GATE-03

ee25btech11063-vejith

1) ”When she fell down the _____ she received many _____ but little help.” The words that best fill the blanks in the above sentence are

(GATE GG 2018)

a) stairs, stares
b) stairs, stairs
c) stares, stairs
d) stares, stares

2) ”In spite of being warned repeatedly, he failed to correct his _____ behaviour.” The word that best fills the blank in the above sentence is

(GATE GG 2018)

a) rational
b) reasonable
c) errant
d) good

3) For $0 \le x \le 2\pi$, $\sin x$ and $\cos x$ are both decreasing functions in the interval

(GATE GG 2018)

a) $\left(0, \frac{\pi}{2}\right)$
b) $\left(\frac{\pi}{2}, \pi\right)$
c) $\left(\pi, \frac{3\pi}{2}\right)$
d) $\left(\frac{3\pi}{2}, 2\pi\right)$

4) The area of an equilateral triangle is $\sqrt{3}$. What is the perimeter of the triangle?

(GATE GG 2018)

a) 2
b) 4
c) 6
d) 8

5) Arrange the following three-dimensional objects in the descending order of their volumes:
- (*i*) A cuboid with dimensions 10 cm, 8 cm and 6 cm
- (*ii*) A cube of side 8 cm
- (*iii*) A cylinder with base radius 7 cm and height 7 cm
- (*iv*) A sphere of radius 7 cm

(GATE GG 2018)

a) (*i*), (*ii*), (*iii*), (*iv*)
b) (*ii*), (*i*), (*iv*), (*iii*)
c) (*iii*), (*ii*), (*i*), (*iv*)
d) (*iv*), (*iii*), (*ii*), (*i*)

6) An automobile travels from city A to city B and returns to city A by the same route. The speed of the vehicle during the onward and return journeys were constant at 60 km/h and 90 km/h respectively. What is the average speed in km/h for the entire journey?

(GATE GG 2018)

a) 72
b) 73
c) 74
d) 75

7) A set of 4 parallel lines intersect with another set of 5 parallel lines. How many parallelograms are formed?

(GATE GG 2018)

a) 20
b) 48
c) 60
d) 72

8) To pass a test, a candidate needs to answer at least 2 out of 3 questions correctly. A total of $6,30,000$ candidates appeared for the test. Question A was correctly answered by $3,30,000$ candidates. Question B was answered correctly by $2,50,000$ candidates. Question C was answered correctly by $2,60,000$ candidates. Both questions A and B were answered correctly by $1,00,000$ candidates. Both questions B and C were answered correctly by $90,000$ candidates. Both questions A and C were answered correctly by $80,000$ candidates. If the number of students answering all questions correctly is the same as the number answering none, how many candidates failed to clear the test?

(GATE GG 2018)

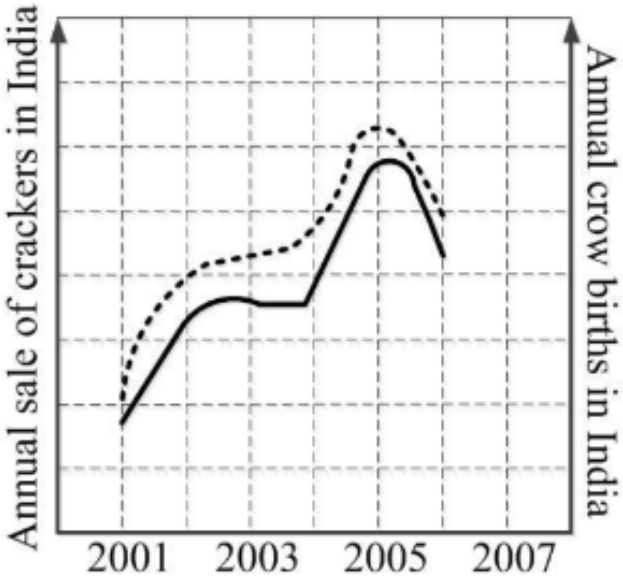
a) $30,000$
b) $2,70,000$
c) $3,90,000$
d) $4,20,000$

9) If $x^2 + x - 1 = 0$ what is the value of $x^4 + \frac{1}{x^4}$?

(GATE GG 2018)

a) 1 b) 5 c) 7 d) 9

10) In a detailed study of annual crow births in India, it was found that there was relatively no growth during the period 2002 to 2004 and a sudden spike from 2004 to 2005. In another unrelated study, it was found that the revenue from cracker sales in India which remained fairly flat from 2002 to 2004, saw a sudden spike in 2005 before declining again in 2006. The solid line in the graph below refers to annual sale of crackers and the dashed line refers to the annual crow births in India. Choose the most appropriate inference from the above data.



(GATE GG 2018)

a) There is a strong correlation between crow birth and cracker sales.
b) Cracker usage increases crow birth rate.
c) If cracker sale declines, crow birth will decline.
d) Increased birth rate of crows will cause an increase in the sale of crackers.

