ASSIGNMENT 3: GATE 2016
GG : Geology and Geophysics

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1) The volume of a sphere of diameter 1 unit is _____ than the volume of a cube of side 1 unit.

(GATE GG 2016)

a) least b) less c) lesser d) low

2) The unruly crowd demanded that the accused be _____ without trial.

(GATE GG 2016)

a) hanged b) hanging c) hankering d) hung

3) Choose the statement(s) where the underlined word is used correctly:
(i) A prone is a dried plum. (ii) He was lying prone on the floor. (iii) People who eat a lot of fat are prone to heart disease.

(GATE GG 2016)

a) (i) and (iii) only
b) (iii) only
c) (i) and (ii) only
d) (ii) and (iii) only

4) Fact: If it rains, then the field is wet.
Read the following statements:
(i) It rains
(ii) The field is not wet
(iii) The field is wet
(iv) It did not rain

Which one of the options given below is NOT logically possible, based on the given fact?

(GATE GG 2016)

a) If (iii), then (iv).
b) If (i), then (iii).
c) If (i), then (ii).
d) If (ii), then (iv).

5) A window is made up of a square portion and an equilateral triangle portion above it. The base of the triangular portion coincides with the upper side of the square. If the perimeter of the window is 6 m, the area of the window in m^2 is _____.

(GATE GG 2016)

a) 1.43 b) 2.06 c) 2.68 d) 2.88

Q.6 - Q.10 carry two marks each.

6) Students taking an exam are divided into two groups, P and Q such that each group has the same number of students. The performance of each of the students in a test was evaluated out of 200 marks. It was observed that the mean of group P was 105, while that of group Q was 85. The standard deviation of group P was 25, while that of group Q was 5. Assuming that the marks were distributed on a normal distribution, which of the following statements will have the highest probability of being TRUE?

(GATE GG 2016)

a) No student in group Q scored less marks than any student in group P.
b) No student in group P scored less marks than any student in group Q.
c) Most students of group Q scored marks in a narrower range than students in group P.
d) The median of the marks of group P is 100.

7) A smart city integrates all modes of transport, uses clean energy and promotes sustainable use of resources. It also uses technology to ensure safety and security of the city, something which critics argue, will lead to a surveillance state.
Which of the following can be logically inferred from the above paragraph?
(i) All smart cities encourage the formation of surveillance states.
(ii) Surveillance is an integral part of a smart city.
(iii) Sustainability and surveillance go hand in hand in a smart city.
(iv) There is a perception that smart cities promote surveillance.

(GATE GG 2016)

a) (i) and (iv) only
b) (ii) and (iii) only
c) (iv) only
d) (i) only

8) Find the missing sequence in the letter series.
B, FH, LNP, _ _ _ _.

(GATE GG 2016)

a) SUWY
b) TUVW
c) TVXZ
d) TWXZ

9) The binary operation $\square$ is defined as $a \square b = ab + (a + b)$, where a and b are any two real numbers. The value of the identity element of this operation, defined as the number x such that $a \square x = a$, for any a, is _ _ _ _ _ _.

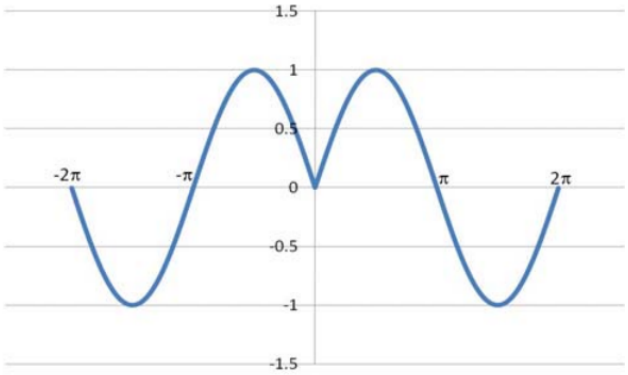
(GATE GG 2016)

a) 0
b) 1
c) 2
d) 10

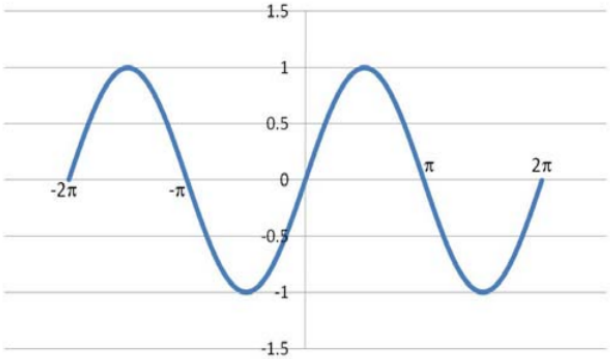
10) Which of the following curves represents the function $y = \ln\left(\left|e^{|\sin(|x|)|}\right|\right)$ for $|x| < 2\pi$? Here, x represents the abscissa and y represents the ordinate.

