134/2025

Question Booklet Alpha Code **A**

Question Booklet Serial Number

Total No. of questions : 100 Time : 1 Hour 30 Minutes

Maximum : 100 Marks

INSTRUCTIONS TO CANDIDATES

1. The question paper will be given in the form of a Question Booklet. There will be four versions of question booklets with question booklet alpha code viz. A, B, C & D.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the question booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a question booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your question booklet is un-numbered, please get it replaced by new question booklet with same alpha code.
6. The question booklet will be sealed at the middle of the right margin. Candidate should not open the question booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the question booklet supplied to him contains all the 100 questions in serial order. The question booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the question booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball-Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

134/2025

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. The ground water contribution to a steam is termed as :

(A) Base flow
(B) Runoff
(C) Infiltration
(D) Overland flow

2. Land pan is used to measure :

(A) Transpiration
(B) Water evaporation
(C) Precipitation
(D) Humidity

3. The specific retention :

(A) Increases with increasing the size
(B) Increase with decreasing the size
(C) Independent on size
(D) Is equal to the specific yield

4. The undulating surface at which pore water pressure is equal to the atmospheric pressure is known as :

(A) Ground water
(B) Connate water
(C) Vadose water
(D) Magmatic water

5. In the petroleum industry the "Darcy" is used as a unit of :

(A) Hydraulic conductivity
(B) Specific yield
(C) Intrinsic Permeability
(D) Specific retention

6. The amount of water that can be transmitted horizontally by the full saturated thickness of the aquifer under a hydraulic gradient of "1" is described as :

(A) Transmissivity
(B) Permeability
(C) Hydraulic conductivity
(D) Specific yield

7. Fluctuations of water table are caused due to :

(A) Evaporation
(B) Atmospheric Pressure
(C) Tidal effect
(D) All of the above

8. Water which is formed at the time of consolidation of magma is termed as :

(A) Meteoric water
(B) Connate water
(C) Juvenile water
(D) Vadose water

9. Fine-grained rocks generally have :

(A) High porosity and low permeability
(B) High permeability and low porosity
(C) Low porosity and low permeability
(D) High permeability and high porosity

10. A site location map must include scale, orientation, title, and :

(A) Topographic contours
(B) Geologic units
(C) Geographic reference
(D) Dip and strike symbol

11. To map regional structural features and bedrock fracture patterns in a temperate, heavily vegetated area, which technique is most effective?

(A) Side looking airborne radar imagery
(B) LANDSAT false color infrared photography
(C) High altitude NASA vertical photography
(D) Regional gravity maps

12. The order of decrease in density of clay, sand, sandstone and alluvium is :

(A) clay, sand, sandstone and alluvium
(B) sandstone, clay, sand and alluvium
(C) sand, clay, sandstone and alluvium
(D) alluvium, sandstone, clay and sand

13. The Earth is not a perfect sphere but an oblate spheroid. Which of the following best explains why the equatorial radius of the Earth is greater than the polar radius?

(A) The Earth's crust is thicker at the equator than at the poles
(B) Gravitational force is stronger at the equator, pulling the surface outward
(C) The Earth's rotation causes centrifugal force, which is maximum at the equator
(D) Tidal forces from the Moon pull the Earth outward along the equator

14. The principle of isostasy is explained differently by Airy and Pratt. Which of the following best represents the distinction between their models?

(A) Airy's model assumes variations in crustal thickness at constant density, while Pratt's model assumes variations in crustal density at constant thickness

(B) Airy's model assumes variations in both thickness and density, while Pratt's model assumes constant density and thickness

(C) Airy's model assumes crustal blocks float at the same depth, while Pratt's model assumes crustal blocks float at different depths

(D) Both Airy and Pratt models assume density variations with depth, but Airy neglects thickness variations

15. Which isotope system is most suitable for dating volcanic ash layers a few million years old?

(A) Carbon-14

(B) Potassium – Argon (K – Ar)

(C) Rubidium – Strontium (Rb – Sr)

(D) Uranium – Lead (U – Pb)

16. Why has Earth's interior retained its heat over billions of years instead of cooling rapidly like an ordinary solid body of comparable size?

