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Signature of Invigilator

Question Booklet Series

X

PAPER-II

Question Booklet No.

(Identical with OMR Answer Sheet Number)

Subject Code : 27

EARTH, ATMOSPHERIC, OCEAN & PLANETARY SCIENCES

Time : 2 Hours

Maximum Marks: 200

Instructions for the Candidates

- Write your Roll Number in the space provided on the top of this page as well as on the OMR Sheet provided.
- At the commencement of the examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and verify it:
 - To have access to the Question Booklet, tear off the paper seal on the edge of this cover page.
 - Faulty booklet, if detected, should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
 - Verify whether the Question Booklet No. is identical with OMR Answer Sheet No.; if not, the full set is to be replaced.
 - After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet.
- This paper consists of One hundred (100) multiple-choice type questions. All the questions are compulsory. Each question carries *two* marks.
- Each Question has four alternative responses marked: (A) (B) (C) (D) . You have to darken the circle as indicated below on the correct response against each question.

Example: (A) (B) (C) (D) , where (C) is the correct response.
- Your responses to the questions are to be indicated correctly in the OMR Sheet. If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
- Rough work is to be done at the end of this booklet.
- If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Sheet, except in the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
- Do not tamper or fold the OMR Sheet in any way. If you do so, your OMR Sheet will not be evaluated.
- You have to return the Original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry question booklet and duplicate copy of OMR Sheet after completion of examination.
- Use only **Black Ball point pen**.
- Use of any calculator, mobile phone, electronic devices/gadgets etc. is strictly prohibited.
- There is no negative marks for incorrect answer.

EARTH, ATMOSPHERIC, OCEAN & PLANETARY SCIENCES

PAPER II

1. Polytypism refers to
 - (A) type of polymorphism where different polymorphs exist in different domains of the same crystal.
 - (B) a phenomenon that is only found in potash feldspar.
 - (C) a phenomenon related to pyrite-marcasite transition.
 - (D) a particular transformation related to calcite -aragonite change.

2. Which one of the following is the correct chronological order of different periods in the Paleozoic Era?
 - (A) Cambrian, Silurian, Ordovician, Carboniferous, Devonian, Permian
 - (B) Cambrian, Devonian, Ordovician, Silurian, Permian, Carboniferous
 - (C) Cambrian, Ordovician, Silurian, Devonian, Carboniferous, Permian
 - (D) Cambrian, Ordovician, Silurian, Devonian, Permian, Carboniferous

3. Which of the following combinations are all considered to be Jovian planets?
 - (A) Mercury–Mars–Saturn–Jupiter
 - (B) Mars–Venus–Earth–Jupiter
 - (C) Mercury–Venus–Earth–Mars
 - (D) Jupiter–Saturn–Uranus–Neptune

4. Storage capacity of a reservoir depends on
 - (A) porosity of rocks.
 - (B) inter-connections.
 - (C) quality of solidity of rocks.
 - (D) porosity and inter-connections.

5. How does mechanical weathering aid chemical weathering?
 - (A) Chemical weathering can not proceed without the aid of mechanical weathering.
 - (B) Mechanical weathering promotes the physical breakdown of rock, thus producing chemical weathering.
 - (C) Mechanical weathering increases surface area for chemical attack.
 - (D) Chemical weathering is controlled by the presence or absence of effect of physical weathering.

6. If a volcano erupts explosively and then collapses into the void left by the emptying of the magma chamber below the mountain, it produces a wide and deep circular hole called a
 - (A) Crater
 - (B) Cinder cone
 - (C) Caldera
 - (D) Lava dome

7. Pull apart basins develop along the _____.
 - (A) releasing bends of strike slip faults.
 - (B) restraining bends of strike slip faults.
 - (C) trailing ramps of thrusts.
 - (D) lateral ramps of thrusts.

