

GATE question papers: Geology and Geophysics 2009 (GG)

Duration: Three Hours

Maximum Marks : 100

Read the following instructions carefully.

1. This question paper contains 24 printed pages including pages for rough work. Please check all pages and report discrepancy, if any.
2. Write your registration number, your name and name of the examination centre at the specific locations on the right half of the Optical Response Sheet (ORS)
3. Using HB pencil, darken the appropriate bubble under each digit of your registration number and the letters corresponding to your paper code.
4. All the questions in this question paper are of objective type.
5. Questions must be answered on Optical Response Sheet (ORS) by darkening the appropriate bubble (marked A, B, c, D) using HB pencil against the question number on the left hand side of the ORS. Each question has only one correct answer. In case you wish to change an answer, erase the old answer completely. More than one answer bubbled against a question will be taken as an incorrect response.
6. The paper consists of two parts: Part A and Part B. Part A is common to both Geology and Geophysics candidates. Part B contains two sections: Section 1 (Geology) and Section 2 (Geophysics). Geology candidates will attempt questions in Section 1 only. Geophysics candidates will attempt questions in Section 2 only. Correctly darken the bubble (in the ORS) corresponding to the section attempted by you.
7. There are a total of 60 questions carrying 100 marks. Part A consists of 20 questions; all are 1-mark questions. Each of the sections (Section 1 and Section 2) in Part B consists of 40 questions; all are 2-mark questions.
8. Questions 51 through 56 (3 pairs) are common data questions and questions pairs (57, 58) and (59, 60) are linked answer questions. The answer to the second question of the above 2 pairs depends on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is un-attempted, then the answer to the second question in the pair will not be evaluated.
9. Un-attempted questions will carry zero marks.
10. Wrong answers will carry NEGATIVE marks. For Q. 1 to Q. 20, $\frac{1}{3}$ mark will be deducted for each wrong answer. For Q. 21 to Q. 56, $\frac{2}{3}$ mark will be deducted for each wrong answer. The question pairs (Q. 57, Q. 58), and (Q. 59, Q. 60) are questions with linked answers. There will be negative marks only for wrong answer to the first question of the linked answer question pair i.e. for Q. 57 and Q. 59. $\frac{2}{3}$ mark will be deducted for each wrong answer. There is no negative marking for Q. 58 and Q. 60.
11. Calculator (without data connectivity) is allowed in the examination hall.
12. Charts, graph sheets or tables are NOT allowed in the examination hall.
13. Rough work can be done on the question paper itself. Additionally, blank pages are given at the end of the question paper for rough work.

Note from www.questionpapers.net.in: The page no. mentioned above has no relevance as we have utilized maximum page space to accommodate more questions.

Part A: common to both Geology and geophysics candidates

Q. 1 - Q. 20 carry one mark each.

1. The gutenberg discontinuity is located at a depth of around
(A) 35 km (B) 150 km (C) 2900 km (D) 5000 km
2. What is the age of the "Barail Series"?
(A) Jurassic (B) Paleocene (C) Oligocene (D) Miocene
3. Thermohaline circulation in the oceans is driven by
(A) only salinity gradients
(B) both temperature and salinity gradients
(C) only temperature gradients
(D) only density difference
4. Which one of the following minerals cannot be used as an abrasive?
(A) Garnet (B) corundum (C) quartz (D) gypsum
5. Which one of the following lakes is interpreted to be of meteoritic impact origin?
(A) Lonar Lake (B) Chilka Lake (C) Kolleru Lake (D) Pulicat lake
6. Which of the following geomorphic features is NOT related to desert environments?
(A) yardang (B) bajada (C) hamada (D) esker
7. Which of the following is located closest to the Ninety-East Ridge?
(A) Bombay High (B) Lokshwadweep islands
(C) Andaman and Nicobar Islands (D) Maldives
8. LPG (Liquefied Petroleum Gas) consists mainly of
(A) propane and butane (B) Methane and ethane
(C) methane and butane (D) ethane and propane
9. Who proposed the principle "the present is the key to the past"?
(A) Carl von Linnaeus (B) James Hutton
(C) William Smith (D) Alcide d'Orbigny
10. Of the following, which is an ore of nickel?
(A) Pentlandite (B) Cinnabar (C) Cassiterite (D) Scheelite
11. Over a three layered earth, comprising of top dry soil followed by saturated weathered layer and hard rock basement, a resistivity sounding experiment is performed. The obtained VES curve is
(A) K-type (B) A-type (C) H-type (D) Q-type
12. The logging tool for direct determination of permeability is
(A) induction (B) litho-density (C) sonic (D) NMR
13. Which of the following parameters is uniquely resolved by residual gravity anomaly data?
(A) lateral density contrast (B) excess/deficit mass
(C) absolute density (D) geometric dimensions of geophysical model
14. Crude oil density, in degree API (American Petroleum Institute), is a measure of viscosity. The value of 10 API is of
(A) water (B) heavy crude (C) average crude (D) light crude
15. For perfectly conducting medium skin depth (m) is
(A) 10^5 (B) 100 (C) 10 (D) 0
16. If a planet revolves around the Sun with a period of 8 years, then its distance from the Sun would be (in terms of distance between Earth and Sun)
(A) two times (B) four times (C) six times (D) eight times