END OF THE QUESTION PAPER

1) Which one of the following periods has the longest time duration? (GATE GG 2018)

a) Ordovician b) Cretaceous c) Jurassic d) Silurian

2) A siliciclastic sedimentary rock consisting predominantly of the same type of gravel-sized clasts is called (GATE GG 2018)

a) Polymict conglomerate
b) Arkose
c) Oligomict conglomerate
d) Petromict conglomerate

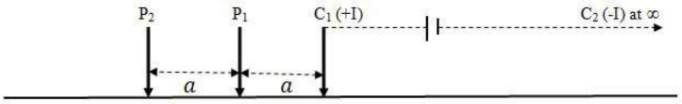
3) Brown coal that has high moisture content and commonly retains many of the original wood fragments is called (GATE GG 2018)

a) Anthracite
b) Bituminous coal
c) Lignite
d) Peat

4) The speed of revolution of the Earth around the Sun is (GATE GG 2018)

a) maximum at Perihelion
b) minimum at Perihelion
c) maximum at Aphelion
d) equal at Aphelion and Perihelion

5) The geometrical factor for the following electrode configuration is (GATE GG 2018)



a) πa b) $2\pi a$ c) $3\pi a$ d) $4\pi a$

6) Which one of the following geophysical methods uses the physical property Dielectric Constant ? (GATE GG 2018)

a) Gravity
b) Ground Penetrating Radar
c) Seismic
d) Self-Potential

7) Pascal second is a unit of (GATE GG 2018)

a) seepage force
b) dynamic viscosity
c) kinematic viscosity
d) permeability

8) Which one of the following statements is CORRECT? (GATE GG 2018)

a) Strength of a rock decreases with increase in confining pressure
b) Strength of a rock increases with increase in temperature
c) Strength of a rock increases with increase in strain rate
d) Strength of a rock increases with increase in pore water pressure

9) The geomorphic feature horns are formed by (GATE GG 2018)

a) wind erosion
b) river erosion
c) wind deposition
d) glacial erosion

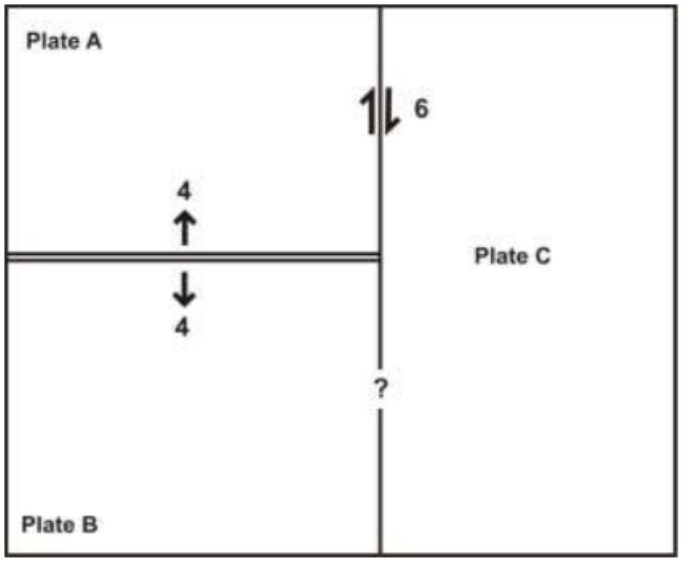
10) A melanocratic porphyritic rock containing phenocrysts of biotite, with feldspar restricted to the groundmass, is called (GATE GG 2018)

a) trachyte b) dacite c) andesite d) lamprophyre

11) The supercontinent that existed in the late Mesoproterozoic to early Neoproterozoic time was (GATE GG 2018)

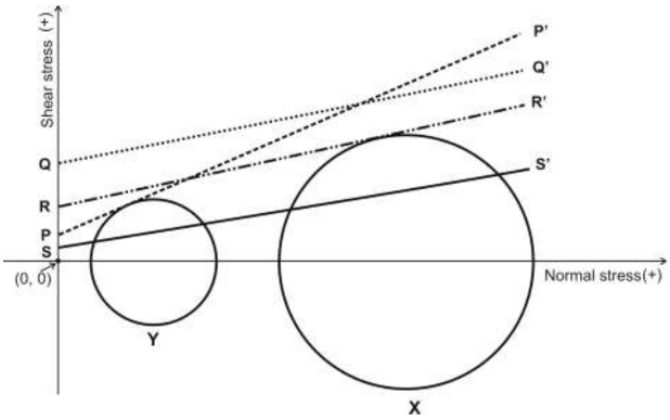
a) Kenorland b) Columbia c) Rodinia d) Pangaea

12) The figure below shows the triple junction between three plates A, B and C. The boundary between the plates A and B is a ridge with a half-spreading rate of 4 cm/year. The A-C and B-C boundaries are collinear and orthogonal to the A-B ridge. The A-C boundary is a dextral transform fault with a relative velocity of 6 cm/year. The boundary between plates B and C is: (GATE GG 2018)



a) dextral transform fault with a relative velocity of 10 cm/year
b) dextral transform fault with a relative velocity of 2 cm/year
c) sinistral transform fault with a relative velocity of 2 cm/year
d) sinistral transform fault with a relative velocity of 6 cm/year