8. Quartz, Garnet, Sillimanite and Graphite bearing schists and gneisses are known as
 - (A) Gondites
 - (B) Charnockites
 - (C) Khondalites
 - (D) Migmatites

9. The equation that represents the value of shear stress is
 - (A) $\frac{\sigma_1 - \sigma_2}{2} \sin 2\phi$
 - (B) $\frac{\sigma_1 + \sigma_2}{2} \sin 2\phi$
 - (C) $\frac{\sigma_1 + \sigma_2}{2} + \frac{\sigma_1 - \sigma_2}{2} \cos 2\phi$
 - (D) $\frac{\sigma_1 - \sigma_2}{2} \sin \phi$

10. Deccan Trap lavas of India are result of
 - (A) volcanism caused due to subduction of Indian plate and Tibetan plate.
 - (B) intraplate volcanism caused by Reunion plume.
 - (C) volcanism caused by mid-oceanic rift ridges.
 - (D) volcanism initially caused at Himalayan region which later transgressed to Central India.

11. Which one of the following is the stable mineral assemblage in metamorphism of a rock with politic bulk composition under granulite facis?

- (A) Staurolite + Muscovite + Sillimanite + K-feldspar
- (B) Phengite + Garnet + Chloritoid + Biotite
- (C) Garnet + Orthopyroxene + Clinopyroxene + Plagioclase
- (D) Garnet + Cordierite + K-feldspar + Sillimanite

12. Which of the following is the direct ancestor of *Homo sapiens*?

- (A) Siwapithecus
- (B) Ramapithecus
- (C) Australopithecus
- (D) Homo erectus

13. Which of the following best explains the principle of order of superposition?

- (A) Older strata are generally deposited directly on younger strata without intermediate age strata.
- (B) Fossiliferous strata are generally deposited on strata with no fossils.
- (C) All sedimentary deposits accumulate randomly without any order.
- (D) All sedimentary strata accumulate on older rocks or sediment layers.

14. What is the pressure of upper surface of unconfined aquifer?

- (A) Very high pressure
- (B) Lower than atmospheric pressure
- (C) Equal to atmospheric pressure
- (D) Greater than atmospheric pressure

15. How many tonnes of gold ore (having an assay value of 2 ppm of Au) need to be processed to produce 1 Kg of gold?

- (A) 5000
- (B) 500
- (C) 50
- (D) 550

16. Point bar deposits are associated with

- (A) Glaciers
- (B) Deserts
- (C) Oceans
- (D) Rivers

17. Which of the following is not yet extinct?

- (A) Ammonites
- (B) Trilobites
- (C) Echinoderms
- (D) Belemnites

18. Crystals belonging to the following crystallographic systems are biaxial:

- (A) Triclinic, Orthorombic and Trigonal
- (B) Trigonal, Monoclinic and Isometric
- (C) Triclinic, Monoclinic, Orthorombic
- (D) Trigonal, Hexagonal and Tetragonal

19. In $R_f-\phi$ method of strain measurement R_f represents the

- (A) final ellipticity.
- (B) orientation of deformed object.
- (C) initial ellipticity.
- (D) initial orientation of undeformed object.

20. The half width of vertical magnetic intensity anomaly over a magnetised sphere is 25 meters. The depth to the center of sphere from the surface will be

- (A) 32.5 m
- (B) 50.0 m
- (C) 25.0 m
- (D) None of the above

21. With reference to the sub-tropical high pressure belt, consider the following statements:

- I. It is affected by Earth's rotation and descent of winds from higher altitudes.
- II. It dynamically induced and characterised with anti-cyclonic conditions.

Which of the statement/statements given above is/ are correct?

- (A) I only.
- (B) II only.
- (C) Both I and II.
- (D) Neither I nor II.

22. A troctolite (when investigated with a petrological microscope) shows presence of corona structure. This can be best explained by crystallization of parent magma in the

- (A) Albite – Anorthite system
- (B) Diopside – Albite – Anorthite system
- (C) Forsterite – Silica system
- (D) Nepheline – Kalsilite – Silica system

23. If g_m is the measured gravity value, g_n is the normal gravity value and Δg_{FA} is the free-air correction, then the free-air gravity anomaly (Δg_F) is expressed as

- (A) $\Delta g_F = g_m + \Delta g_{FA} - g_n$
- (B) $\Delta g_F = g_m + \Delta g_{FA} + g_n$
- (C) $\Delta g_F = g_m - \Delta g_{FA} + g_n$
- (D) $\Delta g_F = g_m + \Delta g_{FA} - g_n$

24. As per the Goldschmidt Mineral stability order

- (A) olivine, pyroxene and hornblende have equal susceptibility to weathering.
- (B) olivine is least stable than pyroxene and hornblende.
- (C) olivine weathers to pyroxenes and pyroxene weathers to hornblende.
- (D) olivine is more stable than orthoclase.