17. A vast majority of earthquake sources are often linked to
(A) inner core (B) outer core
(C) brittle part of the earth's crust (D) molten part of earth's mantle
18. In paleomagnetism, detrital magnetization is an important process for study of
(A) sedimentary rocks (B) metamorphic rocks
(C) basic igneous rocks (D) acidic igneous rocks
19. A Geiger-Muller counter is used for measuring
(A) gamma radiation (B) alpha particles
(C) beta particles (D) both alpha and beta particles
20. The presence of crustal root beneath a mountain chain can be best explained by
(A) Pratt's model (B) Airy's model
(C) Vening Meinesz model (D) Plume model

END OF PART A

Part B (Section 1): For geology candidates only

21. Which one of the following is a typical Lower Gondwana plant assemblage?
(A) Glossopteris, Ptilophyllum, Nilssonina, Bucklandia
(B) Glossopteris, Gangamopteris, Schizoneura, Sphenophyllum
(C) Gangamopteris, Lycopodites, Brachyphyllum, Nilssonina
(D) Vertebraria, Alethopteris, Otozamites, Glossopteris
22. Which of the following is not correct for a Pelecypod shell?
(A) Pedicle is present.
(B) Pallial sinus, if present, is on the posterior side.
(C) Lunule is towards anterior.
(D) Both the valves have teeth and sockets
23. Match the following:
- | Group I | Group II |
|---------------------|--------------------|
| P. Muschelkalk | 1. Cambrian |
| Q. Katrol formation | 2. Miocene |
| R. Uttatur Stage | 3. Middle Triassic |
| S. Baripada beds | 4. Cretaceous |
| | 5. Pleistocene |
| | 6. Late Jurassic |
- (A) P - 3, Q - 6, R - 5, S - 1 (B) P - 1, Q - 2, R - 3, S - 4
(C) P - 3, Q - 6, R - 4, S - 2 (D) P - 6, Q - 3, R - 1, S - 2
24. Match the following:
- | Group I | Group II |
|---------------------|-------------------|
| P. Pelagic | 1. Open ocean |
| Q. Pycnocline | 2. Cold sphere |
| R. Psychrosphere | 3. North Atlantic |
| S. Humboldt Current | 4. Density |
| | 5. Thermocline |
| | 6. East pacific |
- (A) P - 1, Q - 4, R - 3, S - 6 (B) P - 6, Q - 2, R - 1, S - 5
(C) P - 5, Q - 6, R - 1, S - 3 (D) P - 1, Q - 4, R - 2, S - 6
25. Match the following:
- | Group I | Group II |
|--------------------------|-------------------|
| P. Globigerina bulloides | 1. Lower Cambrian |
| Q. Olenellus | 2. Echinodermata |
| R. Ambulacrum | 3. Graptolites |
| S. Nema | 4. Upwelling |
| | 5. Coelenterata |
| | 6. Silurian |
- (A) P - 1, Q - 6, R - 2, S - 5 (B) P - 5, Q - 6, R - 2, S - 3
(C) P - 4, Q - 1, R - 2, S - 3 (D) P - 2, Q - 4, R - 5, S - 6

