GG : GEOLOGY AND GEOPHYSICS
ONLINE Examination

Duration : Three Hours   *Maximum Marks*

Read the following instructions carefully.

1. Questions must be answered using computers provided by the GATE at the examination centers. Each computer shall run specialized examination software that permits a maximum of one answer to be selected for questions of multiple choice type.

2. Your answers shall be updated and saved on the server periodically and at the end of the examination. The examination will automatically stop once the duration of the examination is over.

3. There are a total of **65** questions carrying 100 marks. All questions are of multiple choice type. Each of these questions carries four choices for the answer labeled A, B, C and D. Only one of the four choices is the correct answer.

4. Apart from General Aptitude (GA), there are two parts: Part A and Part B.

5. Part A is common to both Geology and Geophysics candidates. Part A consists of 25 questions Q.1-Q.25 that carry 1-mark each.

6. 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. Each of the sections (Section 1 and Section 2) consists of 30 questions (Q.26-Q.55) that carry 2-marks each.

7. Questions Q.48 – Q.51 (2 pairs) are common data questions and question pairs (Q.52, Q.53) and (Q.54, Q.55) are linked answer questions. The answer to the second question of the linked answer questions depends on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is unattempted, then the answer to the second question in the pair will not be evaluated.

8. Questions Q.56 – Q.65 belong to General Aptitude (GA). Questions Q.56 – Q.60 carry 1-mark each, and questions Q.61 – Q.65 carry 2-marks each.

9. Unattempted questions will result in zero mark. Wrong answers will result in **NEGATIVE** marks. For Q.1–Q.25 and Q.56–Q.60, ⅓ mark will be deducted for each wrong answer. For Q.26–Q.51 and Q.61–Q.65, ⅔ mark will be deducted for each wrong answer. The question pairs (Q.52, Q.53), and (Q.54, Q.55) 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.52 and Q.54, ⅔ mark will be deducted for each wrong answer. There is no negative marking for Q.53 and Q.55.

10. Calculator is allowed whereas charts, graph sheets or tables are **NOT** allowed in the examination hall.

11. Rough work can be done in the specified area only.

12. Candidates may use the back side of this page to record their answers for their own convenience.

13. To login, type your Registration Number and password as per instructions provided in the envelope.

14. In order to answer a question, you may select the question using the left side selection panel on the screen and choose the correct answer by clicking on the radio button next to the answer. The answered questions shall be indicated by a solid black ball on the selection panel. In order to change the answer, you may just click on another option. If you wish to leave a previously answered question unanswered, you may click on DESELECT ANSWER button.

15. You may also select questions using NEXT and PREVIOUS buttons.

16. You may also mark questions for reviewing later using MARK button. All marked questions are indicated by a rectangle in the selection panel. Questions which are answered but are marked for the review are indicated by a solid black rectangle and questions which are not answered but are marked for the review are indicated by an outlined rectangle in the selection panel.

17. You must sign this sheet and leave it with the invigilators at the end of the examination.

   DECLARATION

   I hereby declare that I have read and followed all the instructions given in this sheet.

   Paper Code: GG   Registration No: _____ Name:_____

   Signature

PART A: COMMON TO BOTH GEOLOGY AND GEOPHYSICS CANDIDA

Q. 1 – Q. 25 carry one mark each.

Q.1   The increase in the length of a day on the earth at a rate of 2.4 milliseconds/100 years is due to

(A) prolate tidal bulge   (B) tidal friction
(C) spring tide   (D) bodily earth tide

Q.2   Which of the following rocks contributes the highest amount of radioactive heat in the earth's crust?

(A) basalt   (B) gabbro   (C) dunite   (D) granite

Q.3   The P-wave velocity of the earth's mantle at the Mohoroviĉić discontinuity is

(A) 5.5 km/s   (B) 6.0 km/s   (C) 7.0 km/s   (D) 8.0 km/s

Q.4   Variation of the geomagnetic field observed over the last 500 years indicates that the dipole moment of earth's magnetic field has been

(A) decreasing   (B) increasing
(C) constant   (D) fluctuating randomly

Q.5   Which of the following statements is **TRUE** for the temperature variation with altitude in the earth's atmosphere?