(A) Because Earth's oceans regulate the planet's temperature

(B) Because long-lived radioactive isotopes within the Earth continue to release heat

(C) Because the lithosphere acts as an insulating blanket that blocks heat loss

(D) Because gravitational contraction of Earth is still producing heat today

17. At which type of plate boundary are both deep-focus earthquakes and volcanic arcs most likely to be found?

(A) Divergent boundary

(B) Transform boundary

(C) Convergent boundary

(D) Conjugate boundary

18. The principle of using geomagnetic reversals to date oceanic crust relies on which of the following processes?

(A) Radiometric decay of magnetic minerals

(B) Continuous drift of continents and magnetic declination

(C) Changes in Earth's rotation axis

(D) Recording of Earth's magnetic polarity in basalt as it cools

19. Match the following :

	Column I		Column II
(a)	Benioff Zone	(1)	Point where three plate boundaries meet
(b)	Triple Junction	(2)	Zone of deep earthquakes along a subducting plate
(c)	Mid-Ocean Ridge	(3)	Divergent plate boundary under the ocean
(d)	Subduction Zone	(4)	Occurs at convergent plate boundary

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

20. Which of the following is the most significant driver of seafloor spreading at mid-ocean ridges?

(A) Slab pull from subduction zones
(B) Gravitational and tectonic collapse of ocean basins
(C) Mantle convection and upwelling of magma
(D) Hotspot volcanism and earthquakes

21. The International Gravity Formula accounts for variations in gravity at different latitudes primarily because of :

(A) Differences in Earth's crust density and revolution
(B) Centrifugal force due to Earth's rotation and Earth's oblateness
(C) Changes in Earth's magnetic field and gravity pull
(D) Variations in crustal topography and mountains

22. Solar flares are sudden eruptions of energy on the Sun's surface. Which of the following is the primary cause of solar flares?

(A) Nuclear fission in the Sun's core
(B) Solar wind interaction with Earth's magnetosphere
(C) Gravitational collapse of the Sun
(D) Magnetic reconnection in the Sun's atmosphere

23. The Mariana Trench, the deepest oceanic trench on Earth, is formed at a convergent plate boundary. Which two of the following statements correctly describe its formation?

(i) The Pacific Plate subducts beneath the Mariana Plate.

(ii) The Mariana Plate overrides the Pacific Plate due to higher density.

(iii) The process creates a deep trench and a volcanic island arc.

(iv) The trench forms due to crustal stretching at a divergent boundary.

Options :

(A) (i) and (iii)
(B) (i) and (ii)
(C) (iii) and (iv)
(D) (i) and (iv)

24. Which of the following statements correctly compare lunar and solar tidal variations?

(1) Lunar tides have a larger amplitude than solar tides because the Moon is closer to the Earth despite being less massive.

(2) Solar tides have a larger amplitude than lunar tides because the Sun is more massive.

(3) Lunar tides have a period of about 12.42 hours, while solar tides have a period of about 24 hours.

(4) Solar tides have a stronger influence on tides during spring tides compared to lunar tides.

Options :

(A) (1) and (4)
(B) (2) and (4)
(C) (1) and (3)
(D) (2) and (3)

25. The formation of island arcs is closely associated with which of the following geological processes?

(A) Subduction of an oceanic plate beneath another oceanic plate, producing magma that rises to form a curved chain of volcanoes, usually parallel to a deep ocean trench.

(B) Crustal extension at a mid-ocean ridge, producing new oceanic crust and series of volcanic islands.

(C) Transform fault movement between plates that causes continuous pulses of volcanic activity.

(D) Continental collision producing forearc and backarc basins as part of orogeny

26. How does the temperature distribution vary between the Earth's crust and mantle?

(A) Both crust and mantle show the same linear increase in temperature with depth

(B) The crust has a steep geothermal gradient, while the mantle shows a nearly adiabatic gradient due to convection.

(C) The crust is isothermal, while the mantle shows an exponential rise in temperature.

(D) Both crust and mantle are controlled primarily by radioactive heating, so their gradients are identical.

27. Induced Polarization method is generally used for _____ sulphide ore bodies.

(A) Massive (B) Disseminated

(C) Liquid (D) Small

28. _____ are examples of geophysical methods that use active sources for investigation; whereas _____ are natural source methods.