13) A rock follows Mohr-Coulomb failure criterion. Which one of the Mohr-Coulomb failure envelopes allows failure of the rock under stress state Y, but not under stress state X? (GATE GG 2018)



a) PP′ b) QQ′ c) RR′ d) SS′

14) The maximum and the minimum principal stresses are denoted by σ_1 and σ_3, respectively. The differential stress can have an absolute value greater than σ_1 when (GATE GG 2018)

a) σ_1 and σ_3 are both compressive
b) σ_1 is compressive and σ_3 is tensile
c) σ_1 and σ_3 are equal
d) σ_1 and σ_3 are both tensile

15) The geoid can be best defined as (GATE GG 2018)

a) an oblate spheroid that best approximates the shape of the earth
b) a surface over which the value of gravity is constant
c) the physical surface of the earth
d) an equipotential surface of gravity of the earth

16) For a layered isotropic medium with a flat horizontal free surface, match the wave types listed in Group-I with their corresponding polarizations in Group-II. (GATE GG 2018)

Group I	**Group II**
(P) P-waves	particle motion is transverse to the direction of wave propagation
(Q) Q-waves	particle motion is transverse to the direction of wave propagation and confined to the horizontal plane
(R) Rayleigh waves	particle motion is parallel to the direction of wave propagation
(S) Love waves	particle motion is elliptical

a) P-1; Q-3; R-4; S-2
b) P-3; Q-1; R-4; S-2
c) P-3; Q-1; R-2; S-4
d) P-2; Q-3; R-1; S-4

17) A ′gentle′ fold with an interlimb angle equal to 160° appears tight (apparent interlimb angle equal to 20°) in horizontal section. According to the plunge of the fold axis, it can also be classified as (GATE GG 2018)

a) horizontal fold
b) gently plunging fold
c) steeply plunging fold
d) vertical fold

18) The unit of shear modulus (rigidity modulus) is (GATE GG 2018)

a) kg $m^{-1}s^{-2}$
b) m^2 s^{-2}
c) kg m^{-2} s^{-2}
d) m^{-1}

19) With increasing activity of silica, the CORRECT order of appearance of minerals in a weathering environment with constant ratio of activities of K^+ and H^+ is (GATE GG 2018)

a) gibbsite → kaolinite → pyrophyllite
b) gibbsite → pyrophyllite → kaolinite
c) kaolinite → gibbsite → pyrophyllite
d) pyrophyllite → gibbsite → kaolinite

20) Match the items listed in Group-I with those in Group-II. (GATE GG 2018)

Group I	**Group II**
(P) Mica	1.Beldih
(Q) Uranium	2.Koderma
(R) Phosphate	3.Agucha
(S) Zinc	4.Gochi

a) P-2, Q-3, R-4, S-1
b) P-2, Q-4, R-1, S-3
c) P-4, Q-2, R-3, S-1
d) P-3, Q-1, R-4, S-2

21) Which one of the following corrections is always added during reduction of the observed gravity data? (GATE GG 2018)

a) Latitude b) Free-air c) Bouguer d) Terrain

22) The magnitudes of the total geomagnetic field at the equator and pole are denoted by B_E and B_P, respectively. Which one of the following is TRUE? (GATE GG 2018)

a) $B_P \approx 4B_E$
b) $B_P \approx 2B_E$
c) $B_P \approx B_E$
d) $B_P \approx \frac{1}{2}B_E$

23) Assume a flat earth with crustal thickness of 35 km and average crustal and upper mantle P-wave velocities of 6.4 km/s and 8.1 km/s, respectively. The minimum distance from the epicenter of a near-surface earthquake at which P_n-waves are observed is _____ km. (GATE GG 2018)

24) Given that the velocity of P-waves in a sandstone matrix is 5600 m/s and that in oil is 1200 m/s, the velocity of P-wave propagation in oil-saturated sandstone with 30% porosity is _____ m/s. (Use Wyllie time average equation.) (GATE GG 2018)

25) If the total porosity of a soil is 20%, its void ratio (%) is _____ (GATE GG 2018)

PART B(SECTION 1):FOR GEOLOGY CANDIDATES ONLY

26) Which one of the following Himalayan lithounits predates India-Eurasia collision? (GATE GG 2018)

a) Kasauli sandstone
b) Rangit Pebble Slate
c) Annapurna granite
d) Lower Karewa sandstone

27) Which one of the following ore minerals shows internal reflection? (GATE GG 2018)

a) Orpiment b) Magnetite c) Pyrite d) Molybdenite

28) Which one is CORRECT for the following equilibrium reaction between quartz and magnetite:
$Si^{16}O^{16}O + Fe_3^{16}O_3^{18}O = Si^{16}O^{18}O + Fe_3^{16}O_4$? (GATE GG 2018)