(A) Temperature increases in both stratosphere and mesosphere
(B) Temperature decreases in stratosphere and increases in mesosphere
(C) Temperature increases in stratosphere and decreases in mesosphere
(D) Temperature decreases in both stratosphere and mesosphere

Q.6   The deflection of ocean currents in the northern and southern hemispheres is due to

(A) thermohaline circulation   (B) Coriolis effect
(C) El Nino effect   (D) monsoon effect

Q.7   Tsunamis are

(A) gravity waves   (B) acoustic waves
(C) capillary waves   (D) internal waves

Q.8   The planet which contributes maximum to the angular momentum of the solar system is

(A) Earth   (B) Mars   (C) Jupiter   (D) Saturn

Q.9   The depositional feature that forms where a stream emerges from a mountainous region onto a plain is called

(A) alluvial fan   (B) natural levee   (C) delta   (D) point bar

Q.10   Hanging valleys are formed by the geological action of

(A) river   (B) glacier   (C) ocean   (D) wind

Q.11   The surface of discontinuity between older folded sedimentary strata and younger horizontal strata
is known as

(A) disconformity   (B) parallel unconformity
(C) angular unconformity   (D) nonconformity

Q.12   The hardest *oxide* mineral in the Mohs' scale of hardness is

(A) corundum   (B) topaz   (C) quartz   (D) diamond

Q.13   The dominant constituent of ultramafic rocks in the earth's mantle is

(A) orthoclase   (B) olivine   (C) plagioclase   (D) biotite

Q.14   A highly vesicular rock formed by solidification of viscous lava is

(A) tuff   (B) obsidian   (C) volcanic breccia (D) pumice

Q.15   The most suitable radioactive method for dating Holocene events is

(A) U–Pb   (B) Sm–Nd   (C) Rb–Sr   (D) C-14

Q.16   Which of the following stratigraphic units is **NOT** of Proterozoic age?

(A) Tipam Group   (B) Bhima Group
(C) Nallamalai Group   (D) Semri Group

Q.17   Rampura–Agucha in Rajasthan is known for the ore deposit of

(A) gold   (B) tungsten   (C) zinc   (D) iron

Q.18   The geological age of the major hydrocarbon reservoir in the Bombay High oil field is

(A) Cretaceous   (B) Holocene   (C) Oligocene   (D) Miocene

Q.19   The geophysical method for the exploration of disseminated sulfide deposits is

(A) induced polarization   (B) self- potential
(C) gravity   (D) magnetic

Q.20   In a borehole, high pressure gas zone is identified by

(A) sonic logging   (B) resistivity logging
(C) temperature logging   (D) density logging

Q.21   The acceleration due to gravity (g) and universal gravitational constant (*G*) are related by the expression (*M_e* and *R_e* are the mass and radius of the earth, respectively)

(A) $g = \dfrac{GM_e}{R_e}$

(B) $g = \dfrac{GM_e}{R_e^2}$

(C) $g = \dfrac{GR_e}{M_e}$

(D) $g = \dfrac{GR_e}{M_e^2}$

Q.22   The metamorphic facies diagnostic of subduction zone is

(A) hornblende hornfels   (B) pyroxene hornfels   (C) blueschist   (D) granulite

Q.23   In a formation, if the density increases and elastic constants remain unchanged, then

(A) both P and S wave velocities increase
(B) P wave velocity increases and S wave velocity decreases
(C) both P and S wave velocities decrease
(D) P wave velocity decreases and S wave velocity increases

Q.24   The Poisson ratio (σ) for rocks in terms of Lame's constants λ and μ is

(A) $\sigma = \dfrac{1}{\lambda + \mu}$ (B) $\sigma = \dfrac{\lambda}{\lambda + \mu}$ (C) $\sigma = \dfrac{1}{2(\lambda + \mu)}$ (D) $\sigma = \dfrac{\lambda}{2(\lambda + \mu)}$

Q.25   In seismic exploration, 'ground roll' represents

(A) direct wave   (B) surface wave   (C) Stonely wave   (D) shear wave

PART B (SECTION 1): FOR GEOLOGY CANDIDATES ONLY

Q. 26 to Q. 55 carry two marks each.

Q.26 Choose the correct set of crystal faces for which 'c' crystallographic axis is the zone axis.

(A) (100), (001), ($\overline{1}$00)   (B) (010), (001), (0$\overline{1}$0)

(C) (010), ($\overline{1}$10), ($\overline{1}$00)   (D) (110), (001), ($\overline{1}\,\overline{1}$0)

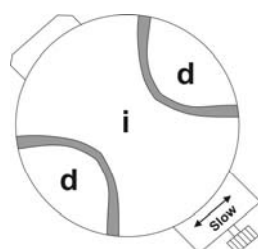Q.27 The twin plane in the Manebach law is

(A) (010)   (B) (001)   (C) (100)   (D) (021)

Q.28 The figure below shows the pattern of increase (**i**) and decrease (**d**) in the interference colors of a mineral after insertion of mica plate. The optic sign of the mineral is
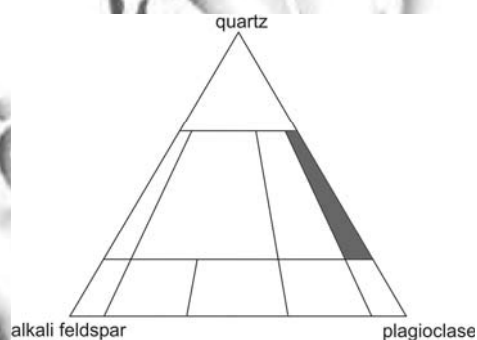

