Test Booklet Code & Serial No.

प्रश्नपत्रिका कोड व क्रमांक

Paper-II

EARTH, ATMOSPHERIC, OCEAN AND PLANETARY SCIENCE

A

Signature and Name of Invigilator

1. (Signature) ....

   (Name) ....

2. (Signature) ....

   (Name) ....

Seat No. | | | | | |

(In figures as in Admit Card)

Seat No. ....

(In words)

OMR Sheet No. | | | | | |

(To be filled by the Candidate)

JUN - 35219

Time Allowed : 2 Hours]

[Maximum Marks : 200

Number of Pages in this Booklet : **16**

Number of Questions in this Booklet : **100**

Earth, Atmospheric, Ocean and Planetary Science
Paper II

Time Allowed : 120 Minutes]   **[Maximum Marks : 200**

Note : This Paper contains **Hundred (100)** multiple choice questions. Each question carrying **Two (2)** marks. Attempt *All* questions.

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1. Consider the below given diagram of gastropod shell, identify the correct set of morphological terminologies :
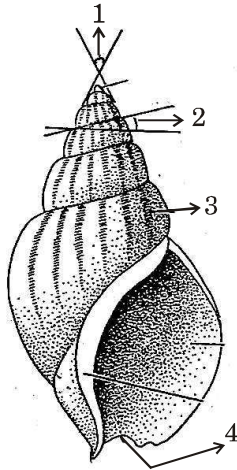
   (A) 1-sutural angle, 2-spire angle, 3-rib, 4-siphonal canal

   (B) 1-spire angle, 2-rib, 3-sutural angle 4-aperture

   (C) 1-spire angle, 2-sutural angle, 3-rib, 4-siphonal canal

   (D) 1-spire angle, 2-sutural angle, 3-rib 4-columella

2. A structure that an animal possesses that serves no function, has a reduced function, or serves a different function than it did in its ancestors is termed as a(n) :

   (A) Extra appendage

   (B) Superfluous organ

   (C) Chromosomal aberration

   (D) Vestigial structure

3. In a petroleum well the bottom hole temperature at 3.2 km recorded 80ºC. The mean surface temperature in the region is 25ºC. What will be the geothermal gradient ?

   (A) 17.17ºC/km

   (B) 07.17ºC/km

   (C) 27.17ºC/km

   (D) 37.17ºC/km

4. .... of kerogen is the principal stage of oil formation.

   (A) Diagenesis

   (B) Metagenesis

   (C) Metamorphosis

   (D) Catagenesis

5. .... is the movement of petroleum from non-reservoir rocks to reservoir rocks.
   (A) Seepage
   (B) Primary migration
   (C) Secondary migration
   (D) Tertiary migration

6. Which one of the following factors does *not* affect the scale of aerial photograph ?
   (A) Focal length
   (B) Flying height
   (C) Ground elevation
   (D) Tilt

7. The coral provides following to the zooxanthellae in the symbiotic relationship.
   (A) Carbon dioxide
   (B) Oxygen
   (C) Nitrogen
   (D) Sugar

8. Phytoplanktons have extremely small diameter because :
   (*i*) it provides relatively high surface area to volume ratio.
   (*ii*) it attributes to frictional resistance to sinking.
   (*iii*) it helps in efficient uptake of nutrients.
   (*iv*) it helps to navigate efficiently in sea water.
   (A) Only (*i*), (*ii*) and (*iii*) are true
   (B) Only (*i*) and (*iii*) are true
   (C) All are true
   (D) Only (*iii*) is true

9. The formula to calculate the speed of wave or celerity (C) is :
   (L = wavelength and T = wave period, H = wave height)
   (A) C = L/T
   (B) C = T/L
   (C) C = L*T
   (D) C = H/T

10. One of the following is a barrier attached at one end to the mainland, with or without recurves, and backed by a bay, lagoon or marshland :
   (A) Chenier ridge
   (B) Beach Berm
   (C) Fringing Reef
   (D) Barrier spit