(GATE GG 2016)

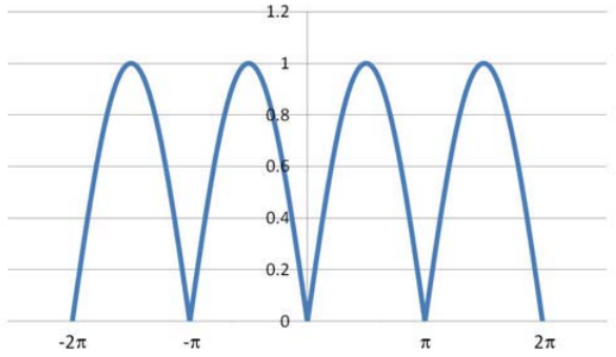
a)



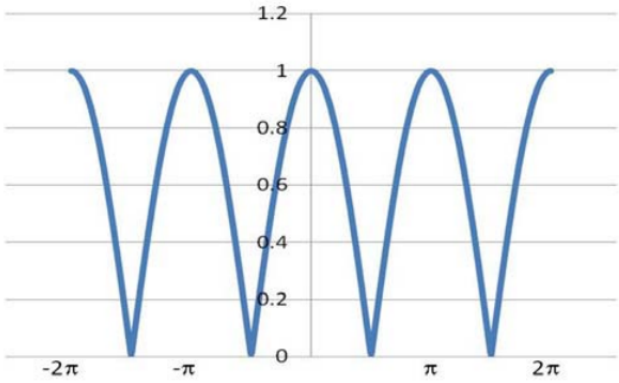
b)



c)



d)



11) Which one of the following is a chronostratigraphic unit?

(GATE GG 2016)

a) Eon b) Period c) Era d) System

12) _____ is a well-sorted sandstone containing up to 75% quartz, with rock fragments in excess of feldspar.

(GATE GG 2016)

a) Arkose b) Lithic arenite c) Quartz arenite d) Feldspathic arenite

13) International Geomagnetic Reference Field (IGRF) is used in processing regional magnetic data

(GATE GG 2016)

a) to remove the secular variation of the geomagnetic field.
b) to remove the diurnal variation of the geomagnetic field.
c) to remove the latitudinal variation of the geomagnetic field.
d) to remove the terrain effect.

14) Which one of the following layers of the Earth has the largest volume?

(GATE GG 2016)

a) Upper Mantle b) Lower Mantle c) Outer core d) Inner Core

15) The S-wave shadow zone of the Earth ranges from _____.

(GATE GG 2016)

a) 103° to 180° b) 103° to 160° c) 103° to 153° d) 103° to 143°

16) According to Airy's model, gravity anomalies for fully isostatically compensated topography are characterized by

(GATE GG 2016)

a) negative Bouguer anomaly and positive free-air anomaly.
b) positive Bouguer anomaly and negative free-air anomaly.
c) zero Bouguer anomaly and negative free-air anomaly.
d) positive Bouguer anomaly and zero free-air anomaly.

17) Match the metals (listed in Group I) with the localities of their deposits (listed in Group II).

Group I	**Group II**
P. Iron	1. Boula
Q. Zinc	2. Gadag
R. Gold	3. Bellary
S. Chromium	4. Agucha

(GATE GG 2016)

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

18) In a region, given the palaeomagnetic inclination (I_R), the palaeolatitude (λ_R) can be calculated using the formula _____.

(GATE GG 2016)

a) $\cos \lambda\_R = \sin I\_R$
b) $\tan \lambda\_R = \tan I\_R$
c) $\tan \lambda\_R = \frac{1}{2} \tan I\_R$
d) $\sin \lambda\_R = 2 \cos I\_R$

19) Which one of the following parent–daughter systems has the longest half life?