26. Dinosaurs can be distinguished from the other Mesozoic reptiles by
 (A) Large size (B) Carnivorous habit
 (C) Erect stance (D) Sprawling stance
27. Which of the following is a polar planktic foraminifer?
 (A) Globigerinoides ruber (B) Neogloboquadrina pachyderma
 (C) Globorotalia menardii (D) Orbulina universa
28. Which one of the following mass-wasting processes is designated as a slow flowage type?
 (A) Mudflow (B) Solifluction (C) Slump (D) Rockslide
29. Which of the following accurately describes the rock 'phonolite'?
 (A) Underesturated ultramafic volcanic rock
 (B) Undersaturated mafic plutonic rock
 (C) Undersaturated ultrabasic volcanic rock
 (D) Intermediate alkaline plutonic rock
30. Match the assemblages in Group I with the corresponding metamorphic facies in Group II:

| | |
|---|-------------------------|
| Group I | Group II |
| P. Albite-jadeite-glaucophane-lawsonite | 1. Greenschist |
| P. Garnet-orthopyroxene-clinopyroxene-plagioclase | 2. Blueschist |
| R. Garnet-muscovite-biotite-sillimanite-quartz | 3. Granulite |
| S. Albite-chlorite-epidote-actinolite | 4. Amphibolite |
| | 5. Zeolite |
| | 6. Prehnite-pumpellyite |

 (A) P - 1, Q - 6, R - 2, S - 5 (B) P - 5, Q - 1, R - 3, S - 4
 (C) P - 2, Q - 3, R - 4, S - 1 (D) P - 3, Q - 2, R - 1, S - 6
31. When underplated by mafic magmas, and with no erosion, lower crutal rocks will experience _____ during metamorphism.
 (A) isobaric heating followed by isothermal decompression
 (B) isothermal compression followed by isobaric heating
 (C) isobaric heating followed by isothermal compression
 (D) isobaric heating-cooling trajectory
32. Match the minerals in Group I with their characteristic optical properties in Group II:

| | |
|----------------|---------------------------|
| Group I | Group II |
| P. Biotite | 1. Uniaxial negative |
| Q. Sodalite | 2. Mottled extinction |
| R. Nepheline | 3. Uniaxial positive |
| S. Quartz | 4. Isotropic, low relief |
| | 5. Isotropic, high relief |
| | 6. Biaxial negative |

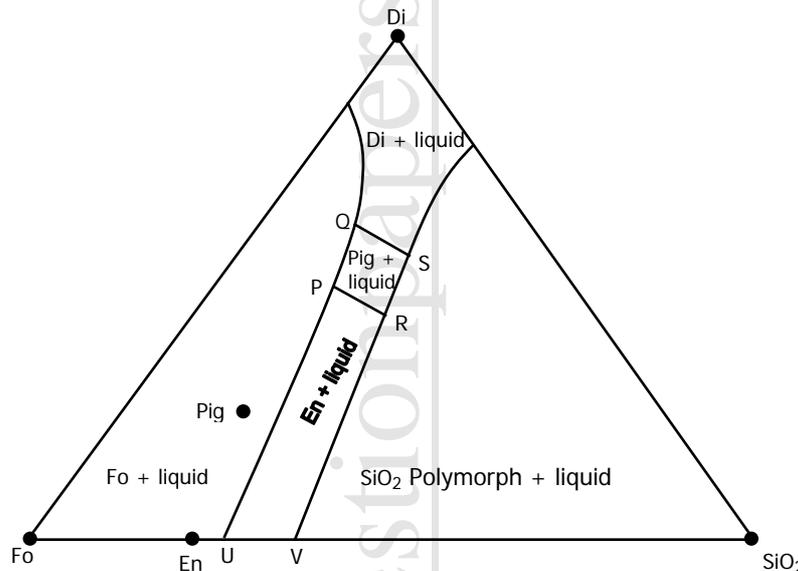
 (A) P - 5, Q - 1, R - 3, S - 6 (B) P - 6, Q - 2, R - 5, S - 1
 (C) P - 3, Q - 2, R - 4, S - 5 (D) P - 2, Q - 4, R - 1, S - 3
33. A single slice of rock bound by thrust faults on all sides is called a
 (A) horse (B) pop-up structure
 (C) duplex (D) graben
34. A strike-slip dip fault strikes 30°E, and dips 45°N. The net slip of the fault plunges
 (A) 30° towards 45°N (B) 0° towards 30°N
 (C) 45° towards 120°N (D) 90° towards 30°N
35. The boundary between the Indian and Eurasian plates is the
 (A) Main central Thrust (B) Main Boundary Thrust
 (C) South Tibetan Detachment Zone (D) Indus-Tsangpo Suture Zone