(A) uniaxial positive   (B) uniaxial negative

(C) biaxial positive   (D) biaxial negative

Q.29 The igneous rock falling in the shaded field of the figure below is
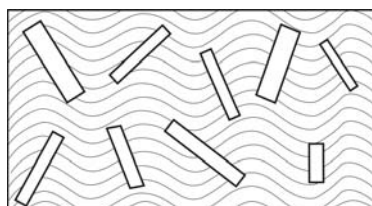

(A) granite   (B) syenite   (C) tonalite   (D) monzonite

Q.30 The figure below is the photomicrograph of a chloritoid mica schist in which chloritoid forms porphyroblasts. The formation of porphyroblasts in the crenulated matrix is

(A) pre-tectonic   (B) early syn-tectonic

(C) late syn-tectonic   (D) post-tectonic

Q.31   A pelitic rock is uplifted after high pressure metamorphism in the earth's crust. The miner
        transformation due to uplift will be

        (A) kyanite to sillimanite   (B) sillimanite to kyanite
        (C) andalusite to kyanite   (D) andalusite to sillimanite

Q.32   Which of the following sedimentary structures is **NOT** a 'tool mark'?

        (A) prod cast   (B) groove cast   (C) flute cast   (D) bounce cast

Q.33   The echinoids transformed from epifaunal to infaunal type in the Jurassic times. Consider the
        following morphological changes:

                P. increase in size of spines
                Q. increase in number of spines
                R. development of phyllodes
                S. bulging of shell

        Which of the above changes were functionally advantageous in this transformation?

        (A) P, Q, R, S   (B) P, S only   (C) Q, S only   (D) Q, R only

Q.34   Match the Bivalvia in **Group I** with corresponding ecology in **Group II.**

                Group I   **Group II**

                P. *Mytilus*   1. Cemented
                Q. *Pecten*   2. Swimmer
                R. *Ostrea*   3. Bysally attached
                S. *Mya*   4. Infaunal
                                                      5. Floating

        (A) P-1, Q-2, R-3, S-5   (B) P-3, Q-2, R-1, S-4
        (C) P-2, Q-3, R-5, S-1   (D) P-2, Q-4, R-5, S-3

Q.35   Determine the correctness or otherwise of the following **Assertion** (a) and **Reason** (r).

        Assertion: The Lower Gondwana rocks in Central India, containing brachiopod genera *Productus*,
        Spiriferina and *Reticularia*, are considered to have formed by transgression of the Tethys Sea in
        Peninsular India during Permian.

        Reason: The brachiopods are marine organisms and the stratigraphic ranges of the brachiopod
        species of the formation suggest Permian age.

        (A) Both (a) and (r) are true and (r) is the correct reason for (a)
        (B) (a) is true but (r) is false
        (C) (a) is false but (r) is true
        (D) Both (a) and (r) are true but (r) is not the correct reason for (a)

Q.36   In the following lithostratigraphic units, which of the formations are of Palaeocene and
        age?

        P. Barail Formation
        Q. Subathu Formation
        R. Sylhet Limestone
        S. Kamlial Formation

        (A) P, Q   (B) Q, R   (C) R, S   (D) P, S

Q.37   The microfaunal assemblages in a fining upward stratigraphic sequence are given below:

        High abundance of *Globigerina, Globorotalia* and *Orbulina*   (Top)
        Moderate abundance of *Uvigerina, Cassidulina* and low abundance of *Globigerina*   (Middle)
        Moderate abundance of *Ammonia, Elphidium* and *Quinqueloculina*   (Bottom)

        The sequence corresponds to

        (A) lowstand systems tract
        (B) highstand systems tract
        (C) transgressive systems tract
        (D) shelf margin systems tract

Q.38   Match the geomorphological features in **Group I** with corresponding characteristics in **Group II.**

          Group I   **Group II**

        P. Atolls   1. reefs parallel to the shore and separated by deep lagoon
        Q. Mesa   2. broad flat topped hill capped by resistant rock and bounded by cliffs
        R. Barchans   3. circular reefs that rim lagoons
                                  4. crescent shaped sand dunes

        (A) P-1, Q-2, R-3   (B) P-3, Q-2, R-4   (C) P-3, Q-4, R-1   (D) P-2, Q-4, R-1

Q.39   Match the optical properties in **Group I** with corresponding mineral in **Group II.**

                        Group I   **Group II**

                        P. internal reflections   1. galena
                        Q. bireflectance   2. sphalerite
                        R. triangular pits   3. magnetite
                                                            4. pyrrhotite

        (A) P-4, Q-3, R-1   (B) P-3, Q-1, R-4   (C) P-2, Q-4, R-1   (D) P-2, Q-1, R-4

Q.40   Which of the following bands (in micrometre) is **NOT** suitable for earth observation in satellite
        remote sensing?