11. Identify the *correct* sequence of land-form development on the head lands due to erosion :
   (A) Cliff – cave – notch – stack – arch
   (B) Cliff – cave – stack – notch – arch
   (C) Cliff – notch – cave – arch – stack
   (D) Stack – arch – cave – notch – cliff

12. Identify the *incorrect* statement :
   (A) Semi-diurnal tides are characterized by two equal high tides and two equal low tides during a lunar day
   (B) Spring tides are higher than normal high tides
   (C) Neap tides are lower than normal low tides
   (D) Neap tides occur twice a month when the moon is new or full

13. In the North Atlantic a clockwise circulation includes the North equatorial current the Gulf Stream and :
   (A) Benguela
   (B) Canaries
   (C) Agulhas
   (D) Oyashio

14. A narrow gap in an uplifted range or topographic feature through which water flows :
   (A) Wind gap
   (B) Dry valley
   (C) Water gap
   (D) Col

15. One of the following pairs of features does *not* include the products of weathering :
   (A) Tafoni-saprolite
   (B) Vertifacts-erratics
   (C) Laterite-saprolite
   (D) Tafoni-alveoli

16. A process which mainly contributes to the development of loess and stone pavements :
   (A) Abrasion
   (B) Caritation
   (C) Deflation
   (D) Cavernous weathering

17. Streamlined parallel ridges aligned with, and typically tapering away from the direction of the prevailing wind :
   (A) Deflation hollows
   (B) Yardangs
   (C) Drumlins
   (D) Roche moutonnee

18. A deposit of unsorted material which has accumulated along the margins of a valley glacier :
   (A) Ground moraine
   (B) Lateral moraine
   (C) Terminal moraine
   (D) End moraine

19. Match the following site investigation in-situ test on the rocks according to their characteristics :

   Test
   (a) Schmidt Hammer test
   (b) Point load test
   (c) Till test
   (d) Pressuremeter test

   Characteristics
   (1) It is carried out to assess deformation ability inside a borehole
   (2) It is carried out to estimate the angle of friction of discontinuities or basic angle of friction for smooth discontinuities to allow calculation of the residue angle of friction and joints roughness coefficients
   (3) Measures the strength index of rock sample classification and for correlation with uniaxial compressive strength of the rock
   (4) It is used to obtain an approximate estimation of uniaxial compressive strength of rocks

   Codes :

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

20. Match the following :
    List I
    (a) Stock works
    (b) Saddle reefs
    (c) Ladder veins
    (d) Gash veins
    List II
    (1) Mineralisation along the creasts of anticline
    (2) Transverse and roughly parallel fraction filled with the ore
    (3) An interlacing network of small ore-bearing veinlets
    (4) Small wedge-shaped fissures filled with the ore
    Codes :

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

21. In which of the following areas does Iron ore deposit occur ?
    (A) Rudrasagar
    (B) Zawar
    (C) Kudremukh
    (D) Dariba

22. Porphyry copper deposits are associated with :
    (A) Mid oceanic ridges
    (B) Subduction zones
    (C) Continental rifts
    (D) Back arc basins

23. Diamond in kimberlite and corundum in nepheline syenite are the good examples of :
    (A) Segregation deposits
    (B) Dissemination deposits
    (C) Injection deposits
    (D) Pegmatitic deposits

24. Banded black coloured coal that contains lower amounts of volatile, moisture and have higher carbon content can be classified as :
    (A) Anthracite
    (B) Bituminous coal
    (C) Bone coal
    (D) Lignite

25. Correctly match the regional stratigraphic sequence of the Western Dharwar Craton :
    A
    (a) Sargur Group
    (b) Gorur gneiss
    (c) Closepet granite
    B
    (1) 3.3 – 3.4 Ga
    (2) 3.3 – 3.1 Ga
    (3) 2.5 – 26 Ga
    Codes :