(A) IP & GPR; Telluric & SP

(B) IP & SP; TDEM & GPR

(C) Telluric & SP; GPR & IP

(D) TDEM & Magnetolelluric; IP & SP

29. The membrane IP effect is most pronounced in the presence of _____ in which the pores are particularly small.

(A) Sand (B) Silt

(C) Clay (D) None of the above

30. Mineralisation potential can be attributed to _____.

(A) Electrochemical potential

(B) Electromechanical potential

(C) Combination of both (A) & (B)

(D) Presence of metallic conductors

31. Which among the following has the lowest dielectric constant?

(A) Air (B) Dry sand

(C) Fresh water (D) Clay

32. Electrical pseudo-section give an information about _____.

(A) Lateral variation

(B) Vertical variation

(C) Both lateral and vertical variation

(D) None of the above

33. According to Archie's equation, the electrical resistivity of porous sandstone doesn't depend on :

(A) Porosity

(B) Nature of interstitial fluid

(C) Tortuosity of pores

(D) Solid matrix

34. The apparent resistivity sounding curve representing the resistivity structure $\rho 1 > \rho 2 < \rho 3 < \rho 4$ is :

(A) HK-type

(B) HA-type

(C) KH-type

(D) HQ-type

35. Which one of the following have greater depth of investigation?

(A) MT

(B) VLF

(C) GPR

(D) AFMAG

36. Which physical property of the medium governs the response of Ground Penetrating Radar (GPR)?

(A) Electrical conductivity

(B) Electromagnetic conductivity

(C) Dielectric permittivity

(D) Seismic wave velocity

37. Mise-a-la-masse system is used in :

(A) EM prospecting

(B) Magneto telluric

(C) Induced polarization

(D) Electrical resistivity

38. In electromagnetic (EM) sounding, the depth of investigation _____ with increasing frequency.

(A) Increases

(B) Decreases

(C) Remains unchanged

(D) Varies randomly

39. Survey using electrical method gives the Apparent Resistivity because of the _____.

(A) Electrode spacing
(B) Depth of measurement
(C) Heterogeneity of ground
(D) Homogeneity of ground

40. Which of the following curve is not possible for a 4-layer Earth model with resistivity $\rho 1$, $\rho 2$, $\rho 3$ and $\rho 4$?

(A) KQ
(B) AH
(C) QH
(D) HA

41. Spatially, the global seismic patterns best correlate with :

(A) River basins
(B) Plate boundaries
(C) Oceanic trenches
(D) Abyssal plains

42. Liquefaction in response to strong ground shaking occurs mostly in :

(A) High grade metamorphic rocks
(B) Glaciers
(C) Intrusive rocks
(D) Loose sediments

43. Prime objective of Moment tensors is to learn :

(A) Focal length
(B) Seismic wave velocity
(C) Fault orientation and slip direction
(D) Tsunami waves

44. Seismic anisotropy in upper mantle is significantly contributed by the processes of :

(A) Magma under plating
(B) Slab melting
(C) Fluid saturation
(D) Lattice preferred orientation of olivine

45. Shallow focus earth quakes in Peninsular India is mainly caused by :

(A) Reactivation of ancient faults
(B) Subduction derived magmatism
(C) Mantle convection
(D) Hotspot volcanism

46. The shadow zone and P-waves is related by :

(A) Earth's curvature

(B) Low-density mantle

(C) Refraction in outer core

(D) Reflection from the Moho

47. The first motion polarity diagram were used to study :

(A) Epicentral distance

(B) Seismic phase

(C) Wave velocity

(D) Focal mechanism solution

48. 'Beachball' diagram is a graphic symbol that indicates :

(A) Seismogram (B) Focal mechanism

(C) Phase arrival (D) Travel time

49. The most destructive earthquake waves are :

(A) S (B) P

(C) PKP (D) Rayleigh

50. Shear modulus is zero in :

(A) Upper Mantle (B) Outer core

(C) Inner core (D) Lower mantle

51. The signals from Velocity seismometer is proportional to :

(A) Ground strain (B) Ground acceleration

(C) Ground velocity (D) Ground force

52. STS-2 seismometer is an example of :

(A) Analog accelerometer

(B) Short-period sensor

(C) Broadband velocity meter

(D) Nuclear array sensor

53. The seismographic recording system, primarily used in WWSSN :

(A) Broadband feedback seismometers

(B) Digital accelerometers with GPS

(C) Analog optical drum recorders

(D) Strainmeter-based digital recorders

54. The organization mainly responsible for operation and management of WWSSN :

(A) US Geological Survey

(B) American Geophysical Union

(C) International Association of Seismology and Physics of the Earth's Interior (IASPEI)