        (A) 0.30–0.35   (B) 0.53–0.58   (C) 0.62–0.67   (D) 0.74–0.78

Q.41   Thermal maturation of hydrocarbon source rocks can be determined from

(A) temperature of the borehole drilled into the source rock
(B) O^{18}/O^{16} ratio of the source rock
(C) Mg/Ca ratio of foraminifera in the source rock
(D) color of spores and pollens in the source rock

Q.42   Determine the correctness or otherwise of the following **Assertion** (a) and **Reason** (r).

Assertion: Strontium concentration in a basic magma decreases with fractional crystallization of plagioclase.

Reason: Strontium is a compatible trace element in plagioclase during magmatic crystallization.

(A) Both (a) and (r) are true and (r) is the correct reason for (a)
(B) (a) is true but (r) is false
(C) (a) is false but (r) is true
(D) Both (a) and (r) are true but (r) is not the correct reason for (a)

Q.43   Which of the following is **TRUE** for the coordination number (n) of aluminium?

(A) n = 4 in both plagioclase and garnet
(B) n = 6 in both plagioclase and garnet
(C) n = 4 in plagioclase and n = 6 in garnet
(D) n = 6 in plagioclase and n = 4 in garnet

Q.44   If the dissociation constant of pure natural water at 50°C is $10^{-13.10}$, the pH of the water will be

(A) 6.00   (B) 6.55   (C) 7.00   (D) 7.55

Q.45   Choose the **CORRECT** statement

(A) Sandstone forms aquifers and sandy shale forms aquifuges
(B) Sandstone forms aquifers and sandy shale forms aquitards
(C) Sandstone forms aquicludes and sandy shale forms aquifuges
(D) Both sandstone and sandy shale form aquifuges

Q.46   The slow, permanent and continuous deformation of materials under constant load is called

(A) strain hardening   (B) stress stiffening   (C) work hardening   (D) creep

Q.47   Which of the following lithostratigraphic units hosts lignite at Neyveli?
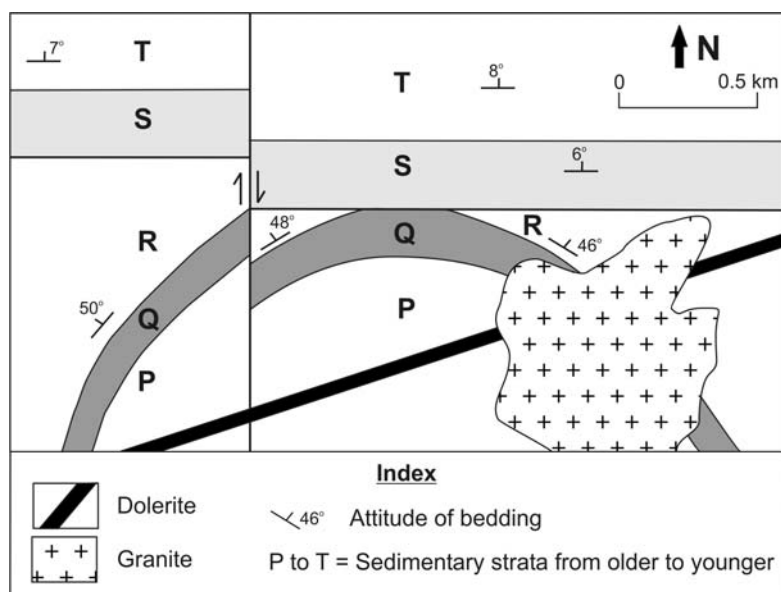
(A) Ariyalur Formation   (B) Cuddalore Formation
(C) Kamthi Beds   (D) Pali Beds

Common Data Questions

Common Data for Questions 48 and 49:

The figure below is the schematic geological map of a flat terrane.

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Dolerite

Granite

∠46° Attitude of bedding

P to T = Sedimentary strata from older to younger

Q.48   The strata P, Q and R have been folded into a

(A) north-plunging anticlinal antiform   (B) south-plunging anticlinal antiform
(C) north-plunging synclinal antiform   (D) south-plunging synclinal antiform

Q.49   The granite pluton intruded

(A) before folding and faulting
(B) before faulting but after folding
(C) after development of unconformity but before faulting
(D) after development of unconformity and faulting

Common Data for Questions 50 and 51:

Oceanic crust is generally covered by sediments. In a convergent tectonic setting, basaltic crust, along with its sedimentary cover, is subducted beneath continental plate. In such a setting, magmatism leads to the formation of a continental arc.