49. Which type of cross-bedding is a definite indicator of tidal currents?
 (A) epsilon cross-bedding (B) herring-bone cross-bedding
 (C) hummocky cross-bedding (D) trough cross-bedding
50. Which type of sedimentary basin is formed close to continent-continent collisional settings?
 (A) Fore-arc basin (B) Peripheral foreland basin
 (C) back-arc basin (D) Retro-arc foreland basin

Common Data Questions

Common Data for Questions 51 and 52:

A rock contains 65% forsterite (Fo), 27% enstatite (En) and 8% pigeonite (Pig) and its melting relationships at 1 bar can be represented by the figure given below:



51. The name of the rock is
 (A) Lherzolite (B) Harzburgite (C) Wehrlite (D) Dunite
52. On partially melting this rock, the first melt will have the composition of point
 (A) P (B) Q (C) R (D) S

Common Data for Questions 53 and 54:

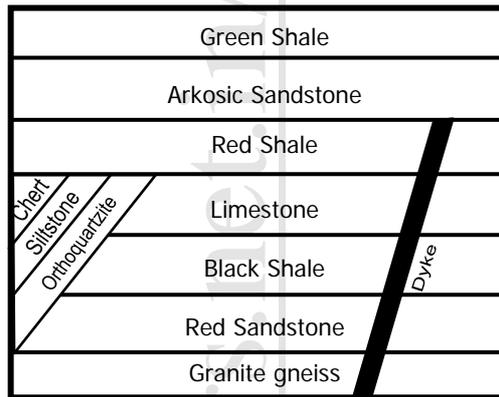
An unfossiliferous sedimentary succession is characterized by the following features -

(i) sandstone-shale alternation, with sheet-like geometry of the sandstone beds; (ii) the sandstones exhibit graded bedding; (iii) erosional structures under the sandstone beds; (iv) convolute lamination, and (v) ripple marker on the sandstone beds.

53. Which depositional environment is indicated for the above sedimentary succession?
 (A) Fluvial (B) Eolian (C) Intertidal (D) Deep marine
54. What type of paleocurrent pattern is expected from the erosional structures in the succession?
 (A) Unimodal (B) Bimodal (C) Bimodal-bipolar (D) Polymodal

Common Data for Questions 55 and 56:

Examine the given geological section, which contains sedimentary successions interrupted by a dike, and which contains no tectonic discontinuities.



55. How many unconformities can be identified in the section?
 (A) 3 (B) 4 (C) 5 (D) 6
56. Which of the following contacts is a nonconformity?
 (A) Granite gneiss - Red Sandstone
 (B) Black Shale - Limestone
 (C) Limestone - Red shale
 (D) Red shale - Arkosic Sandstone

linked Answer Questions

Statement for Linked Answer Questions 57 and 58:

Microfossils may have different test composition.

57. Which of the following is a siliceous microfossil group?
 (A) Conodonts (B) Radiolaria (C) Dinoflagellates (D) Foraminifera
58. What is the preferred microhabitat of the microfossil group that is the correct answer in Q.57?
 (A) Benthic (B) Planktic (C) Nektic (D) Nektobenthic

Statement for Linked Answer Questions 59 and 60:

Pb-Zn sulphide deposits can form in different types of host rocks.

59. Of the following, where do we get predominantly carbonate-hosted Pb-Zn sulphide deposits?
 (A) Mochia - Zawar (B) Sargipalli
 (C) Pur - Banera (D) Sindesar - Khurd
60. What is the age of the host rock to the correct answer in Q. 59?
 (A) Neoproterozoic (B) Mesoproterozoic
 (C) Paleoproterozoic (D) Archean