(D) Global Seismographic Network Consortium

55. Compared to optically pumped magnetometers the major disadvantage of proton precession magnetometers is :

(A) Higher sensitivity

(B) Slower reading rate

(C) Better temporal resolution

(D) Operation at higher altitudes

56. Lacoste-Romberg gravimeter generates the data of :

(A) Relative gravity

(B) Absolute gravity only

(C) Gravity gradient

(D) Magnetic field anomalies

57. The absolute value of gravity at the equator :

(A) 978032 mGal

(B) 983218 mGal

(C) 969418 mGal

(D) 980482 mGal

58. Correction compensates for the Earth's shape and rotation in gravity surveys?

(A) Drift correction

(B) Latitude correction

(C) Free-air correction

(D) Bouguer correction

59. Optical Pumping magnetometer works on the principle of :

(A) Doppler effect

(B) Proton precession

(C) Magnetic saturation

(D) Zeeman effect

60. In the magnetosphere, the region where the pressure from the solar wind becomes equal to the pressure from the planet's magnetic field is called as :

(A) Magnetopause (B) Magnetotail

(C) Magnetosheet (D) Bow shock

61. Which geological feature would most likely cause a positive gravity anomaly?

(A) salt dome (B) sedimentary basin

(C) groundwater aquifer (D) dense igneous intrusion

62. Which deposit can be explored using gravity survey better?

(A) Gold (B) Chromite

(C) Bauxite (D) Manganese

63. Magnetic anomaly is symmetrical and independent of the strike of the body at the latitude of :

(A) 0° (B) 45°

(C) 90° (D) all latitudes

64. Euler deconvolution is a geophysical method used for :

(A) Upward continuation

(B) Depth estimation of magnetic sources

(C) Measuring gravitational gradients

(D) Terrain correction

65. The correct order of the geomagnetic timescale, from oldest to youngest is :

(A) Gilbert, Gauss, Matuyama, and Brunhes

(B) Gauss, Gilbert, Brunhes and Matuyama

(C) Brunhes, Matuyama, Gauss and Gilbert

(D) Gauss, Gilbert, Matuyama and Brunhes

66. At magnetic pole the inclination of total magnetic field is :

(A) 0° (B) 30°

(C) 45° (D) 90°

67. Eotvos corretion is positive for :

(A) Northward motion

(B) Southward motion

(C) Eastward motion

(D) Westward motion

68. In a region, if the paleo-magnetic inclination is 45°, what is the paleo-latitude?

(A) 26.5° (B) 45°

(C) 54.5° (D) 62.5°

69. Radiometric method is suitable for which type of deposit?

(A) Radium (B) Sulfide ore

(C) Graphite (D) Ilmenite

70. Standard unit of gamma radiation is :

(A) Fission

(B) Gamma

(C) Lambda

(D) Roentgen

71. Which statement is not correct for radiometric surveying for investigation of :

(A) Nuclear fuel and associated minerals

(B) Determination of geochronology of rock formations

(C) Demarcation of geological structures and intrusive

(D) Massive sulfides deposits

72. Geiger-Müller counter, responds primarily to which particles in the proximity of radioactive source?

(A) Alpha (B) Gamma

(C) Beta (D) Neutron

73. The scintillometer is used to measure :

(A) Alpha (B) Gamma

(C) Beta (D) Neutron

74. The radioactive carbon method is a simple decay analysis based on equation :

(A) $P = P_0 e^{-\lambda t}$ (B) $P = P_0(1 + e^{-\lambda t})$

(C) $P = P_0(e^{-\lambda t} - 1)$ (D) $P = P_0 e^{\lambda t}$

75. Radon is the products of the ^{238}U decay series with a half-life of :

(A) 3.8 days (B) 38 days

(C) 380 days (D) 3800 days

76. Radiometric method is used as a secondary geophysical method for :

(A) Hydrocarbon exploration

(B) Forensic geophysics

(C) Detection of subsurface cavities

(D) Hydrogeological investigations

77. The main objective of a Cement Bond Log is to :

(A) Measure formation porosity

(B) Evaluate the quality of cement behind casing

(C) Detect natural fractures

(D) Record formation resistivity

78. The investigation depth of the LDT (Litho Density Tool) is generally :

(A) A few centimetres into the formation

(B) Several tens of meters

(C) Unlimited in clean formations

(D) Deeper than resistivity logs

79. The primary objective of thermal logging in boreholes is to :

(A) Measure rock density

(B) Detect fluid movement and heat flow patterns

(C) Determine porosity directly

(D) Record natural radioactivity

80. Caliper logs are mainly used to measure :

(A) Measure borehole diameter (B) Measure formation resistivity

(C) Detect natural fractures directly (D) Determine formation porosity

81. Irregular bore hole shape or rugosity can strongly affect :

(A) Neutron and density logs
(B) Gamma ray logs
(C) Seismic velocity logs
(D) Core recovery rate