25. In Flinn diagram of presentation of strain ellipsoid, strain ellipsoid present along the line $K = 1$ is

- (A) Uniaxial oblate type
- (B) Uniaxial prolate type
- (C) Plain-strain type
- (D) Flattening type

26. The ratio of the total solar radiant energy returned by a planetary body to the total radiant energy incident on the body, is called

- (A) Reflectance
- (B) Reflectance factor
- (C) Albedo
- (D) None of the above

27. Which of the following subtropical gyre has been named as the *Columbus Gyre* by the oceanographers?

- (A) North Atlantic Subtropical Gyre
- (B) South Atlantic Subtropical Gyre
- (C) North Pacific Subtropical Gyre
- (D) South Pacific Subtropical Gyre

28. Perthitic texture is the result of

- (A) peritectic reaction between orthoclase and albite.
- (B) solid solution between albite and anorthite.
- (C) high pressure breakdown reaction of orthoclase.
- (D) sub-solvus cooling of alkali feldspar.

29. Sand dunes migrate in the

- (A) gentle windward direction.
- (B) leeward direction.
- (C) both windward and leeward.
- (D) sand dunes are generally stable and do not migrate.

30. In any sample of ocean water worldwide, the chloride ions account for 54.04% of the total proportion of dissolved solids. Thus, it can be used to determine salinity of the ocean water sample by using the following formula:

- (A) Salinity (‰) = $1.10655 \times \text{Chlorinity (‰)}$
- (B) Salinity (‰) = $1.50665 \times \text{Chlorinity (‰)}$
- (C) Salinity (‰) = $1.80665 \times \text{Chlorinity (‰)}$
- (D) Salinity (‰) = $2.10665 \times \text{Chlorinity (‰)}$

31. Which one of the following statements is correct regarding GPS satellites?

- (A) The nominal altitude is about 20,200 km.
- (B) The inclination of axis satellite is 55°.
- (C) The satellite transmits two L band signals (L_1 with 1575.42 MHz and L_2 with 1276.6 MHz).
- (D) All of the above

32. Sanidine, Orthoclase and Microcline are examples of order-disorder transformation of potassium feldspar where

- (A) Microcline shows maximum ordering and least crystallographic symmetry.
- (B) Sanidine shows maximum ordering and least crystallographic symmetry.
- (C) Microcline shows minimum ordering and maximum crystallographic symmetry.
- (D) Sanidine shows maximum ordering and maximum crystallographic symmetry.

33. Which of the following material is required for Optically Simulated Luminescence (OSL) dating?

- (A) Wood pieces
- (B) Charcoal pieces
- (C) Quartz grains
- (D) Carbonate shell

34. Which of the following sentences is NOT TRUE about the seawater salinity?

- (A) It varies from place to place and also with the depth.
- (B) Surface seawater salinity is lowest at the poles.
- (C) Surface seawater salinity is highest at the equator.
- (D) Surface seawater salinity in far northern latitudes is lower as compared to that in equivalent latitudes in the southern hemisphere.

35. 'Taphonomy' is the science dealing with

- (A) study of fossil pollens and spores.
- (B) reconstruction of palaeo-environments by means of fossils.
- (C) modes of preservation of fossils.
- (D) study of the conditions of burial history of fossils.

36. If a magnetic reversal occurred in Earth today, it would result in new rocks exhibiting

- (A) Remanent magnetism
- (B) Reverse polarity
- (C) Palaeomagnetism
- (D) No magnetic signature

37. Which of the following compounds is used in cloud-seeding, for artificial precipitation?

- (A) Silver bromide (AgBr)
- (B) Silver chloride (AgCl)
- (C) Silver fluoride (AgF)
- (D) Silver iodide (AgI)

38. Match the following sedimentary rock/deposits with characteristic structures/textures listed in *Group-I* with the depositional environments listed in *Group-II*. Choose the correct answer.