End of section 1 of Part B

Part B (Section 2): For Geophysics candidates only

Q. 21 to Q. 60 carry two marks each.

21. Match the following functions in time-domain with their fourier spectra:

Group I

P. $\Pi(t) = \begin{cases} 1, & -1/2 \leq t \leq 1/2 \\ 0, & t < -1/2 \text{ and } t > 1/2 \end{cases}$

Q. Dirac delta function, $\delta(t)$

R. $x(t) = e^{-|t|}$

S. $\Lambda(t) = \begin{cases} 1+t, & -1 < t < 0 \\ 1-t, & 0 < t < 1 \\ 0, & \text{otherwise} \end{cases}$

(A) P - 2, Q - 3, R - 1, S - 4

(C) P - 1, Q - 4, R - 2, S - 3

Group II

1. 1

2. $\frac{\sin(\pi f)}{f}$, where f is frequency

3. $\frac{2}{1 + 4\pi^2 f^2}$, where f is frequency

4. $\frac{\sin^2(\pi f)}{f^2}$, where f is frequency

(B) P - 1, Q - 3, R - 2, S - 4

(D) P - 2, Q - 1, R - 3, S - 4

22. The teleseismic rays are those that arrive at a seismometer for a distance greater than

(A) 18° (B) 28° (C) 38° (D) 48°

23. Match the following seismic source generated noise type with its appearance on the seismogram:

Group I

P. Reverberation

Q. Multiples

R. Guided waves

S. Diffractions

(A) P - 1, Q - 3, R - 2, S - 4

(C) P - 2, Q - 4, R - 3, S - 1

Group II

1. Coherent hyperbolic events

2. Tails on reflected events

3. Events paralleling first breaks

4. Reflections at even time intervals after the primary reflection

(B) P - 3, Q - 4, R - 2, S - 1

(D) P - 4, Q - 1, R - 3, S - 2

24. Which is the parameter for measuring the size of the earthquake that does not need an instrumental record?

(A) Richter Magnitude

(C) Moment

(B) Intensity

(D) M_w

25. The standard form of wave equation for propagation of cubical dilation (θ) is

$$\rho \frac{\partial^2 \theta}{\partial t^2} = (\lambda + 2\mu) \nabla^2 \theta$$

The compressional wave velocity is given by

(A) $\sqrt{\frac{2\lambda + \mu}{\rho}}$ (B) $\sqrt{\frac{\lambda + 2\mu}{2\rho}}$ (C) $\sqrt{\frac{\lambda + \mu}{\rho}}$ (D) $\sqrt{\frac{\lambda + 2\mu}{\rho}}$

26. PKIKP is a seismic body wave which travels through

(A) upper mantle

(C) mantle, outer core and inner core

(B) upper and lower mantle

(D) mantle and outer core

27. A seismic signal is recorded in a frequency band, 50 - 100 Hz. The sampling interval (ms) to avoid aliasing would be

(A) 5

(B) 10

(C) 15

(D) 20

28. The minimum appreciable amplitude recorded by a seismometer is 0.2 mm and the maximum one is 20.0 cm, then the dynamic range in dB is

(A) 80

(B) 60

(C) 40

(D) 20

29. Match the following:

Group I

- P. Primary wave
Q. Secondary wave

R. Rayleigh wave
S. Love wave
(A) P - 3, Q - 4, R - 1, S - 2
(C) P - 1, Q - 3, R - 2, S - 4

Group II

1. Propagate along surface of the medium
2. Particle motion is orthogonal to direction of propagation
3. Particle motion describes a retrograde ellipse
4. Particle motion in the direction of propagation
(B) P - 1, Q - 4, R - 2, S - 3
(D) P - 4, Q - 2, R - 3, S - 1

30. Which of the following is a minimum-phase wavelet? The first value in each case is at time zero
(A) $\{-2, 5, -2\}$ (B) $\{-2, 5, 2\}$ (C) $\{6, -1, -2\}$ (D) $\{3, 4, -4\}$

31. In a gas zone, true porosity ϕ_t , neutron log ϕ_n and density derived porosity ϕ_d are related as
(A) $\phi_n < \phi_d > \phi_t$ (B) $\phi_n > \phi_d > \phi_t$ (C) $\phi_n > \phi_d = \phi_t$ (D) $\phi_n < \phi_d = \phi_t$

32. Identify the equation for formation water resistivity (R_{w_e}) estimation from SP log, wherein SSP, $K(T)$ and R_{mf_e} are respectively static SP, temperature dependent coefficient and mudfiltrate resistivity.

- (A) $SSP = -R_{w_e} \log \left(\frac{K(T)}{R_{mf_e}} \right)$ (B) $SSP = -K(T) \log \left(\frac{R_{w_e}}{R_{mf_e}} \right)$
(C) $SSP = -R_{mf_e} \log \left(\frac{K(T)}{R_{w_e}} \right)$ (D) $SSP = -K(T) \log \left(\frac{R_{mf_e}}{R_{w_e}} \right)$

33. Gamma ray detected in density log is

- (A) natural gamma present in the formation
(B) gamma ray from epithermal neutron source
(C) gamma ray scattered from the formation
(D) gamma ray emitted from neutron capture reaction