(GATE GG 2016)

a) $^{147}\text{Sm} \rightarrow ^{143}\text{Nd}$
b) $^{40}\text{K} \rightarrow ^{40}\text{Ar}$
c) $^{87}\text{Rb} \rightarrow ^{87}\text{Sr}$
d) $^{187}\text{Re} \rightarrow ^{187}\text{Os}$

20) For a soil, Liquidity Index = (Natural Water Content – X) / Plasticity Index. Here, X is

(GATE GG 2016)

a) Shrinkage Limit
b) Plastic Limit
c) Liquid Limit
d) Activity

21) Match the following features (listed in Group I) with the different agents of erosion (listed in Group II).

Group I	**Group II**
P. Earth pillar	1. River
Q. Fjord	2. Wind
R. Pot hole	3. Glacier
S. Yardang	4. Rain

(GATE GG 2016)

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

22) Match the parameters listed in Group I with the units listed in Group II.

Group I	**Group II**
P. Hydraulic conductivity	1. Newton sec./m^2
Q. Permeability	2. m/sec
R. Viscosity	3. m
S. Hydraulic head	4. m^2

(GATE GG 2016)

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

23) In digital remote sensing, land–water contrast is best identified in the _____ wavelength band.
(GATE GG 2016)

a) Ultraviolet b) Near IR c) Middle IR d) Thermal IR

24) Which one of the following rocks has the highest magnetic susceptibility value?
(GATE GG 2016)

a) Quartzite b) Limestone c) Gabbro d) Shale

25) In which one of the following electromagnetic methods is the rate of change of secondary field recorded?
(GATE GG 2016)

a) Very Low Frequency method
b) Time-domain EM method
c) Magnetotelluric method
d) TURAM method

26) A Wenner array with 60 m spacing between current electrodes is placed over an inhomogeneous ground. If the measured potential difference and current flow in subsurface are $10mV$ and $5mA$, respectively, the apparent resistivity will be _____ Ωm. (Use $\pi = 3.14$)
(GATE GG 2016)

27) Which one of the following geophysical methods is most suitable for the exploration of a horizontally stratified graphite deposit at a depth of 50 m?
(GATE GG 2016)

a) Gravity b) Magnetic c) Radiometric d) Electromagnetic

28) Which one of the following logging techniques is most suitable to detect a shale layer sandwiched between two sandstone layers?
(GATE GG 2016)

a) Neutron-Gamma b) Gamma-Gamma c) Natural Gamma d) Sonic

29) The following schematic diagram is a plan view of three oceanic plates forming a stable triple junction on a flat earth. Plate A subducts below Plate C normal to the plate boundary, while the contact between Plates A and B is a transform fault, as indicated. The boundary between Plates B and C is a _____.
(GATE GG 2016)

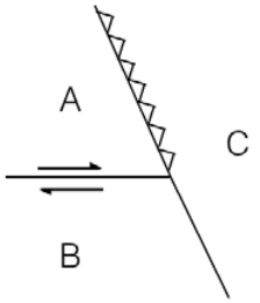


Fig. 1

a) mid-oceanic ridge
b) subduction zone
c) sinistral transform fault
d) dextral transform fault

30) In Gondwanaland reconstructions, much of the present west coast of India is placed adjacent to _____.
(GATE GG 2016)

a) South America b) Madagascar c) Antarctica d) Australia

31) Two vertically dipping limbs of a fold have perpendicular strikes. The fold can be classified as _____.
(GATE GG 2016)

a) an antiformal fold b) a synformal fold c) a vertical fold d) a recumbent fold

32) Match the crystal forms (listed in Group I) with their corresponding number of faces (listed in Group II).

Group I	**Group II**
P. Cube	1. Two
Q. Tetrahedron	2. Four
R. Pinacoid	3. Six
S. Dodecahedron	4. Twelve

(GATE GG 2016)

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

33) Match the rocks in Group I with their essential mineral assemblages in Group II.

Group I	**Group II**
P. Granodiorite	1. Hornblende-plagioclase
Q. Harzburgite	2. Plagioclase-quartz
R. Gabbro	3. Olivine-orthopyroxene
S. Diorite	4. Clinopyroxene-plagioclase

(GATE GG 2016)

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

34) Which one of the following mineral assemblages is stable under eclogite facies conditions?
(GATE GG 2016)

a) Garnet-orthopyroxene-clinopyroxene-plagioclase
b) Garnet-clinopyroxene-plagioclase-kyanite
c) Garnet-orthopyroxene-hornblende-plagioclase
d) Garnet-clinopyroxene-kyanite-quartz

Geology(section - 1) : Optional Section

35) Select the CORRECT statement from the following options.