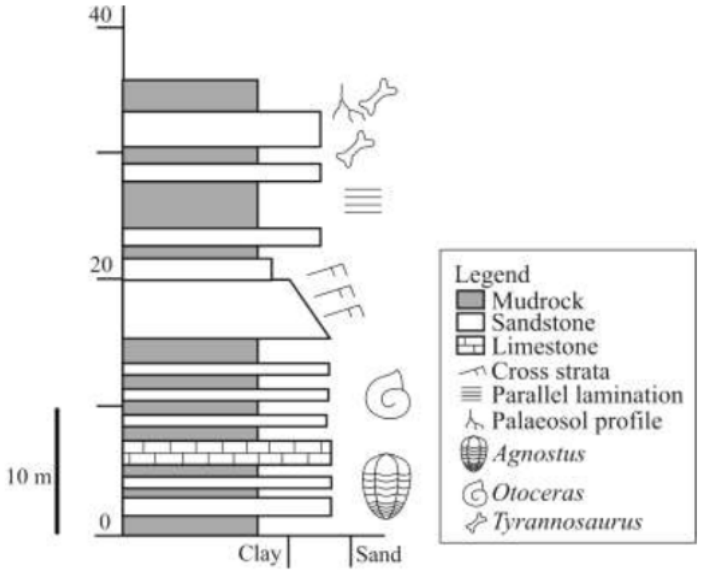
a) $1000 \ln \alpha = \Delta_{\text{qtz-mag}},\ \alpha = K^{1/n}$ (K equilibrium constant at specified T, n constant)
b) $1000 \ln \alpha = \Delta_{\text{qtz-mag}},\ \alpha = K^{n}$ (K equilibrium constant, n = no. of exchangeable sites)
c) $(\ln \alpha / 1000) = \Delta_{\text{qtz-mag}},\ \alpha = K^{1/n}$ (K equilibrium constant, n constant)
d) $1000 \ln \alpha = \Delta_{\text{qtz-mag}},\ \alpha = K^{1/n}$ (K equilibrium constant, n = no. of exchangeable sites)

29) Match the modes of life (Group I) with the corresponding bivalve genera (Group II) (GATE GG 2018)

Group I	**Group II**
(P) Burrowing	1. (1) Mytilus
(Q) Recumbent unattached	2. Pecten
(R) Byssally attached	(3) Mya
(S) Swimming	4. Gryphaea

a) P-4, Q-3, R-2, S-1
b) P-3, Q-4, R-1, S-2
c) P-2, Q-3, R-1, S-4
d) P-3, Q-1, R-4, S-2

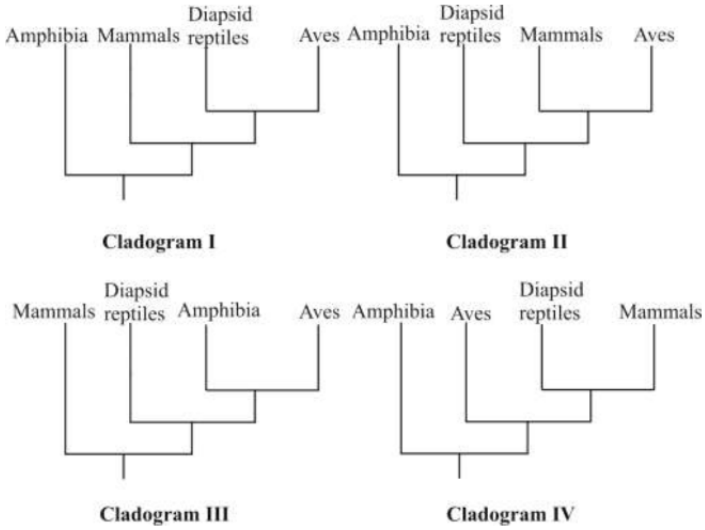
30) Based on the hypothetical litholog continuous succession of sedimentary rocks , which one statement is CORRECT?



(GATE GG 2018)

a) Cambrian to Cretaceous, change from marine → continental
b) Cambrian to Triassic, change from marine → continental
c) Cambrian to Cretaceous, change from continental → marine
d) Palaeozoic in age, change from marine → continental

31) Which cladogram shows the CORRECT interrelationships among the major groups of vertebrates?



(GATE GG 2018)

a) Cladogram I b) Cladogram II c) Cladogram III d) Cladogram IV

32) Which one of the following stratigraphic successions is in the CORRECT chronological order (older to younger)? (GATE GG 2018)

a) Rajmahal, Dubrajpur, Barakar
b) Fenestella Shale, Muth Quartzite, Syringothyris Limestone
c) Bagh Bed, Lameta Formation, Deccan Traps
d) Singhbhum Granite, Kolhan Group, Older Metamorphic Gneiss

33) Match the items in Group I with Group II (GATE GG 2018)

Group I	**Group II**
(P) Peloids	(1) Nucleus with irregular laminae
(Q) Ooids	(2) Micritic grains no structure
(R) Oncoids	(3) Rounded grains thin micrite coating
(S) Cortoids	(4) Spherical grains concentric laminae

a) P-3, Q-1, R-4, S-2
b) P-2, Q-4, R-1, S-3
c) P-3, Q-4, R-1, S-2
d) P-2, Q-3, R-4, S-1

34) Which one of the following is an image rectification technique? (GATE GG 2018)

a) Histogram equalization
b) Density slicing
c) Histogram normalization
d) Rubbersheeting

35) Match Group I with Group II. (GATE GG 2018)