	(a)	(b)	(c)
(A)	(2)	(1)	(3)
(B)	(1)	(2)	(3)
(C)	(1)	(3)	(2)
(D)	(2)	(3)	(1)

26. The typical record of the early crust of ultramafic high Fe-Mg rocks depicting upto 500°C hotter mantle are :
    (A) Eclogite
    (B) Pegmatite
    (C) Anorthosite
    (D) Komatiites

27. The cimmerian orogeny characterizes for :
   (A) Opening up of Pacific Ocean
   (B) Opening up of Paleotethys
   (C) Closure of Neotethys
   (D) Closure of Paleotethys

28. Thrusting and folding of sediments in the Himalaya appears to have caused a crustal shortening of the order of :
   (A) 10,000 km
   (B) 2,400 km
   (C) 1,000 km
   (D) 500 m

29. When the strain rate is related to stress through a non-linear relationship, it is described as :
   (A) Plastic deformation
   (B) Elastic deformation
   (C) Viscous strain
   (D) Non-linear deformation

30. A bed parallel elongation giving rise to tectonic thinning is characteristic of :
   (A) Extensional fault
   (B) Thrust fault
   (C) Normal fault
   (D) Buckle fault

31. Considering the two-dimensional stress, (σ), the normal stresses are expressed as .... and the shear stresses are ....
   (A) σ_{xy} and σ_{yz}; σ_{xz} and σ_{yz}
   (B) σ_{xx} and σ_{yy}; σ_{xy} and σ_{yx}
   (C) σ_{xy} and σ_{yx}; σ_{xx} and σ_{yy}
   (D) σ_{xz} and σ_{yz}; σ_{xy} and σ_{yz}

32. Which one of the following stable isotopic ratio is used for estimation of palaeotemperature of sea water ?
   (A) $^{13}C/^{12}C$
   (B) $^{18}O/^{16}O$
   (C) $^{87}Sr/^{86}Sr$
   (D) $^{15}N/^{14}N$

33. Isotopes are the elements having :
   (A) Same N but different Z and A
   (B) Same Z but different N and A
   (C) Same A but different Z and N
   (D) Same N, Z and A

34. The separation between arrival times of P and S wave .... with distance and the ratio of P and S wave .... with distance.
   (A) Decrease, increase
   (B) Increase, decrease
   (C) Remain same, decrease
   (D) Increase, remain same

35. The half-life of ^{238}U is 4468×10^6 years and ^{235}U is 704×10^6 years. The ratio $^{235}U/^{238}U$ in a metamorphosed sample is 0.007257. Given that the ratio was 0.4 at the time of formation, calculate the metamorphosed sample age.
   (A) 4.8×10^6 years
   (B) 4.8×10^9 years
   (C) 4.8×10^3 years
   (D) 4.8×10^7 years

36. Rb-Sr age based on the individual minerals often yield younger age than that of the whole rock age. The reason for this is :
    (A) The whole rock gives enough sample to date the rock accurately
    (B) The whole rock contains more ^{87}Kb than the individual minerals
    (C) Individual minerals have a higher closure temperature and diffusion of Sr atoms is not random at smaller scale (~ a few meters)
    (D) Individual minerals have a lower closure temperature and diffusion of Sr atoms is random at smaller (~ a few meters) scale

37. The value of 'g' (acceleration due to gravity) at a place varies with time due to which of the following :
    (A) Isostatic rebound
    (B) The topography of the continents
    (C) Lateral differences in the compositions of rocks
    (D) The Earth's rotation

38. Identify the *correct* statements from the following :
    (*i*) Proton precession magneto-meter measures the total field
    (*ii*) Fluxgate magnetometer measures the total field
    (*iii*) Fluxgate magnetometer measures a Component of the field
    (*iv*) Proton precession magneto-meter measures component of the field
    (A) (*i*) and (*iv*)   (B) (*ii*) and (*iv*)
    (C) (*i*) and (*iii*)   (D) (*iii*) and (*iv*)