<i>Group-I</i>	<i>Group-II</i>
(a) Sandstone with herring bone cross-bedding	(i) Eolian
(b) Poorly sorted sediments with faceted and striated pebbles	(ii) Pelagic
(c) Chalk with coccoliths	(iii) Sabkha
(d) Well-sorted arenite with large scale cross-bedding (5-10 m thick)	(iv) Tidal
	(v) Glacial
(a)	(b)
(A) (iv)	(v)
(B) (iv)	(i)
(C) (iv)	(i)
(D) (ii)	(i)
(c)	(d)
(ii)	(i)
(ii)	(v)
(iii)	(ii)
(iii)	(ii)
(iv)	(iv)
(v)	(v)

39. Veins, developed during buckling mechanism of folding in the outer and inner fold arc of the folded layer in an antiformal fold, show the following orientation with respect to the folded layer boundary.

- (A) Nearly parallel with the folded surface in the outer arc but perpendicular with the folded surface in the inner arc.
- (B) Nearly perpendicular with the folded surface in the outer arc but parallel with the folded surface in the inner arc.
- (C) Everywhere the orientation is same irrespective of the position in the fold.
- (D) Veins are randomly oriented throughout the fold.

40. In extensional tectonic regime of plate tectonics
- normal fault is most dominant structure.
 - reverse fault is most dominant structure.
 - both normal and reverse faults are dominant structures.
 - fold and strike slip faults are dominant structures.
41. Van allen zones form at
- North pole
 - South pole
 - North and South pole
 - Equator
42. In a fluvial landscape, a palaeochannel is seen a few kilometers away from the meander belt of an active channel. And, no other palaeochannels are seen between it and the active meander belt. Then, this palaeochannel indicates the landscape was modified _____.
- suddenly due to change in extrinsic variable
 - suddenly due to crossing of threshold by intrinsic variable
 - gradually due to change in extrinsic variable
 - gradually due to crossing of threshold by intrinsic variable
43. The relationship between applied load 'P', cross-sectional area of the sample 'A' and compressive strength ' ρ ' is expressed by the formula _____.
- $\rho = \frac{P}{A}$
 - $\rho = \frac{A}{P}$
 - $\rho = \frac{(P-A)}{A}$
 - $\rho = \frac{(P-A)}{P}$
44. The formation which may be porous enough to hold enough quantity of water but does not allow an easy and quick flow through it is an
- Aquifer
 - Aquiclude
 - Aquifuge
 - Aquitard
45. Which of the following microfossil groups is generally associated with deep sea below the CCD levels?
- Foraminifera
 - Radiolaria
 - Microgastropods
 - Cocoliths
46. The degree of freedom at the Eutectic point for the Diopside-Anorthite system (1 atm dry) is
- Three
 - Two
 - One
 - Zero
47. Paired Metamorphic Belt is characteristically formed at
- divergent plate boundary.
 - convergent plate boundary.
 - transform faults.
 - plume Lithospheric interaction zone.
48. If a planet's orbital period is 'T' and its semi-major axis is 'a', then according to the Kepler's third law of planetary motion _____.
- the ratio of T^2 to a^3 is constant (k), i.e. $\frac{T^2}{a^3} = k$
 - the ratio of T^2 to a^2 is constant (k), i.e. $\frac{T^2}{a^2} = k$
 - the ratio of T^3 to a^2 is constant (k), i.e. $\frac{T^3}{a^2} = k$
 - the ratio of T^3 to a^3 is constant (k), i.e. $\frac{T^3}{a^3} = k$
49. Sensitivity of a gravimeter is
- 0.001 mgal
 - 0.002 mgal
 - 0.1 mgal
 - 0.01 mgal
50. Which of the following characterize the grain supported limestones with presence of matrix?
- Wackestone
 - Grainstone
 - Packstone
 - Dolostone