Q.50   The magma series typical of the arc is

(A) alkaline
(B) alkaline-shoshonitic
(C) tholeiitic
(D) calc-alkaline

Q.51   The type of sulphide mineral deposit formed in this tectonic setting is

(A) Porphyry copper   (B) Mississippi Valley lead and zinc
(C) Besshi copper and zinc   (D) Kuroko copper

Linked Answer Questions

Statement for Linked Answer Questions 52 and 53:

The modal analysis of a sandstone shows: Quartz 54%; Mica 3%; Feldspar 33%; Cement 5% and Matrix 5%

Q.52   The sandstone belongs to the class

(A) Quartz wacke   (B) Arkosic wacke   (C) Arkose   (D) Quartz arenite

Q.53   In which of the following conditions the **CORRECT** sandstone class in the previous question might have formed?

P. Warm arid climate   Q. Humid tropical climate
R. Long exposure and transportation   S. Quick burial without much transportation

(A) P, S   (B) P, R   (C) Q, R   (D) Q, S

Statement for Linked Answer Questions 54 and 55:

Lithostratigraphic units of different ages and hosting different ore deposits are exposed in Peninsular India.

Q.54   Which of the following lithostratigraphic units is of Palaeoproterozoic age?

(A) Aravalli Supergroup   (B) Dharwar Supergroup
(C) Vindhyan Supergroup   (D) Sukma Group

Q.55   The host rock and associated metal deposit found in the correct lithostratigraphic unit in the previous question is

(A) chlorite schist – copper   (B) dolomite – lead and zinc
(C) banded haematite quartzite – iron   (D) chlorite schist – antimony

PART B (SECTION 2): FOR GEOPHYSICS CANDIDATES ONLY

Q. 26 to Q. 55 carry two marks each.

Q.26   Rayleigh number associated with convection in the earth's interior is proportional to the ratio of

(A) buoyancy force to diffusive viscous force
(B) buoyancy force to gravitational force
(C) diffusive viscous force to gravitational force
(D) gravitational force to buoyancy force

Q.27   Shadow zones for direct P- and S-waves lies between

(A) 102° to 142° for both direct P- and S-waves
(B) 102° to 180° for direct P- wave and 102° to 142° for direct S-wave
(C) 102° to 180° for both direct P- and S-waves
(D) 102° to 142° for direct P- wave and 102° to 180° for direct S-wave

Q.28   Snell's law of refraction deals with which of the following properties of refracted waves?

(A) amplitude   (B) direction   (C) energy   (D) phase

Q.29   In seismic reflection, the seismic trace is modeled as

(A) convolution of source wavelet with the reflection coefficient series
(B) multiplication of source wavelet with the reflection coefficient series
(C) correlation of source wavelet with the reflection coefficient series
(D) addition of source wavelet with the reflection coefficient series

Q.30   From the following figure, choose the **CORRECT** multiple reflection events encountered in seismic exploration
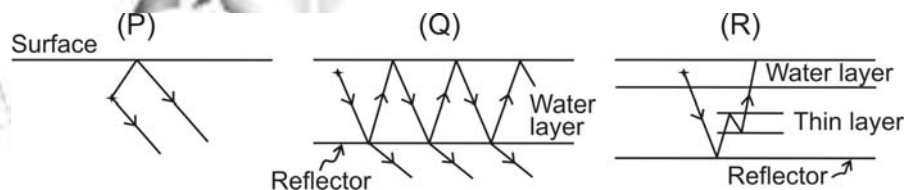
(A) P is peg leg multiple, Q is ghost, R is long path multiple
(B) P is ghost, Q is simple multiple, R is reverberation
(C) P is peg leg multiple, Q is simple multiple, R is reverberation
(D) P is ghost, Q is reverberation, R is peg leg multiple

Q.31   The frequency of a signal sampled at 200 samples per second appears as 75 Hz. If the signal was undersampled, the frequency (in Hz) of the original signal would be

(A) 100   (B) 125   (C) 150   (D) 175

Q.32   Match the items in **Group I** with those in **Group II**

	Group I		**Group II**

P. correlation in frequency domain   1. reciprocal of total signal duration
Q. phase spectrum   2. aliasing
R. frequency interval   3. product of Fourier transform and its conjugate
S. undersampling   4. autocorrelation
                                           5. Hilbert transform
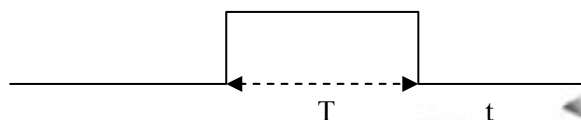
(A) P-3, Q-5, R-1, S-2   (B) P-3, Q-4, R-2, S-1
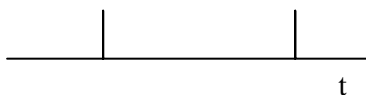(C) P-3, Q-4, R-1, S-2   (D) P-2, Q-3, R-4, S-5