39. Bouguer correction is applied to correct for the gravity anomaly due to mass between station location and ....
    (A) Mohorovicic discontinuity
    (B) Base of upper crust
    (C) Mean sea level
    (D) Local datum plane

40. Six electrode configuration, termed axial parallel, perpendicular, Radial, Azimuthal and equatorial spreads are associated with which of the following array.
    (A) Wenner array
    (B) Schlumberger array
    (C) Dipole array
    (D) Lee-Partitioning

41. At a point on the Earth at height 1000 m, the observed value of gravity is 979700 mGal. The value at sea level is 980000 mGal. Calculate the Bouguer anomalies :
    (A) –1046 gu
    (B) –4443 gu
    (C) –5246 gu
    (D) –7013 gu

42. The peculiar structure of a particular type of nodular anhydride that consists of slightly elongated, irregular polygonal masses of anhydrite separated by thin dark stringers of carbonate or clay minerals is referred to as :
    (A) Mesh wire structure
    (B) Framboydal frame structure
    (C) Chickenwire structure
    (D) Both (A) and (B) are correct

43. Which of the following groups of rock formations is 'NOT' arranged from older to younger ?
    (A) Semri-Kaimur-Rewa-Bhander
    (B) Talchir-Damuda-Panchat-Mahadeva
    (C) Jurio-Jumara-Jhuran-Bhuj
    (D) Uttature-Trichinopoly-Ariyalore-Niniyur

44. The correct chronological order (older to younger) of the following stratigraphic units is :
    P : Talchir Tillite
    Q : Muth Quartzite
    R : Umia Ammonite Bed
    S : Umaria Marine Bed
    (A) P-R-S-Q   (B) Q-P-S-R
    (C) R-Q-P-S   (D) P-Q-R-S

45. This is the current epoch of the quaternary as is known as Oxygen Isotope Stage 1 :
    (A) Cenozoic   (B) Neogene
    (C) Pleistocene   (D) Holocene

46. In Phi(ϕ) grain size scale :
    (*a*) Increasing absolute value of negative Phi numbers indicate increasing millimetre size
    (*b*) Increasing positive Phi numbers indicate decreasing millimetre size
    (*c*) Increasing positive Phi numbers indicate increasing millimeter size
    (*d*) Increasing absolute value of negative Phi numbers indicate decreasing millimeter size
    (A) (*a*), (*b*)   (B) (*c*), (*d*)
    (C) (*d*), (*a*)   (D) (*b*), (*c*)

47. Brown cathodoluminescence colour of quartz is suggestive of .... provenance.
    (A) Plutonic quartz
    (B) Pegmatitic
    (C) Volcanic
    (D) Regionally metamorphosed rock

48. The temperature at the centre of the earth is estimated to be reaching to :
    (A) 10,000ºC   (B) 12,000ºC
    (C) 8,000ºC   (D) 4,500ºC

49. The main energy source for the geodynamo is :
    (A) Mantle convection
    (B) Thermal convection
    (C) Rotational friction
    (D) Radioactivity

50. Which one of the following is the earliest formed mineral condensate in the early solar system ?
    (A) Corundum
    (B) Forsterite
    (C) Anorthite
    (D) Enstatite

51. The fundamental formula to calculate the moment magnitude of an earthquake is :
    (A) Slip × Area × Density
    (B) Area × Rupture × Young's modulus
    (C) Elastic modulus × Rigidity × Velocity
    (D) Slip × Area × Elastic modulus

52. One of the following features is *not* associated with strike-slip fault :
    (A) Beheaded Valley
    (B) Sag pond
    (C) Hog back
    (D) Shutter ridge

53. Aggradation :
    (A) Leads to lowering of stream channel elevation
    (B) Reduces the slope of the river channel
    (C) Leads to raising of the stream channel elevation
    (D) Results into deepening of river channel