51. Pick up the correct statement from the following:
- In remote sensing technique, the observation place, is called a platform.
 - Platforms may be either stationary or mobile.
 - Spatial resolution of the imaging system becomes poorer with increase of platform height.
 - All of the above
52. Steepness of seawaves is defined as the ratio of wave height to wavelength, i.e. $wave\ steepness = \frac{wave\ height}{wavelength}$.
- A wave breaks if the wave steepness is _____.
- $\frac{1}{3}$
 - $\frac{1}{5}$
 - $\frac{1}{7}$
 - $\frac{1}{9}$
53. Ancient lake level in preserved deltaic sequence is marked by the _____.
- topmost part of the topset bed
 - contact between topset and foreset beds
 - contact between foreset and bottomset beds
 - base of the bottommost bottomset bed
54. An area around the earth where trade winds of the northern and southern hemisphere collide is known as the _____.
- Intertropical Convergence Zone
 - Intertropical Collision Zone
 - Intertrade Convergence Zone
 - Intertrade Collision Zone
55. Which of these controls on mass wasting reduces the cohesion of slope material?
- A decrease in the steepness of the slope.
 - An increase in the amount of water in the regolith.
 - An increase in the amount of vegetation cover.
 - An increase in the shear strength of the regolith particles.
56. Which of the following is not the Indian Ocean current?
- Northeast Monsoon Drift
 - Southwest Monsoon Drift
 - Agulhas current
 - Benguela current
57. Layered Anorthosites are represented by
- highly sodic plagioclase.
 - highly sodic plagioclase and orthoclase.
 - highly calcic plagioclase and biotite.
 - highly calcic plagioclase.
58. The flow of water/air could be laminar or turbulent. A dimensionless number, which differentiates between laminar and turbulent water/air flows is known as the _____.
- Rossby Number
 - Reynolds Number
 - Froude Number
 - Richardson Number
59. Van der Waal's bond is present in
- Graphite
 - Pyroxene
 - Olivine
 - Anorthite
60. The inclination of the subducted oceanic plate is high when
- the rate of subduction is very low.
 - the rate of subduction has no control on inclination.
 - the rate of subduction is very high.
 - the thickness of the overriding plate is higher than the subducted plate.

- 61.** A good example of a type of cap rock in an oil reservoir is
- Sandstone
 - Limestone
 - Conglomerate
 - Shale
- 62.** Which of the following sentences is NOT TRUE about the tidal bore?
- Tidal bores move up the river during incoming tides.
 - Tidal bores develop if the tidal cycle has abrupt flood tide phase and elongated ebb tidal phase.
 - Tidal bores can develop even if the tidal range is as short as 3 meters.
 - Tidal bores develop in low-lying rivers that have a persistent seaward current during the time when an incoming high tide begins.
- 63.** Which of the following statements is NOT TRUE about the earthquakes?
- Only shallow earthquakes occur on the oceanic ridge systems.
 - P-waves are fastest seismic waves.
 - An earthquake having the focal depth of 230 km. will be classified as an intermediate focus earthquake.
 - The largest proportion (> 80%) of the annual release of global seismic energy is liberated in deep-sea earthquakes.
- 64.** Which of the following statements is TRUE about the gas composition of the earth's atmosphere?
- Proportion of argon is more than that of the carbon dioxide.
 - Proportion of oxygen is maximum among all gases.
 - Trace gases constitute about 10% of the total gas composition.
 - Proportion of the ozone is more than that of the helium.
- 65.** Which of the following statements is NOT TRUE regarding the atmospheric Rossby Waves?
- These are giant meanders in low-altitude winds that do not influence the weather.
 - These are associated with pressure systems and jet streams.
 - Barotropic Rossby waves have the fastest propagation speed, and they do not vary in vertical.
 - Baroclinic Rossby waves are slower and vary in vertical.
- 66.** A compass spins at the North pole because
- it is too cold for a compass to work properly.
 - the magnetic declination changes through time.
 - the magnetic field is inclined vertically with respect to the surface.
 - the magnetic field direction constantly reverses.
- 67.** In case of TEM technique, following statements would be most appropriate:
- An accelerated beam of electrons which passes through a very thin specimen.
 - A retarded beam of electrons which passes through a very thick specimen.
 - Thick hand specimens are directly studied.
 - The same output is obtained as in case of SEM.
- 68.** The thickness of the oceanic lithosphere varies from oceanic ridge-rift system to the margin of the ocean. Its thickness increases
- as we move from ridge-rift system to margin of the ocean.
 - as we move from margin of the ocean to the ridge-rift system.
 - no regular relation exist.
 - thickness remain constant with minor increase at the ridge.
- 69.** Coriolis force is directly proportional to
- Poles
 - Tropic of Cancer
 - Equator
 - Arctic circle
- 70.** Which one of the upheavals was the most pronounced phase of the Himalayan orogeny?
- Second
 - Third
 - Fourth
 - Fifth