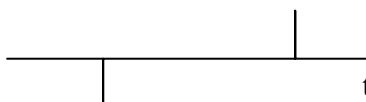Q.33   The derivative of the following boxcar function is

(A)

(B)

(C)

(D)

Q.34   Gravity measurement is made on a ship sailing at the speed of 6 knots in the direction N65°E at 20°N latitude. The Eotvos correction (in mGal) is

(A) +38.5   (B) +24.5   (C) −35.5   (D) −39.5

Q.35   Isostatic residual anomaly over a mountainous terrain is due to

(A) gravitational effect of compensating mass
(B) long wavelength variations of topography
(C) short wavelength variations of topography
(D) density inhomogeneities in the upper and middle crust

Q.36   In magnetic data reduction, the altitude correction at magnetic equator is 0.015 nT/m. Altitude correction (in nT/m) at the magnetic poles is

(A) 0.015   (B) 0.030   (C) 0.045   (D) 0.060

Q.37   The Larmor precession frequency (in Hz) measured by proton precession magnetometer for a total field of 50,000 nT is (gyromagnetic ratio of proton $\gamma_p = 0.267513 \text{ nT}^{-1}\text{S}^{-1}$)

(A) 1890   (B) 2020   (C) 2130   (D) 2420

Q.38   Gamma ray log measurements are used to quantify

(A) hydrocarbon saturation
(B) porosity of the formation
(C) density of the formation
(D) volume of shale in the formation

Q.39   Free fluid index (FFI) of a formation is estimated from

(A) neutron log   (B) latero log   (C) induction log   (D) NMR log

Q.40   Compton scattering takes place if the energy of gamma rays lies in the range of

(A) 10 KeV to 50 KeV
(B) 50 KeV to 100 KeV
(C) 100 KeV to 2.0 MeV
(D) 2.0 MeV to 3.5 MeV

Q.41   Which of the following Maxwell's equations is **NOT CORRECT** for time varying electromagnetic field?

(A) $\nabla \times \vec{H} = \vec{J}$

(B) $\nabla \times \vec{E} = -\dfrac{\partial \vec{B}}{\partial t}$

(C) $\nabla \cdot \vec{D} = \rho$

(D) $\nabla \cdot \vec{B} = 0$

Q.42   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) KQ–type

Q.43   Forced movement of fluids through porous rocks gives rise to

(A) streaming potential   (B) Nernst potential
(C) mineralization potential   (D) liquid junction potential

Q.44   Match the EM methods in **Group I** with the corresponding quantity measured by them in **Group II**

Group I	**Group II**
P. VLF	1. amplitude ratio and phase difference
Q. Two-frame	2. real and imaginary components
R. Slingram	3. dip angle
S. TURAM	4. amplitude ratio

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

Q.45   Arrange the following electromagnetic methods in the decreasing order of depth of inv

P. Time domain EM method
Q. Magnetotelluric method
R. VLF method
S. Ground Penetrating Radar method

(A) P > Q > S > R   (B) S > Q > P > R
(C) Q > P > R > S   (D) Q > R > P > S

Q.46   The least squares generalized inverse of an overdetermined problem is expressed as

(A) $(G^T G)^{-1} G^T$ (B) $(G^T G)^{-1}$

(C) $G^T (GG^T)^{-1}$ (D) $(GG^T)^{-1}$

Q.47   The primary field (H_p) in EM prospecting is represented by $H_p = K \sin(\omega t)$. Which is the
        CORRECT expression for induced e.m.f. (e_s) in the subsurface conductor? (K and K′ are
        constants)

(A) $e_s = K' \sin(\omega t - \dfrac{\pi}{4})$

(B) $e_s = K' \cos(\omega t - \dfrac{\pi}{4})$

(C) $e_s = K' \sin(\omega t - \dfrac{\pi}{2})$

(D) $e_s = K' \cos(\omega t - \dfrac{\pi}{2})$

Common Data Questions

Common Data for Questions 48 and 49:

Time series P and Q are given by

$$P = \{1, -1, -2, 0, 1\}$$
$$Q = \{1, 0, -1\}$$

Q.48   The convolution of P and Q is

(A) {−1, 0, 3, 1, −3, −1, 1}
(B) {1, −1, −3, 1, 3, 0, −1}
(C) {1, −1, −3, −1, 3, 1, −1}
(D) {1, 0, 3, 1, −3, −1, 1}

Q.49   P is similar and most out of phase to Q at a lag of

(A) 0   (B) 1   (C) 2   (D) 3

Common Data for Questions 50 and 51:

An asymmetric split spread extends from $x_1 = -400$ m to $x_2 = 800$ m. A reflection observed on the ... yields $t_1 = 0.997$ s at $x_1 = -400$ m, $t_2 = 1.025$ s at $x_2 = 800$ m, $t_0 = 1.0$ s at $x = 0.0$ m and velocity of ... m/s.