54. Match the following :
    List-I
    (a) Carbonation
    (b) Hydrolysis
    (c) Chelation
    (d) Hydration
    List-II
    (1) The addition of water to the molecular structure of a mineral
    (2) The reaction of minerals with dissolved CO_2 in water
    (3) The incorporation of cations from the mineral into organic compounds
    (4) The decomposition and reaction with water
    Codes :

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

55. A graph that shows the relationship between the size of sediment and the threshold flow velocity required to erode it, transport it and deposit it :
    (A) Hjulstrom curve
    (B) Flow duration curve
    (C) Sediment rating curve
    (D) Trombe's curve

56. The peeling away of layers or sheets of rock from exposed rock surface is :
    (A) Exhumation
    (B) Exfoliation
    (C) Insolation
    (D) Chelation

57. Which one of the following gives the strongest evidence that the moon is derived from the earth.
    (A) Proximity of the moon to the earth
    (B) Both the moon and earth have basaltic crust
    (C) Both have similar oxygen isotopic composition
    (D) Silicate-earth and silicate-moon have similar SiO_2 and MgO content

58. Earthquake shadow zone exists because :
    (A) The outer core is liquid
    (B) The seismic waves do not follow the Snell's law at the core-mantle boundary
    (C) D^{11} layer at the core-mantle boundary
    (D) The inner core is solid

59. The long wavelength geoid of the Earth is controlled by density variation in :
 (A) Crust   (B) Deep mantle
 (C) Core   (D) Inner core

60. The surface samples of moon are remarkably depleted in :
 (A) Non-volatile elements
 (B) Volatile elements
 (C) Refractory elements
 (D) Refractory trace metals

61. The magma-ocean concept was developed to explain the petrology and geochemisty of :
 (A) Mars   (B) Moon
 (C) Earth   (D) Jupiter

62. The general equation for a seismic wave velocity is :

 (A) $\sqrt{\left(\dfrac{\text{Elastic modulus}}{\text{density}}\right)}$

 (B) $\sqrt{\dfrac{(\text{Density})}{\text{Time}}}$

 (C) $\dfrac{\text{Cycles}}{\text{Seconds}}$

 (D) $\left(\dfrac{\text{Shear Modulus}}{\text{Bulk Modulus}}\right)^2$

63. The unaccreted gas and dust during the early planetary phase was blown away during :
 (A) T-Tauri phase
 (B) Nebular phase
 (C) Corona phase
 (D) S-Tauri phase

64. One of the following temperature regimes was *not* recognized by Köppen :
 (A) Tropical   (B) Desert
 (C) Mid-latitude (D) Polar

65. In Köppen climate system "Am" climate is called tropical :
 (A) Desert   (B) Steppe
 (C) Wet-and-dry (D) Monsoon

66. In bio-geography edaphic factors are those factors that are related to :
 (A) Rocks   (B) Landforms
 (C) Soils   (D) Plant habitat

67. Match the following :
  A
 (*a*) Pools
 (*b*) Sapping
 (*c*) Barrier Spit
 (*d*) Stack
  B
 (1) Lagoon
 (2) Headland
 (3) Riffles
 (4) Groundwater
 Codes :

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

68. Hydrograph shows change in .... with time.
 (A) Volume
 (B) Water level
 (C) Discharge
 (D) Velocity

11   [**P.T.O.**

69. The groundwater in the Narmada valley and the hilly terrain in western and central India falls is this category of major hydrogeochemical provinces of India :
    (A) Bicarbonate Province
    (B) Bicarbonate-Chloride Province
    (C) Chloride Province
    (D) Bicarbonate-Chloride and Chloride Province

70. What is the specific capacity of a well that is pumping at 249 lpm, has a static water level at 5 m and pumping water level of 6.50 m ?
    (A) 166 lpm/meter of drawdown
    (B) 266 lpm/meter of drawdown
    (C) 373.5 lpm/meter of drawdown
    (D) 156 lpm/meter of drawdown