71. Clay minerals are also represented by which of the following?

- (A) Resistates
- (B) Hydrolysates
- (C) Oxidates
- (D) Bicarbonates

72. Diameter of a chondrule ranges from which one of the following?

- (A) 0.5–1 mm
- (B) 1–5 mm
- (C) 0–2.2 mm
- (D) 0.1–1 mm

73. Phenomenon of MONOTROPY can be explained by which of the following?

- (A) Quartz–Tridymite
- (B) Diamond–Graphite
- (C) Pyrite–Marcasite
- (D) Quartz–Tridymite–Cristobalite

74. Find out the correct answer from the following:

Nuclides	Half life (year)	Material to be dated
(A) ^{235}U – ^{206}Pb	4.48×10^{10}	Sanidine
(B) ^{40}K – ^{40}Ar	1.31×10^9	Zircon
(C) ^{87}Rb – ^{87}Sr	4.47×10^9	Micas
(D) ^{147}Sm – ^{143}Nd	1.06×10^{11}	Igneous rocks

75. When Hf^{4+} enters into Zircon crystal lattice, the phenomenon is called as

- (A) Captured
- (B) Admittance
- (C) Diadochy
- (D) Camouflaged

76. Synthesis of primitive matter started with which of the following process?

- (A) C – burning
- (B) He – burning
- (C) O – burning
- (D) H – burning

77. Find out the correct answer from the following:

	Pathfinder elements	Media	Ore types
(A)	As	Water	Sulphide deposit
(B)	Se	Gossan	Epigenetic deposit
(C)	Mo	Wall rock	Ag-bearing Au ore deposit
(D)	Hg	Residual soil	Porphyry Cu deposit

78. Canyon-Diablo meteorite trilonite is used as standard for which of the following isotopes?

- (A) O
- (B) C
- (C) H
- (D) S

79. Pick up the most important High Field Strength element from the following.

- (A) Ba
- (B) Bi
- (C) Sr
- (D) Hf

80. Which of the following is not matching correctly?

	Twin	Twin Plane
(A)	Baveno	021
(B)	Carlsbad	010
(C)	Carlsbad	001
(D)	Manebach	001

81. Which of the following statements about optical property of mineral is TRUE?

- (A) Quartz has high birefringence value than calcite.
- (B) Garnet is highly pleochroic.
- (C) Melatopes are the indicators of emergence of optic axes.
- (D) Isotropic minerals extinct four times during 360° rotation of microscope stage.

82. An orthorhombic crystal face intercepts the crystallographic axes and the parameters are $2a$, $2b$ and $\frac{2}{3}c$, the miller indices will be

- (A) 223
- (B) 311
- (C) 113
- (D) 123

83. When did supercontinent Pangaea begin to break up?

- (A) Cenozoic
- (B) Mesozoic
- (C) Palaeozoic
- (D) Proterozoic

84. Which one of the following can be best explored using electrical method?

- (A) Oil-bearing strata
- (B) Coal-bearing strata
- (C) Massive sulfide deposit
- (D) Bedded Manganese deposit

85. Of the following stratigraphic sequences, which one is the oldest?

- (A) Cuddalore Sandstone
- (B) Kajrahat Limestone
- (C) Gulcheru Quartzite
- (D) Closepet Granite

86. Montmorillonite is formed by the chemical weathering of

- (A) Calcite
- (B) Augite
- (C) Orthoclase
- (D) Kyanite

87. Copper-Nickel ores of sulfide association in Sudbury type of deposits are formed by

- (A) contact metasomatism
- (B) hydrothermal fracture filling
- (C) liquid immiscibility process
- (D) early magmatic dissemination

