite
- (b) Graphite
- (c) Pentlandite
- (d) Cassiterite

99.

Which one of the following minerals is used as an important raw material for the manufacture of cement and fertilizer-ammonium sulphate?

- (a) Barytes
- (b) Magnesite
- (c) Gypsum
- (d) Calcite

100.

Which one of the following ore minerals is associated with the nepheline syenite in Khammam district of Andhra Pradesh?

- (a) Andalusite
- (b) Corundum
- (c) Sillimanite
- (d) Sheelite

101.

Which silicate of iron and magnesium is termed as chrysolite?

- (a) Mica
- (b) Olivine
- (c) Magnesite
- (d) Biotite

102.

Which one of the following statements regarding hydrothermal solutions is correct?

- (a) These are weakly concentrated, highly dissociated, basic solutions
- (b) These are weakly concentrated, highly dissociated, acidic solutions
- (c) These are concentrated, highly dissociated, electrolytic solutions
- (d) These are concentrated, weakly dissociated, electrolytic solutions

103.

Which one of the following is a ladder vein type of deposit?

- (a) Iron deposits of Goa
- (b) Cassiterite deposit of Bastar, Chhattisgarh
- (c) Lead-Zinc deposit of Zawar, Rajasthan
- (d) Magnesite deposit of Mysore, Karnataka

104.

A host of mineral deposits occur at the contact zone of meso and epi-zonal igneous plutons because:

- (a) Maximum fracture/shearing and low thermal gradient exist here
- (b) Prominent lineament run parallel to the stratigraphic trends
- (c) These are weak zones, mixing of fluids takes place and thermal gradient is steep
- (d) Very intense weathering leads to the formation of residual deposits

105.

Which one of the following is correct for the bituminous coal?

- (a) Its calorific value ranges between 11,000 to 12,500 B.T.U.
- (b) It shows banded structure with alternate dull and bright bands
- (c) It shows sign of original vegetal matter
- (d) It contains very high volatile matter

106.

The organic theory of oil genesis appeared for the first time in the form of:

- (a) Gubkin's hypothesis
- (b) Lomonosov's distillation hypothesis
- (c) Pryor's distillation hypothesis
- (d) Bosworth's theory

107.

Which one of the following properties of mica make it an excellent electrical insulator?

- (a) Its splitting property combined with flexibility, elasticity, resilience, low heat conductivity and high dielectric strength
- (b) Its hardness, lustre, malleability and electric strength
- (c) To easily spun into yarn and its resistance to heat
- (d) Its inert and stable nature

108.

Petroleum and natural gas deposits in Assam are associated with rocks of:

- (a) Jurassic age
- (b) Precambrian age
- (c) Eocene age
- (d) Oligocene to Lower-Miocene age

109.

Coalescence process is one by which:

- (a) Nucleation of raindrops develops around the organic or dust particles
- (b) The small cloud droplets increase their size due to contact with other droplets through collision
- (c) Sea water brought into the environment during the evaporation
- (d) The tiny rain drops are held in the environment just before the precipitation

110.

Which one of the following is the correct equation for the calculation of the volume of water absorbed in a rock?

(where,  $n$  = porosity,  $w_S$  = saturated weight,  $w_D$  = dry weight,  $V$  = volume,  $D$  = density)

(a)  $n = \frac{100 \times w_S + w_D \times D}{V}$

(b)  $n = \frac{100 \times w_S - w_D \times D}{V}$

(c)  $n = \frac{100 \times w_D - w_S \times D}{V}$

(d)  $n = \frac{100 \times w_D + w_S \times D}{V}$

111.

The barometric efficiency (BE) of a confined aquifer derived by Jacob is expressed as:

(where,  $\alpha$  = bulk modulus of compression of the solid skeleton of the aquifer,  $\beta$  = bulk modulus of compression of water,  $\theta$  = porosity of the aquifer)

(a)  $BE = \frac{1}{1 + \alpha/\theta\beta}$

(b)  $BE = \frac{1}{\alpha/\theta\beta}$

(c)  $BE = \frac{1}{1 + \alpha\theta/\beta}$

(d)  $BE = \frac{1 + \alpha}{\theta\beta}$

112.

Which one of the following is called the secondary porosity?

- (a) The fractures in the igneous and metamorphic rocks developed due to tectonic activity
- (b) The primary pore spaces present in both unconsolidated and semi-consolidated sediment
- (c) The permeability of the rock which is directly proportional to the pore spaces and size of pore
- (d) The pore spaces that develops at the time of formation of a rock or sediment

113.

The coefficient of transmissivity (T) can be expressed as:

(a)  $T = \frac{1}{K \times b}$

(b)  $T = cd^2$

(c)  $T = \sqrt{K \times b}$

(d)  $T = K \times b$

114.

The quantity of water (Q) moving per unit of time, as stated by Darcy's law is expressed as:  
(where, P = coefficient of permeability, I = hydraulic gradient, A = cross-sectional area through which water moves)

- (a)  $Q = PIA$
- (b)  $Q = \frac{1}{PIA}$
- (c)  $Q = \sqrt{PIA}$
- (d)  $Q = \frac{1}{\sqrt{PIA}}$

115.

According to Darcy's law, the rate of flow of water through a porous media is:

- (a) Inversely proportional to the difference in hydraulic head between the two ends of the porous media
- (b) Proportional to the difference in hydraulic head between the two ends of the porous media
- (c) Proportional to the length of the flow path
- (d) Inversely proportional to the area of cross section of the aquifer

116.

The total mechanical energy per unit weight (h) as expressed by Bernoulli equation is:  
(where, P = pressure,  $\gamma$  = specific weight of water per unit volume, V = velocity of flow of water,  $\rho$  = density of water, g = acceleration due to gravity, Z = elevation head measured from a datum or sea level)

- (a)  $h = \frac{P}{\rho g} + \frac{V^2}{g} + Z$
- (b)  $h = \frac{P}{\rho g} + \frac{V^2}{2g} - Z$
- (c)  $h = \frac{P}{\rho g} + \frac{V^2}{2g} + Z$
- (d)  $h = \frac{P}{\rho g} + \frac{V^2}{g} - Z$

117.

Which one of the following is the correct expression for determining the Reynold's number (R)?

(a)  $R = \frac{\rho v d}{\mu}$

(b)  $R = \frac{\rho d}{\mu v}$

(c)  $R = \frac{\rho v}{\mu d}$

(d)  $R = \frac{\rho d \mu}{v}$

118.

Sodium salts are highly soluble in water and are released in solution during:

- (a) Dissolution action of limestone
- (b) Decay of quartz by chemical replacement
- (c) Weathering of plagioclase feldspar
- (d) Weathering of olivine minerals

119.

The contour trenches with bunds which are constructed for the artificial recharge of ground water are:

- (a) Parallel to topographic contour with plantation to check rapid runoff
- (b) Perpendicular to rivulets where permeable formation are present
- (c) Parallel to rivulets where permeable formation are present
- (d) Perpendicular to topographic contour with plantation to check rapid runoff

120.

Induced recharge is an indirect method of artificial recharge involving:

- (a) The pumping from an aquifer which is hydraulically connected with surface water bodies
  - (b) A method in which pumping lowers the ground water level and cone of recharge is formed
  - (c) A method where stream bed is connected to aquifer by clayey formation
  - (d) A method in which there is build up of ground water storage
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