71. Which one of the following is the correct expression for Ghyben-Herzberg relation with respect to fresh water-seawater boundary.
    (A) For every meter of fresh water head above mean sea level the thickness of fresh water zone resting on the salt water is 14 metres
    (B) For every 40 metres of fresh water head above mean sea level the thickness of fresh water zone resting on the salt water is 40 metres
    (C) For every meter of fresh water head above mean sea level the thickness of fresh water zone resting on the salt water is 40 metres
    (D) For every 10 metres of fresh water head above mean sea level the thickness of fresh water zone above salt water is 40 metres

72. In basaltic rocks, alteration of the outer iron-rich rim of olivine produce brownish red mineral called :
    (A) Nephrite
    (B) Schorlomite
    (C) Iddingsite
    (D) Kaolinite

73. Magma undering extensive differentiation in $F_e^{tot}/(F_e^{tot} + MgO)$ ratio coincide with a miminal change in silica content resulting in crystallization of olivine and pyroxene without Fe-Ti oxides leads to formation of ....
    (A) N-MORB
    (B) E-MORB
    (C) Ferrobasalt
    (D) Fast-spreading EPR

74. .... microstructure is characterise as vermicular intergrowth of quartz and sodic-plagioclase, formed by replacement of K-feldspar in deformed granitic rocks.
    (A) Myrmekite
    (B) Migmatite
    (C) Metapeletic
    (D) Idioblastic

75. Which of the following igneous complex is *not* associated with Deccan Volcanic Province ?
    (A) Girnar
    (B) Phenaimata
    (C) Mundevara
    (D) Sittampundi

76. PGE are mostly associated with :
  (A) Felsic rocks
  (B) Ultramafic rocks
  (C) Intermediate rocks
  (D) Mafic rocks

77. Mineral pigeonite typically occurs in the volcanic rocks because :
  (A) It is relatively light mineral and floats in magma
  (B) At deeper conditions it exsolves into other pyroxenes
  (C) At deeper levels pressure reduces the stability of pigeonite
  (D) At deeper conditions it quickly reacts with other minerals

78. Melting of pure enstatite leads to :
  (A) Liquid of enstatitic composition
  (B) Forsterite + liquid
  (C) Fayalite + liquid
  (D) Forsterite + fayalite + liquid

79. Presence of stishovite in a rock indicates :
  (A) Vicinity of divergent plate boundary
  (B) Vicinity of volcanic cadlera
  (C) Vicinity of subduction zone
  (D) Vicinity of meteoric impact crater

80. The group of clay minerals having 1 : 1 ratio of tetrahedral and octahedral components is :
  (A) Kaolinite
  (B) Illite
  (C) Smectite
  (D) Vermiculite

81. Chrome garnet is termed as :
  (A) Almandine
  (B) Grossularite
  (C) Spessartite
  (D) Uvarovite

82. The defining symmetry characteristics of the crystals belonging to the cubic system is :
  (A) Three axes of four-fold symmetry
  (B) Four axes of three-fold symmetry
  (C) Oblique and vertical minor planes
  (D) Four axes of two-fold symmetry

83. For a series of points in a line and at zero height which are affected by the gravitational attraction exerted a buried sphere of density contrast 1.5 gm/cm^3, the anomaly versus horizontal distance curve has a maximum of 4.526 mGal and a point of inflexion at 250 m from maximum. Calculate the depth of the point :
  (A) 500 meters
  (B) 700 meters
  (C) 400 meters
  (D) 800 meters

84. A building is to be founded on a clay stratum. The water table is practically at ground surface level. Laboratory test shows that the unit weight of the soil is $r = 20$ kN/m^3 and classify the soil as a firm clay. The uniaxial compressive strength is $qu = 150$ kN/m^2. Supposing that the footing will be square, 2 m wide and the foundation depth will be 2 m below the ground surface. Calculate the ultimate bearing capacity :

   (A) 304.8 kPa
   (B) 403.9 kPa
   (C) 700.9 kPa
   (D) 502.6 kPa

85. .... terrains are represented as deep crustal rocks that have been technically exhumed of hot and dry magmatism.