(GATE GG 2016)

a) Hogback is an isolated tableland with sides that are usually steep.
b) Crevasses are deposits of glacial origin.
c) Loess comprises pebbles of rocks or minerals with some plane faces formed by wind abrasion.
d) Loamy soil is a mixture of sand and clay.

36) Match the following patterns (listed in Group I) with their appropriate Cephalopod sutures (listed in Group II). Arrow gives the direction of aperture.

(GATE GG 2016)

Group I	**Group II**
P. 	1.Ceratitic
Q. 	2.Nautilitic
R. 	3. Goniatitic
S. 	4.Orthoceratitic

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

37) Match the following test composition (listed in Group I) with the microfossil taxa (listed in Group II).

(GATE GG 2016)

Group I	**Group II**
P. Organic-walled	Radiolaria
Q. Siliceous	2. Conodont
R. Phosphatic	3. Foraminifera
S. Calcareous	4. Acritarch

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

38) Which one of the following statements is CORRECT?

(GATE GG 2016)

a) Movement of the shoreline seaward is transgression.
b) No movement of the shoreline is transgression.
c) Movement of the shoreline seaward as a result of sea-level fall is forced regression.
d) Movement of the shoreline landward is regression.

39) Mud-supported limestone containing greater than 10% allochems is called

(GATE GG 2016)

a) Packstone b) Wackestone c) Grainstone d) Mudstone

40) At a depth of 500 m, the determined in-situ stresses in a rock mass are as follows: maximum horizontal stress = 20 MPa, minimum horizontal stress = 8 MPa and vertical stress = 13.5 MPa. Assuming the principal stress directions to be vertical and horizontal, if this compressive stress field leads to faulting, the plausible fault type would be

(GATE GG 2016)

a) Normal fault
b) Reverse fault
c) Strike-slip fault
d) Detachment fault

41) The following litholog represents fossil occurrences (figure). The biostratigraphic zone represented by the assemblage is.

(GATE GG 2016)

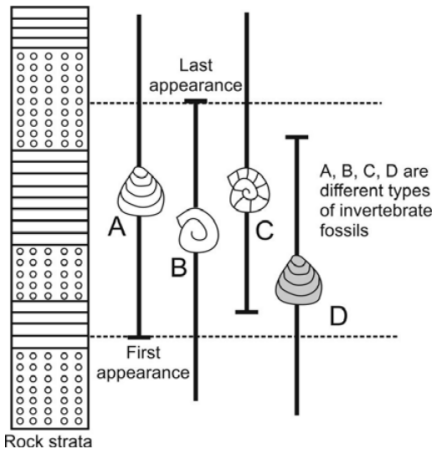


Fig. 2

a) Assemblage Zone
b) Taxon Range Zone
c) Consecutive Range Zone
d) Acme Zone

42) Which one of the following stratigraphic successions is in the correct chronological order (oldest at bottom)?

(GATE GG 2016)

a) Iron Ore Group, Older Metamorphic Group, Kolhan Group
b) Chitradurga Group, Sargur Group, Bababudan Group
c) Jharol Group, Alwar Group, Ajabgarh Group

d) Chitravati Group, Papaghni Group, Kurnool Group

43) Water content is 10%, total porosity is 25% and specific gravity of solid grains is 2.5. The volume of water required to be added to 100 m^3 of the wet soil to make it fully saturated is m^3.

(GATE GG 2016)

44) In a zone of superposed folding, poles to bedding plot as a great circle on the stereonet. For such a case, the fold axes related to the first generation of folds will:

(GATE GG 2016)

a) be parallel to the great circle.
b) lie on the great circle at its intersections with the primitive circle.
c) lie at the poles to the great circle.
d) be randomly distributed.

45) For horizontal flow in a fully saturated aquifer, the product of hydraulic conductivity and aquifer thickness is called the

(GATE GG 2016)

a) specific yield
b) transmissivity
c) coefficient of storage
d) seepage force

46) If a rectangle is deformed into a parallelogram of equal area by simple shear deformation (with shear strain γ) parallel to the abscissa, the displacement matrix is

(GATE GG 2016)

a) $\begin{pmatrix} 1 & \gamma \\ 0 & 1 \end{pmatrix}$
b) $\begin{pmatrix} 1 & 0 \\ \gamma & 1 \end{pmatrix}$
c) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
d) $\begin{pmatrix} 0 & \gamma \\ 1 & 0 \end{pmatrix}$

47) If tangent Young's modulus (at 50% of the uniaxial compressive strength) and modulus ratio of a rock are given as 60 GPa and 500, respectively, the uniaxial compressive strength of the rock is MPa.