Q.50   NMO correction estimated at $x_1 = -400$ m and $x_2 = 800$ m are, respectively

(A) 5 and 30 ms   (B) 8 and 35 ms   (C) 10 and 41 ms   (D) 15 and 45 ms

Q.51   The depth of the reflector at the shot point normal to the reflector is

(A) 700 m   (B) 1400 m   (C) 2100 m   (D) 2800 m

Linked Answer Questions

Statement for Linked Answer Questions 52 and 53:

A gravity survey is conducted over a highly compact ore deposit (spherical shape). Bouguer anomaly values reduced along a profile are given below.

Distance (m)	Gravity anomaly (mGal)	Distance (m)	Gravity anomaly (mGal)	Distance (m)	Gravity anomaly (mGal)
0	0.25	2400	3.50	4800	1.50
400	0.35	2800	4.00	5200	0.80
800	0.50	3200	5.00	5600	0.50
1200	0.80	3600	4.00	6000	0.35
1600	1.50	4000	3.50	6400	0.25
2000	2.50	4400	2.50		

Q.52   What is the depth to the center of the ore deposit?
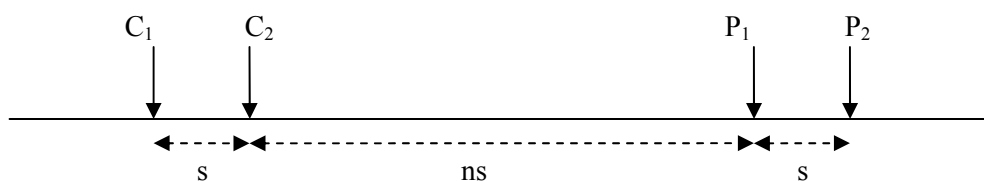
(A) 3100 m   (B) 1820 m   (C) 1560 m   (D) 1450 m

Q.53   What is the excess mass (in metric tons) by the deposit?

(A) 1.615×10^8 (B) 2.165×10^8 (C) 1.312×10^9 (D) 1.825×10^9

Statement for Linked Answer Questions 54 and 55:

An axial dipole-dipole configuration is given below.

C₁   C₂   P₁   P₂

$$C_1 \quad C_2 \qquad\qquad\qquad\qquad\qquad P_1 \quad P_2$$

$$\underbrace{\qquad}_{s} \quad \underbrace{\qquad\qquad\qquad\qquad}_{ns} \quad \underbrace{\qquad}_{s}$$

Q.54   The geometrical factor for the above axial dipole array is

(A) $\pi n(n+1)s$ (B) $\pi n(n+2)s$ (C) $\pi(n+1)(n+2)s$ (D) $\pi n(n+1)(n+2)s$

Q.55   What is the apparent resistivity (in Ωm) if 1.0 Amp current flowing between C_1 and C_2 produces 10 mV potential difference between P_1 and P_2 for s = 10 m and n = 10? (Use $\pi = 3.14$)

(A) 414.48   (B) 41.45   (C) 37.68   (D) 34.54

General Aptitude (GA) Questions

Q. 56 – Q. 60 carry one mark each.

Q.56   Choose the most appropriate word or phrase from the options given below to complete the following sentence.

The environmentalists hope _____ the lake to its pristine condition.

(A) in restoring
(B) in the restoration of
(C) to restore
(D) restoring

Q.57   Choose the word from the options given below that is most nearly opposite in meaning to the given word:

Polemical

(A) imitative
(B) conciliatory
(C) truthful
(D) ideological

Q.58   Choose the most appropriate word from the options given below to complete the following sentence.

Despite the mixture's _____ nature, we found that by lowering its temperature in the laboratory we could dramatically reduce its tendency to vaporize.

(A) acerbic
(B) resilient
(C) volatile
(D) heterogeneous

Q.59   If m students require a total of m pages of stationery in m days, then 100 students will require 100 pages of stationery in

(A) 100 days   (B) $m/100$ days   (C) $100/m$ days   (D) m days

Q.60   Choose the most appropriate words from the options given below to complete the following sentence.

Because she had a reputation for _____ we were surprised and pleased when she greeted us so _____.

(A) insolence …… irately
(B) insouciance …… curtly
(C) graciousness …… amiably
(D) querulousness …… affably

Q. 61 to Q. 65 carry two marks each.

Q.61   The number of solutions for the following system of inequalities is

$X_1 \geq 0$
$X_2 \geq 0$
$X_1 + X_2 \leq 10$
$2X_1 + 2X_2 \geq 22$

(A) 0   (B) infinite   (C) 1   (D) 2

Q.62   In a class of 300 students in an M.Tech programme, each student is required to take at le
       subject from the following three:

       M600: Advanced Engineering Mathematics
       C600: Computational Methods for Engineers
       E600: Experimental Techniques for Engineers

       The registration data for the M.Tech class shows that 100 students have taken M600, 200 students
       have taken C600, and 60 students have taken E600. What is the maximum possible number of
       students in the class who have taken all the above three subjects?