   (A) Greenstone
   (B) Granulite
   (C) Gneiss
   (D) Metasedimentary

86. Ionization from cosmic rays and terrestrial sources produce small ions which makes the Earth Atmosphere :

   (A) Weakly electrically conductive
   (B) Strongly electrically conductive
   (C) Electrically neutral
   (D) Moderately electrically conductive

87. The atmosphere is positively charged with respect to the earth surface during :

   (A) Thunderstorm activity
   (B) Rainfall event
   (C) Fair weather condition
   (D) Lightning activity

88. In the momentum equation, the ratio of the advective term to the rotational term is the :

   (A) Prandtl number
   (B) Reynold number
   (C) Richardson number
   (D) Rossby number

89. Rossby waves depend fundamentally upon the variation of the Coriolis parameter with latitude, known as :

   (A) Alfa effect
   (B) Gamma effect
   (C) Beta effect
   (D) Lambda effect

90. Arrange the following formations into a north to south cross-section trend occurring within Central Indian Tectonic Zone :

   (*a*) Son-Narmada South fault
   (*b*) Sausar group
   (*c*) Mahakoshar group
   (*d*) Betul group
   (A) (*a*)—(*b*)—(*c*)—(*d*)
   (B) (*a*)—(*c*)—(*b*)—(*d*)
   (C) (*d*)—(*b*)—(*a*)—(*c*)
   (D) (*c*)—(*a*)—(*d*)—(*b*)

91. The cycle of Sunspot Maxima having the same polarity is referred to as the :
   (A) 11-year cycle
   (B) 22-year cycle
   (C) 7-year cycle
   (D) 5-year cycle

92. Temperature Kelvin scale contains :
   (A) Negative numbers
   (B) No positive numbers
   (C) No negative numbers
   (D) Zero

93. Entropy (ϕ) and potential temperature (θ) are related by the relation :
   (A) $\phi = C_p t_n \theta + \text{constant}$
   (B) $\phi = C_p e^{\theta}$
   (C) $\phi = C_p \theta + \text{constant}$
   (D) $\phi = C_p \sin \theta + \text{constant}$

94. The peak radiation from the sun is at 0.48 micrometer. What is the corresponding temperature of the sun ?
   (A) 6000 °K
   (B) 4897 °K
   (C) 3897 °K
   (D) 273 °K

95. In an isentropic process there is no change in :
   (A) Temperature
   (B) Heat
   (C) Volume
   (D) Pressure

96. The minimum temperature over tropical station occurs at :
   (A) Before sunrise
   (B) After sunrise
   (C) After sunset
   (D) Midnight

97. Richardson number is the Ratio of :
   (A) Stability and vertical wind shear
   (B) Stability and square of the vertical wind shear
   (C) Stability and Coriolis force
   (D) Vertical wind shear and Coriolis force

98. The angular velocity of the Earth is Ω, then the vorticity of the earth is :
   (A) Ω (B) $2\,\Omega$
   (C) $3\,\Omega$ (D) $1/2\,\Omega$

99. $\overline{d}$ and γ are the dry adiabatic lapse rate and environmental lapse rate respectively. An unsaturated Air parcel is said to unstable, if :
   (A) $\overline{d} > \gamma$ (B) $\overline{d} = \gamma$
   (C) $\overline{d} < \gamma$ (D) $\overline{d} = 10\,\gamma$

100. The total potential energy =
   (A) Internal Energy + Kinetic Energy
   (B) Internal Energy + Gravitational Potential Energy
   (C) Internal Energy – Kinetic Energy
   (D) Kinetic Energy + Gravitational Potential Energy

ROUGH WORK