82. The dip angle in dipmeter logging is the angle between :

(A) Bedding plane and horizontal
(B) Bedding plane and borehole axis
(C) Borehole wall and tool pad
(D) Formation resistivity and porosity curve

83. Dipmeter interpretation is most useful in :

(A) Locating casing collars
(B) Structural and stratigraphic analysis
(C) Measuring cement bond quality
(D) Determining geothermal gradient

84. A sudden drop in gravity values observed in a borehole may suggest :

(A) Cement channelling
(B) Presence of a low-density formation such as shale or porous sandstone
(C) High-density dolomite
(D) Proper casing placement

85. Disseminated sulfide ores are located by using which logging operations :

(A) Induced Polarisation logging
(B) SP logging
(C) Sonic logging
(D) Neutron logging

86. The log, which is used as a detector of mud cake and for measuring mud resistivity :

(A) Latero log
(B) Micro log
(C) Induction log
(D) Caliper log

87. The microseismogram log is primarily used to indicate the quality of :

(A) Borehole wall rugosity
(B) Cementing behind the casing
(C) Formation porosity
(D) Hydrocarbon saturation

88. The gamma ray log is particularly useful to estimate :

(A) Formation permeability
(B) Shale volume (Vsh)
(C) Hydrocarbon saturation
(D) Lithostatic pressure

89. The regions of the electromagnetic spectrum in which the atmosphere is transparent are called :

(A) Atmospheric Hollows
(B) Atmospheric Shadows
(C) Atmospheric Windows
(D) Atmospheric Pane

90. The width and number of spectral bands in which the image is taken in remote sensing :

(A) Spatial Resolution
(B) Spectral Resolution
(C) Radiometric Resolution
(D) Image Resolution

91. Which of the statements is true in the case of reflectance :

(i) Reflectance is a measure of electromagnetic radiation reflected off a surface
(ii) Reflectance is expressed as a number between 0 and 1.0
(iii) Every object on the Earth's surface has its unique spectral reflectance
(iv) In the near Infrared range, the reflectance of clear water is virtually 1

(A) Statements (i), (ii) and (iii) are True and (iv) is False
(B) Statements (i), (ii) and (iv) are True and (iii) is False
(C) Statements (i), (ii) and (iv) are False and (iii) is True
(D) Statements (ii), (iii) and (iv) are True and (i) is False

92. Which one of the following is *not* an Imaging Sensor System :

(A) Multispectral Scanner (MSS)
(B) Infrared Sensing System (ISS)
(C) Thermal Sensing System (TSS)
(D) Microwave Imaging System (MIS)

93. Which is India's latest satellite in the IRS series, launched in 2025?

(A) BHUVAN
(B) IRS P4
(C) NISAR
(D) NNRMS

94. The two widely used spatial interpolation methods in Geographic Information Systems include Inverse Distance Weighting (IDW) and :

(A) Charged Coupled Method (CCM)

(B) Capacity Mapping Mission (CMM)

(C) Geometric Correction Method (GCM)

(D) Triangulated Irregular Network (TIN)

95. The *Kayals* of Kerala are treated under which category of the LULC classification of the National Resource Census of NRSC :

(A) Agricultural lands (B) Wastelands

(C) Croplands (D) Wetlands

96. Which one is *not* a common software used for Groundwater Modelling :

(A) ESPATIAL (B) FEFLOW

(C) MODFLOW (D) GMS

97. The Global Navigation Satellite System (GNSS) developed by Russia is :

(A) GALILEO (B) GPS

(C) GLONASS (D) GESPACE

98. Which of the following is a structurally controlled drainage pattern that can be identified from an aerial photograph in hilly areas?

(A) Dendritic Pattern (B) Radial Pattern

(C) Trellis Pattern (D) Braided Pattern

99. The world's largest natural structure that can be viewed from space or satellites :

(A) Richat Structure, Sahara (B) Great Barrier Reef, Australia

(C) Vredefort Dome, South Africa (D) Chicxulub Crater, Mexico

100. ———— is a more generic term for any digital representation of a topographic surface.

(A) Digital Elevation Model (DEM) (B) Digital Imaging Model (DIM)

(C) Digital Terrain Model (DTM) (D) Radar Terrain Model (RTM)

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