       (A) 20   (B) 30   (C) 40   (D) 50

Q.63   Three sisters (R, S, and T) received a total of 24 toys during Christmas. The toys were initially
       divided among them in a certain proportion. Subsequently, R gave some toys to S which doubled
       the share of S. Then S in turn gave some of her toys to T, which doubled T's share. Next, some of
       T's toys were given to R, which doubled the number of toys that R currently had. As a result of all
       such exchanges, the three sisters were left with equal number of toys. How many toys did R have
       originally?

       (A) 8   (B) 9   (C) 11   (D) 12

Q.64   The quality of services delivered by a company consists of six factors as shown below in the radar
       diagram. The dots in the figure indicate the score for each factor on a scale of 0 to 10. The
       standardized coefficient for each factor is given in the parentheses. The contribution of each factor
       to the overall service quality is directly proportional to the factor score and its standardized
       coefficient.
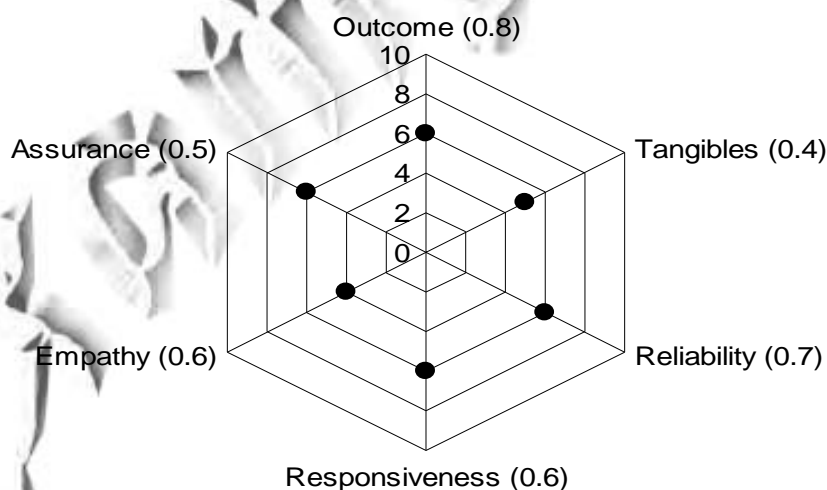
       The lowest contribution among all the above factors to the overall quality of services delivered by
       the company is

       (A) 10%   (B) 20%   (C) 24%   (D) 40%

Q.65 **In order to develop to full potential, a baby needs to be physically able to res environment.**

It can be inferred from the passage that

(A) Full physical potential is needed in order for a baby to be able to respond to the environment.
(B) It is necessary for a baby to be able to physically respond to the environment for it to develop its full potential.
(C) Response to the environment of physically able babies needs to be developed to its full potential.
(D) A physically able baby needs to develop its full potential in order to respond to its environment.

END OF THE QUESTION PAPER

GATE 2011 - Answer Key - Paper - GG

Paper	Question no.	Section 1	Section 2
GG	1	B	B
GG	2	D	D
GG	3	D	D
GG	4	A	A
GG	5	C	C
GG	6	B	B
GG	7	A	A
GG	8	C	C
GG	9	A	A
GG	10	B	B
GG	11	C	C
GG	12	A	A
GG	13	B	B
GG	14	D	D
GG	15	D	D
GG	16	A	A
GG	17	C	C
GG	18	D	D
GG	19	A	A
GG	20	MarkstoAll	MarkstoAll
GG	21	B	B
GG	22	C	C
GG	23	C	C
GG	24	D	D
GG	25	B	B
GG	26	C	A
GG	27	B	D
GG	28	D	B
GG	29	C	A
GG	30	D	D
GG	31	A	B
GG	32	C	C
GG	33	D	B
GG	34	B	A
GG	35	A	D
GG	36	B	B
GG	37	C	C
GG	38	B	D
GG	39	C	D
GG	40	A	C
GG	41	D	A
GG	42	A	B
GG	43	C	A
GG	44	B	B
GG	45	B	C

GATE 2011 - Answer Key - Paper - GG

Paper	Question no.	Section 1	Section 2
GG	46	D	A
GG	47	B	C
GG	48	A	B
GG	49	D	C
GG	50	D	C
GG	51	A	B
GG	52	C	C
GG	53	A	D
GG	54	A	D
GG	55	B	A
GG	56	C	C
GG	57	B	B
GG	58	C	C
GG	59	D	D
GG	60	D	D
GG	61	A	A
GG	62	B	B
GG	63	C	C
GG	64	A	A
GG	65	B	B