Group I	**Group II**
(P) Coefficient of compressibility of soils	(1) Brazilian test
(Q) Method of slope stabilization	(2) Overcoring
(R) In situ stress determination	(3) Oedometer test
(S) Indirect tensile strength of rocks	(4) Shotcreting

a) P-4, Q-2, R-3, S-1
b) P-1, Q-4, R-2, S-3
c) P-3, Q-2, R-1, S-4
d) P-3, Q-4, R-2, S-1

36) Match the items listed in Group I with those listed in Group II. (GATE GG 2018)

Group I	**Group II**
(P) Crevasse	(1) River
(Q) Yardang	(2) Groundwater
(R) Mesa	(3) Wind
(S) Stalactite	(4) Glacier

a) P-4, Q-3, R-1, S-2
b) P-3, Q-1, R-4, S-2
c) P-4, Q-2, R-3, S-1
d) P-1, Q-2, R-3, S-4

37) In the hypothetical isobaric ternary liquids projection diagram shown, solid phases A, B, C, D and E exist in equilibrium with liquid. The reaction taking place at the isobaric invariant point W is (GATE GG 2018)

a) Liquid (at W) = B + D + E
b) Liquid (at W) = A + B + D
c) Liquid (at W) + E = B + D
d) Liquid (at W) + B + D = E

38) Match the optical properties (Group I) with the corresponding mineral (Group II). (GATE GG 2018)

Group I	**Group II**
P. Brown colour, very high RI, very high birefringence, biaxial positive	(1) Apatite
Q. Colourless, very high RI, low birefringence, uniaxial negative	(2) Rutile
R. Deep reddish-brown, very high RI, very high birefringence, uniaxial positive	(3) Zircon
S. Colourless, very high RI, very high birefringence, uniaxial positive	(4) Titanite

a) P-4, Q-1, R-2, S-3
b) P-1, Q-2, R-4, S-3
c) P-3, Q-4, R-1, S-2
d) P-4, Q-1, R-3, S-2

39) The reaction muscovite + quartz = K-feldspar + sillimanite + water (GATE GG 2018)

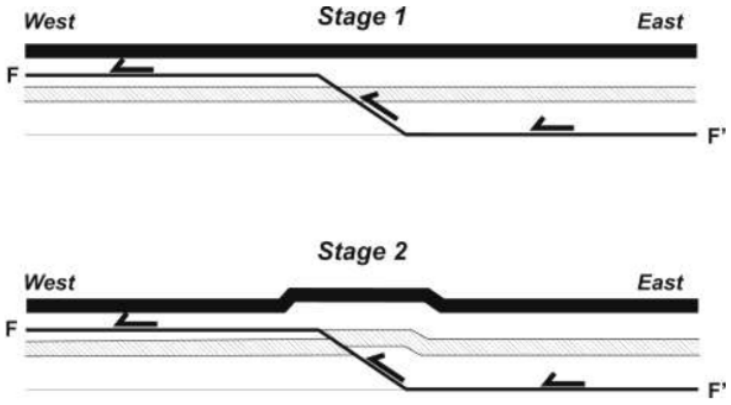
a) takes place within the greenschist facies
b) takes place within the amphibolite facies
c) takes place within the eclogite facies
d) takes place within the granulite facies

40) Match the mineral assemblages (Group I) with rock types (Group II). (GATE GG 2018)

Group I	**Group II**
(P) Diopside-tremolite-forsterite	1. Pelite (low P, high T)
(Q) Talc-phengite-kyanite	(2) Metabasite (low P, high T)
(R) Hornblende-cummingtonite-plagioclase	(3) Calc-silicate (moderate P, T)
(S) Andalusite-cordierite-biotite	(4) Pelite (high P, low T)

a) P-3, Q-4, R-1, S-2
b) P-1, Q-2, R-4, S-3
c) P-3, Q-4, R-2, S-1
d) P-1, Q-2, R-3, S-4

41) The figure shows the initial stages of development of a thrust fault (FF) with ramp and flat geometry, moving east to west. With respect to synform and antiform in Stage 2, the next increment of movement will: (GATE GG 2018)



a) Both synform and antiform move westward
b) Synform stays, antiform amplitude grows
c) Both synform and antiform amplitudes grow
d) Geometry remains unchanged

42) Which one of the following is the CORRECT chronological sequence for Iron formations? (GATE GG 2018)
a) Algoma type > Superior type > Rapitan type > Minette type
b) Superior type > Algoma type > Rapitan type > Minette type
c) Rapitan type > Minette type > Algoma type > Superior type
d) Algoma type > Minette type > Superior type > Rapitan type

43) Assertion (a): High-temperature, low-pressure metamorphism occurs on the over-riding plate near convergent plate margins. Reason (r): Partial melting in the mantle wedge generates magmas that rise to form the arc. (GATE GG 2018)
a) (a) true, (r) false
b) (a) false, (r) true
c) Both true and (r) is correct reason
d) Both true but (r) not the correct reason

44) Two coeval aqueous biphase fluid inclusions X (liquid-rich) and Y (vapour-rich) occur in the same grain. Which indicates boiling? (GATE GG 2018)
a) X homogenizes to liquid and Y homogenizes to a vapour at different temperatures.
b) Both homogenizes to liquid at same temperatures.
c) Both homogenizes to liquid at same temperatures.
d) X homogenizes to liquid and Y homogenizes to a vapour at same temperatures