34. In Turam method, one measures the reduced field ratio of the amplitude and of the phase difference between the two coils. In the absence of subsurface conducting body, the response is characterized as

- (A) the successive reduced field ratio is equal to 1.0 and phase difference is 0°
(B) the successive reduced field ratio is equal to 1.0 and phase difference is 45°
(C) the successive reduced field ratio is equal to 0.5 and phase difference is 90°
(D) the successive reduced field ratio is equal to 0.5 and phase difference is 60°

35. Electric field (\vec{E}) through a polarizable dielectric medium with polarization vector (\vec{P}), electric susceptibility (χ_e) and dielectric permittivity (ϵ_0). The electric displacement vector (\vec{D}) for the medium can be written as

- (A) $\vec{D} = \epsilon_0 (1 + \chi_e) \vec{E}$ (B) $\vec{D} = \epsilon_0 \vec{E} - \vec{P}$
(C) $\vec{D} = \epsilon_0 \vec{E} + \chi_e$ (D) $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$

36. Using different electrodes configuration, maximum depth of investigation is achieved in

- (A) Schlumberger (B) dipole (C) tri-electrodes (D) Wenner

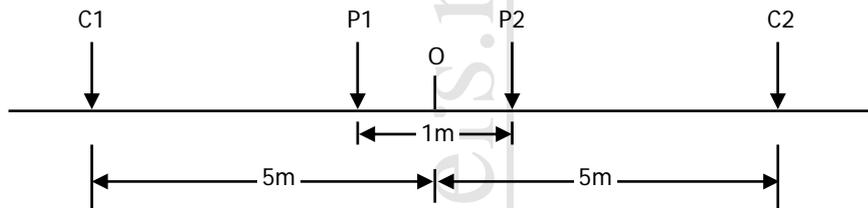
37. Relevant differential equation to study low frequency electromagnetic prospecting for a conducting target can be written in the form of

- (A) Wave equation (B) Laplace's equation
(C) Helmholtz equation (D) Poisson's equation

38. In a layered medium, if the basement is perfectly conducting, magnetotelluric phase response asymptotically approaches to

- (A) 0° (B) 45° (C) 60° (D) 90°

39. Magnetotelluric spectral impedance can be defined as
 (A) the ratio of the spatial spectrum from mutually orthogonal horizontal components of the electric and magnetic field
 (B) the ratio of the spatial spectrum of the vertical component of the horizontal component of magnetic field.
 (C) the ratio of the spatial spectrum of the vertical component to the horizontal component of electric magnetic field
 (D) the ratio of the spatial spectrum of the two horizontal components of electric field
40. Following four electrodes array: P1, P2 are measuring electrodes and C1 and C2 are current electrodes used in resistivity measurement. Inter-electrode separation is also shown in figure.



The above electrode configuration is

- (A) radial dipole (B) parallel dipole
 (C) Schlumberger (D) Wenner
41. In DC resistivity method, direct filter coefficients are used to compute
 (A) apparent resistivity data from resistivity transform
 (B) resistivity transform from apparent resistivity data
 (C) apparent resistivity from measured potential difference
 (D) apparent resistivity from one electrode configuration to other electrode configuration
42. A counter rate of 15,100 counts per minute is recorded by a radiation counter having a dead time of 300 μ sec. The count rate (counts per minute) in the absence of dead time would be
 (A) 13,333 (B) 14,333 (C) 15,333 (D) 16,333
43. The output of a linear and invariant system for a unit input is $\{3, 1\}$. Then what would be the output for an input $\{-2, 1\}$?
 (A) $\{-6, 1, 1\}$ (B) $\{-1, 1, 6\}$ (C) $\{-1, 6, 1\}$ (D) $\{1, -1, 6\}$
44. Geophysical inverse problems are described by
 (A) Fredholm's integral equation of first kind
 (B) Fredholm's integral equation of second kind
 (C) Volterra's equation of second kind
 (D) Legendre equation
45. Spot the ANN method from the following:
 (A) Singular value decomposition (B) Monte-Carlo technique
 (C) Ridge regression procedure (D) Back propagation technique
46. The concept of resolving kernel is used in
 (A) Tikhonov's regularization method (B) Ridge regression method
 (C) Backus-Gilbert method (D) Simulated annealing method
47. For underwater gravity measurements, the following correction is needed:
 (A) Prey correction (B) Free-air correction
 (C) Bouguer correction (D) Isostatic correction
48. The source of magnetic anomalies extend up to
 (A) upper mantle (B) core-mantle boundary
 (C) lower mantle (D) Curie-point isotherm