88. Extensive hydrothermal alteration is generally associated with

- (A) Quartz-pebble conglomerate hosted gold deposit
- (B) Superior type iron deposit
- (C) Stratiform chromite deposit
- (D) Porphyry copper deposit

89. The correct sequence of metamorphic facies with increasing depth in a subduction zone is

- (A) greenschist, blueschist, eclogite
- (B) greenschist, eclogite, blueschist
- (C) blueschist, greenschist, eclogite
- (D) blueschist, eclogite, greenschist

90. Which one of the following is a continental hotspot?

- (A) Reunion
- (B) Macdonald
- (C) Hawaii
- (D) Afar

91. The geomorphic feature 'horns' are formed by
- (A) wind erosion
 - (B) river erosion
 - (C) wind deposition
 - (D) glacial erosion
92. The age of the most of the bituminous coal seams of India is
- (A) Silurian
 - (B) Miocene
 - (C) Carboniferous
 - (D) Permian
93. Maculose structure is produced due to
- (A) thermal metamorphism of argillaceous rocks.
 - (B) involvement of high stress.
 - (C) regional metamorphism of limestone.
 - (D) shock metamorphism.
94. Abukuma type of metamorphism represents
- (A) low pressure metamorphism of regional extent.
 - (B) very high pressure metamorphism of regional extent.
 - (C) very high pressure shock effects.
 - (D) a type of retrograde metamorphism.
95. Considering that (1) _____ are unable to pass through liquids, we know that the (2) _____ must be a liquid because seismic wave shadow zones are observed after a major earthquake occurs.
- (A) (1) P-waves (2) outer core
 - (B) (1) P-waves (2) inner core
 - (C) (1) S-waves (2) outer core
 - (D) (1) S-waves (2) inner core
96. In a fault its tip line marks the line that
- (A) demarcates the boundary of the fault surface in 3-dimension.
 - (B) is any line parallel to the strike of the fault on fault surface.
 - (C) represents trace of the fault on Earth's surface.
 - (D) represents trace of the fault in section perpendicular to the strike of the fault.
97. The Jurassic stratigraphic succession of Kutch is characterized by which one of the following fossil groups?
- (A) Trilobites
 - (B) Graptolites
 - (C) Cephalopods
 - (D) Foraminifera
98. The Refractive Index of ocean water _____.
- (A) increases with temperature
 - (B) decreases with temperature
 - (C) decreases with salinity
 - (D) increases with salinity

99. Match the following items listed in *Group-I* with those in *Group-II*. Choose the correct answer.

<i>Group-I</i>		<i>Group-II</i>	
(a) Determination of co-efficient of compressibility of soils	(i) Shotcreting		
(b) Determination of indirect tensile strength of rocks	(ii) Oedometer test		
(c) A method of slope stabilization	(iii) Overcoring		
(d) A method of <i>insitu</i> stress determination	(iv) Brazilian test		

	(a)	(b)	(c)	(d)
(A)	(ii)	(iv)	(i)	(iii)
(B)	(ii)	(i)	(iii)	(iv)
(C)	(iv)	(i)	(ii)	(iii)
(D)	(iii)	(iv)	(ii)	(i)

100. Match the detrital rock from *Group-I* with the appropriate description as listed in *Group-II*.

<i>Group-I</i>		<i>Group-II</i>	
(a) Breccia	(i) well sorted, medium size (upto 2 mm) particles, good porosity, mature		
(b) Graywacke	(ii) angular large particles that are poorly sorted, few pore spaces		
(c) Quartz Arenite	(iii) gravel and sometimes boulder-sized particles that are poorly sorted and rounded, few pore spaces		
(d) Conglomerate	(iv) Poorly sorted, medium sized, immature, rock fragment dominated		

	(a)	(b)	(c)	(d)
(A)	(ii)	(iv)	(i)	(iii)
(B)	(iii)	(ii)	(iv)	(i)
(C)	(ii)	(i)	(iii)	(iv)
(D)	(iii)	(iv)	(i)	(ii)

27-II

X-14

ROUGH WORK

X-15

27-II

ROUGH WORK

27-II

X-16

ROUGH WORK