45) During bench blasting in a quarry, 50 kg of explosive with yield of 5 MJ/kg is required to break 100 m^3 of marble. The energy expended per unit volume of marble in MN/m^2 is _____ (GATE GG 2018)

46) The stretching lineation on the axial plane (S2) of a reclined fold on the S1 foliation makes an angle of 30° with the S1/S2 intersection lineation. The rake of the stretching lineation on the axial plane in degrees is _____ (GATE GG 2018)

47) A basaltic magma has an initial nickel concentration of 300 ppm. Olivine crystallizes from this magma by equilibrium crystallization (Case I)or fractional crystallization (Case II). Then, the absolute value of the difference between the nickel concentrations of the liquids remaining after 25% crystallization in these two cases is _____. (Use $K_{D,Ni}$olivine/melt = 10). (GATE GG 2018)

48) The difference in the number of faces in forms {*hkl*} and {111} in the holosymmetric class of the isometric system is _____ (GATE GG 2018)

49) An inclined cylindrical confined aquifer has coefficient of permeability of 40 m/day. The horizontal distance between two vertical wells penetrating the aquifer is 800 m. The water surface elevations in the wells are 50 m and 45 m above a common horizontal datum. The absolute value of Darcy flux through the aquifer is _____ m/day. (GATE GG 2018)

50) The mass and volume of a natural soil sample are 2.1 kg and 1×10^{-3} m^3, respectively. When fully dried, the mass of the soil sample becomes 2 kg without any change in volume. Assuming the specific gravity of soil particles to be 2.5, and water density of 1000 kg/m^3, the degree of saturation of the natural soil sample is _____% . (GATE GG 2018)

51) For a granitic rock mass, joint set number (Jn) = 9, joint water reduction factor (Jw)= 1, joint alteration number (Ja) = 1, stress reduction factor (SRF) = 1, rock quality designation (%) = 84, and joint roughness number (**Jr**) = 3. The Q-value as per Barton′s Q-system of rock mass classification (1974) is (GATE GG 2018)

52) A sun synchronous satellite is at an altitude of 300 km and the spectrometer makes an angular coverage angle of 12°. The Swath (GFOV) of the satellite is _____ km. (GATE GG 2018)

53) The stability field boundary between two minerals A and B is linear with a positive slope in P-T space. The molar entropy of A and B are 85.5 and 92.5 J K^{-1} respectively, and their respective molar volumes are 35.5 and 38.2 cc. The slope of the phase boundary in P-T space is _____ bar K^{-1}. (GATE GG 2018)

54) Five moles of gas A (volume V_1) and three moles of gas B (volume V_2) were kept in two separate containers. These two gases are completely transferred to a new container of volume V. Assuming isothermal conditions and that the work done is only mechanical, the entropy change of the system is _____ J K^{-1}. (R = 8.3 J K^{-1} mol^{-1}) (GATE GG 2018)

55) The value of Eh corresponding to the upper limit of natural surface aqueous environment at pH = 8.0 is _____ V. (GATE GG 2018)

PART B(SECTION 2):FOR GEOPHYSICS CANDIDATES ONLY

56) The maximum number of linearly independent rows of an $m \times n$ matrix G where $m > n$ is (GATE GG 2018)

a) m
b) n
c) $m - n$
d) 0

57) The impulse response of the Kirchhoff pre-stack time migration operator for non-zero offsets in a homogeneous and isotropic medium is (GATE GG 2018)

a) a circle
b) a parabola
c) a hyperbola
d) an ellipse

58) A solution to the eikonal equation $|\nabla\tau| = \frac{1}{v_0}$ for a homogeneous and isotropic medium in Cartesian coordinates is (GATE GG 2018)

a) $\tau = \dfrac{\sqrt{x^2 + y^2 + z^2}}{v_0}$
b) $\tau = \dfrac{1}{v_0}$
c) $\tau = \dfrac{x + y + z}{v_0}$
d) $\tau = \dfrac{xyz}{v_0}$

59) The forward Fourier transform is $F(\omega) = \int_{-\infty}^{\infty} f(t)e^{-i\omega t}dt$ and the inverse Fourier transform is $f(t) = \int_{-\infty}^{\infty} F(\omega)e^{i\omega t}d\omega$. Then, the forward Fourier transform of $F(\omega) = e^{-2i\omega}$ is (GATE GG 2018)

a) $2\delta(t)$ b) $\delta(2t)$ c) $\delta(t + 2)$ d) $\delta(t - 2)$

60) Which one of the following rock types has the highest bulk magnetic susceptibility value? (GATE GG 2018)

a) Gabbro
b) Marble
c) Orthoquartzite
d) Limestone

61) Figure 1 is a schematic of seismic events in t-x(time-offset) domain and Figure 2 is the corresponding transformation to f-kx (frequency-horizontal wavenumber) domain. Match events in Figure 1 with those in Figure 2. (GATE GG 2018)