49. In magnetic prospecting scalar magnetometers are used. Then the prime assumption involved in magnetic data acquisition is
(A) remnant magnetization is predominant
(B) both remnant and induced magnetization are responsible
(C) induced magnetization plays a dominant role
(D) only diamagnetic sources are responsible
50. Source of main geomagnetic field is best represented by
(A) a system of electric currents at core-mantle boundary
(B) a system of dipoles, quadrupoles, octupoles and multipoles
(C) an inclined geomagnetic dipole at center of earth
(D) a system of current in the ionosphere

Common Data Questions

Common Data for Questions 51 and 52:

51. In a resistivity sounding experiment using Schlumberger configuration the apparent resistivity function asymptotically approaches a sloping straight line of slope 45° with abscissa.
(A) Perfectly conducting (B) Relatively resistive
(C) Relatively conducting (D) Perfectly resistive
52. If the intercept at $\rho_a = 1$ ohm-m and resistivity of top layer is 10 ohm-m, then the depth of basement is
(A) 50.0 m (B) 5.0 m (C) 2.0 m (D) 0.5 m

Common Data for Questions 53 and 54:

In a seismic refraction experiment involving a two-layered earth of P-wave velocities, 3 km/sec and 4.5 km/sec the delay time is found to be 49.69 m sec.

53. From the above data, the depth to the interface is given by
(A) 150 m (B) 120 m (C) 100 m (D) 50 m
54. Using the above depth, the computed critical distance (m) would be
(A) 151.20 (B) 178.88 (C) 221.67 (D) 169.87

Common Data for Questions 55 and 56:

The peak gravity anomaly over a 2-D line mass of circular cross-section (horizontal cylinder) of density contrast 500 kg/m^3 is 1.674 mgal. The anomaly decreases to 0.837 m gal at a distance of 500 m along a principle profile. The universal gravitation constant, $G = 6.6667 \times 10^{-11} \text{ m}^3 \text{ sec}^{-2} \text{ kg}^{-1}$

55. The depth (m) to center of line mass and radius (m) of the horizontal cylinder are
(A) 500, 199.80 (B) 200, 150.93 (C) 200, 100.33 (D) 100, 60.37
56. Hence compute the excess mass per unit length (kg/m) of the line mass
(A) 11.0×10^7 (B) 9.0×10^7 (C) 6.27×10^7 (D) 3.67×10^7

Linked Answer Questions

Statement for Linked Answer Questions 57 and 58:

Resistivity log recorded using normal device with measuring electrode, M, is situated close to the current electrode, A, in logging device placed in borehole. A constant current, I, injected from current electrode into the formation.

57. If the spacing between A and M is r, and the potential difference ΔV is measured between the measuring electrode, M and remotely placed surface electrode. Then the expression for the apparent resistivity can be written as
(A) $\rho_a = \frac{2\pi r}{I} \Delta V$ (B) $\rho_a = \frac{4\pi r^2}{I} \Delta V$ (C) $\rho_a = \frac{2\pi r^2}{I} \Delta V$ (D) $\rho_a = \frac{4\pi r}{I} \Delta V$
58. If $r = 0.40 \text{ m}$; $I = 0.02 \text{ amp}$; $\Delta V = 0.04 \text{ volt}$, then the measured apparent resistivity will be
(A) $1 \Omega\text{m}$ (B) $5 \Omega\text{m}$ (C) $10 \Omega\text{m}$ (D) $20 \Omega\text{m}$

Statement for Linked Answer Questions 59 and 60:

Given the wavelets, $a = \{3, -2\}$ and $b = \{1, -2\}$

59. The cross-correlation, ϕ_{ab} , is given by
(A) $\{-6, 7, -2\}$ (B) $\{-6, 10, -12\}$ (C) $\{-4, -11, -6\}$ (D) $\{-6, 11, -4\}$
60. The inverse of wavelet 'a', W_a^{-1} is given by
(A) $\{4/3, 16/9, 17/7, 64/81\}$ (B) $\{1/3, 2/9, 4/27, 8/81\}$
(C) $\{4/9, 1/3, 64/81, 16/27\}$ (D) $\{16/27, 64/81, 4/9, 1/3\}$

End of Question Paper

<http://www.questionpapers.net.in/>