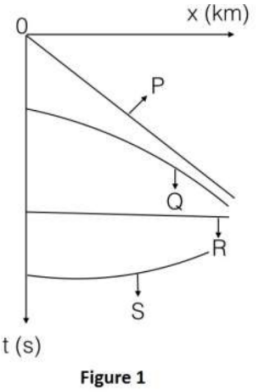


Figure 1

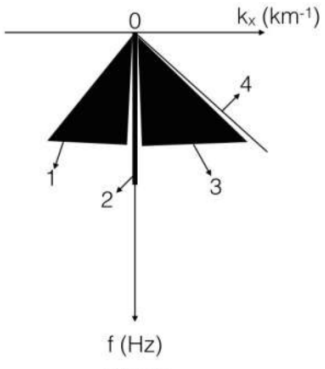


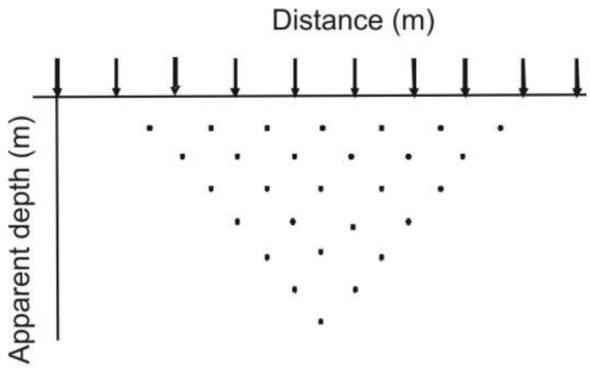
Figure 2

a) P-1; Q-2; R-3; S-4
b) P-1; Q-3; R-2; S-4
c) P-4; Q-3; R-2; S-1
d) P-4; Q-2; R-3; S-1

62) Across the Gutenberg discontinuity (from mantle to outer core) there is a change of bulk modulus and density. Which one of the following is CORRECT? (GATE GG 2018)

a) Both bulk modulus and density increase
b) Both bulk modulus and density decrease
c) Bulk modulus decreases and density increases
d) Bulk modulus increases and density decreases

63) Multi-electrode resistivity survey is carried out with 10 equispaced electrodes. (denoted by arrows in the figure below) Considering the mid-point of the 4-electrode array as the point of observation laterally, identify the CORRECT configuration. (GATE GG 2018)



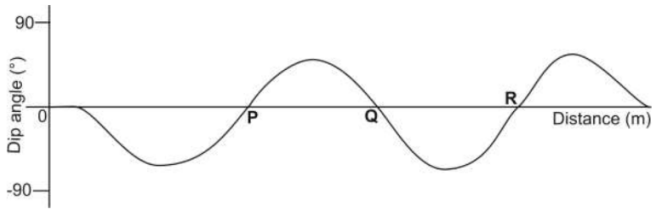
a) Multi-electrode Wenner array
b) Multi-electrode Axial Dipole-dipole array
c) Multi-electrode Wenner-Schlumberger array
d) Multi-electrode Axial Pole-dipole array

64) Match the electromagnetic methods in Group I with the corresponding quantities measured in Group II. . (GATE GG 2018)

Group I	**Group II**
(P) AFMAG method	1.Decay of secondary field
Q) Time domain EM	2.Real and imaginary components
(R) TURAM	3.Dip angle
(S) Slingram	Amplitude ratio and phase difference
	5.Ellipticity of polarization ellipse

a) P-3; Q-2; R-4; S-5
b) P-2; Q-1; R-4; S-3
c) P-3; Q-1; R-4; S-2
d) P-1; Q-2; R-5; S-3

65) Dip angle electromagnetic response measured along a profile over multiple conductors is shown. Which crossover points P, Q and R indicate CORRECT conductor locations? (GATE GG 2018)



a) P, Q and R
b) Q and R
c) P and R
d) P and Q

66) The effect of small scale near surface inhomogeneities can be removed from magnetic data by (GATE GG 2018)

a) upward continuation
b) downward continuation
c) second vertical derivative
d) reduction to pole

67) The frequencies of the primary magnetic field generated by worldwide thunderstorm activity vary in the range (GATE GG 2018)

a) 10^{-6} Hz - 10^{-3} Hz
b) 10^{-3} Hz - 1 Hz
c) 1 Hz - 10^{3} Hz
d) 10^{3} Hz - 10^{6} Hz

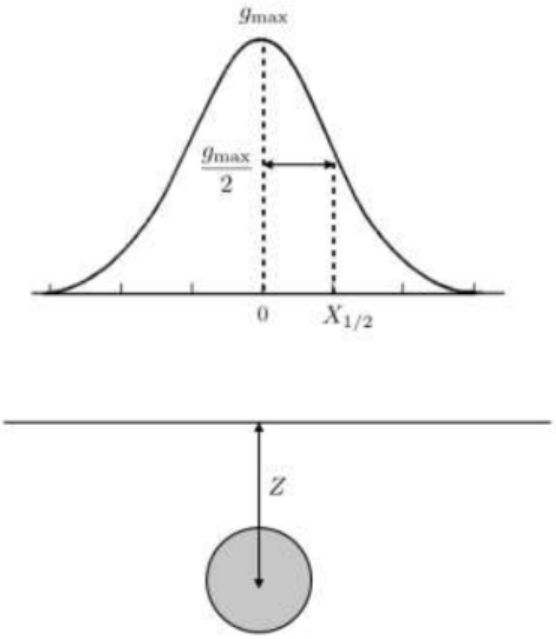
68) Assertion (a): The Static Self-Potential for a thick, clean freshwater bearing sandstone formation is positive.
Reason (r): Resistivity of the formation water is less than the resistivity of salt water mud-filtrate. (GATE GG 2018)
a) Both (a) and (r) are true and (r) is the correct reason
b) Both (a) and (r) are true and (r) is not the correct reason
c) Both (a) and (r) are false
d) (a) is true but (r) is false

69) Which one of the following well log responses characterizes an overpressured zone in the subsurface? (GATE GG 2018)
a) High velocity and high resistivity
b) Low velocity and low density
c) High velocity and low resistivity
d) Low velocity and high density

70) The angle of inclination of the remanent magnetization measured on a basalt flow at a location P (28°N 85°E) is 40°. The palaeomagnetic latitude of the basalt flow is _____ °N. (GATE GG 2018)

71) Using the Gutenberg-Richter recurrence relationship, the mean annual rate of exceedance of earthquake occurrence in a seismic belt is 0.3 per year for an earthquake of magnitude 6.0. The return period for an earthquake of magnitude 6.0 in this belt is _____ years. (GATE GG 2018)

72) In the figure, Z denotes the depth to the center of a buried sphere from the surface and $X_{1/2}$ denotes the half-width of the profile at half the maximum gravity value. The ratio $Z/X_{1/2}$ _____ is . (GATE GG 2018)



73) Two survey vessels with shipborne gravimeters are cruising towards each other at 6 knots each along an E-W course. The difference in gravity readings of the two gravimeters is 63.5 mGal when they cross. The latitude along which they are cruising is _____°N. (GATE GG 2018)

74) A gravity reading is taken in a stationary helicopter hovering 1 km above mean sea level at a location. The difference in the value of g measured in the helicopter and at mean sea level beneath it is _____ mGal. (GATE GG 2018)

75) The P-wave velocity and Poisson′s ratio for a homogeneous isotropic sedimentary rock are 2500 m/s and 0.3, respectively. The S-wave velocity for the rock is _____ m/s. (GATE GG 2018)

76) A plane electromagnetic (EM) wave travelling vertically downwards with a frequency of 1000 Hz in a homogeneous medium has a skin depth of 100 m. The ratio of the amplitude of the EM wave at a depth of 75 m with respect to the amplitude at the Earth′s surface is C. (GATE GG 2018)

77) A student interpreted a four-layer Schlumberger resistivity sounding dataset with resistivities and thicknesses: $\rho_1 = 100\,\Omega m$, $\rho_2 = 20\,\Omega m$, $\rho_3 = 1500\,\Omega m$, $\rho_4 = 50\,\Omega m$, $h_1 = 50$ m, $h_2 = 10$ m, $h_3 = 20$ m. Another student interprets the same data with $\rho_3 = 2000\,\Omega m$.According to the principle of equivalence, the value of h_3 for the second interpretation is _____ m. (GATE GG 2018)

78) The apparent resistivities obtained at 0.1 Hz and 10 Hz in a frequency domain I.P. measurement are 100 Ωm and 80 Ωm, respectively. The percentage frequency effect is _____. (GATE GG 2018)

79) A 15 V power supply is applied across a cylindrical container (diameter = 0.20 m, length = 0.50 m). Currents measured: 750 mA (brine only), 500 mA (rock sample fully saturated with brine). The formation factor of the rock sample is _____. (GATE GG 2018)

80) The ratio of the number of daughter nuclides to parent nuclides after a decay period of 3 half-lives is _____. (GATE GG 2018)

81) Consider a laterally homogeneous and isotropic earth model with a flat horizontal surface and three horizontal layers underlain by a half-space. A seismic reflection survey was simulated on this model with the sources and receivers placed on the surface. The table below lists the root mean square (rms) velocities, Vrms, and zero-offset two-way traveltimes to for the three reflection events from the bottom of each of the three layers observed in a pre-stack CDP (CMP) gather. The interval velocity of the second layer is m/s. (GATE GG 2018)

Reflection Event	V_{rms}	t_0
1	1500 m/s	0.2 s
2	1600 m/s	0.3 s
3	1700 m/s	0.4 s

82) A spherically symmetric vector field $\mathbf{g}(r)$ satisfies $\nabla \cdot \mathbf{g}(r) = -r$. The flux of the vector field through a sphere of unit radius is _____ .(Use $\pi = 3.14$) (GATE GG 2018)

83) A horizontally travelling surface wave with wavelength 20 m is attenuated by a linear uniform array of 4 receivers. The minimum receiver spacing is _____ m. (GATE GG 2018)

84) An end-on marine survey is carried out with equal shot and receiver spacing.If the total number of shots fired is 50 and the total number of traces recorded is 10000, the maximum fold of the survey is _____ (GATE GG 2018)

85) The highest singular value of the matrix $G = \begin{pmatrix} 1 & 2 & 1 \\ -1 & 2 & 0 \end{pmatrix}$ is _____. (GATE GG 2018)

END OF THE QUESTION PAPER