(GATE GG 2016)

48) In a rock sample, the values of $(^{87}Sr/^{86}Sr)_{present}$ and $(^{87}Rb/^{86}Sr)_{present}$ are 0.7125 and 0.2, respectively. The decay constant λ of ^{87}Rb is 1.42×10^{-11} year^{-1}, and time before present t is 1000 million years. The value of the initial ratio $(^{87}Sr/^{86}Sr)_0$ is

(GATE GG 2016)

49) The ΔG^0 of the reaction $2\,Fe_3O_4 + 0.5\,O_2 = 3\,Fe_2O_3$ at 300°C and 500 bars is −40.657 kilocalories. The value of $\log f_{O_2}$ at that temperature and pressure is

(GATE GG 2016)

50) Match the types of mineralization in Group-I with their appropriate tectonic settings in Group-II. (VMS = volcanogenic massive sulfide)

(GATE GG 2016)

Group I	**Group II**
P. Cyprus-type VMS	1.Island Arc
Q. Kuroko-type VMS	2. Continental Arc
R. Porphyry copper	3. Intraplate
S. Diamond in Kimberlite	4. Mid Oceanic Ridge

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

51) Clay minerals and Fe-oxide minerals, products of hydrothermal alteration and supergene oxidation, are good indicators of mineralization. Choose the CORRECT Thematic Mapper (TM) band ratio images for detection of these minerals.

(GATE GG 2016)

a) band ratio 5/7 for clay and 3/1 for Fe-oxide minerals
b) band ratio 3/1 for clay and 5/7 for Fe-oxide minerals
c) band ratio 3/7 for clay and 5/1 for Fe-oxide minerals
d) band ratio 5/1 for clay and 3/7 for Fe-oxide minerals

52) The age range of reservoir rock in Cambay oil field is

(GATE GG 2016)

a) 34 – 15 million years
b) 56 – 34 million years
c) 65 – 56 million years
d) 100 – 65 million years

53) Which one of the following statements is CORRECT in all respects for the amphibole glaucophane, $Na_2Mg_3Al_2Si_8O_{22}(OH)_2$?

(GATE GG 2016)

a) Na is in the M4-site, Al is in octahedral coordination and Si is in tetrahedral coordination.
b) Na is in the A-site, both Al and Si are in tetrahedral coordination.
c) Na is in the M4-site, Al is partly in octahedral and partly in tetrahedral coordination, Si is in tetrahedral coordination.
d) Na is in the A-site, both Al and Si are in octahedral coordination.

54) Choose the CORRECT modern analog of Besshi type VMS deposits (all are ocean floor rift zones).

(GATE GG 2016)

a) 21°N East Pacific Rise (EPR)
b) Guaymas Basin
c) Lau Basin
d) Trans Atlantic Geotraverse (TAG)

55) Which one of the following options is arranged in the CORRECT increasing order of Vicker's micro-hardness?

(GATE GG 2016)

a) galena ¡ chalcopyrite ¡ sphalerite ¡ magnetite
b) sphalerite ¡ galena ¡ magnetite ¡ chalcopyrite
c) galena ¡ magnetite ¡ chalcopyrite ¡ sphalerite
d) sphalerite ¡ magnetite ¡ chalcopyrite ¡ galena

56) The $(^{18}O/^{16}O)$ of a quartz sample yields a value of 0.0019. The value of $\delta^{18}O$ of the quartz sample is

$_{,(Usethevalueoftheratioin VSMOWas 0.002005.)}$

(GATE GG 2016)

57) The ionic strength of a solution having 0.5 molal NaCl and 0.25 molal $CaCl_2$ is

$_{molal.}$

(GATE GG 2016)

58) During which stage of coalification is most of the methane gas generated?

(GATE GG 2016)

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

59) The figure shows the liquidus phase relations in the forsterite–anorthite–silica system at 1 bar pressure. From the options below, identify the CORRECT reaction that takes place at the isobaric invariant point P.

(GATE GG 2016)

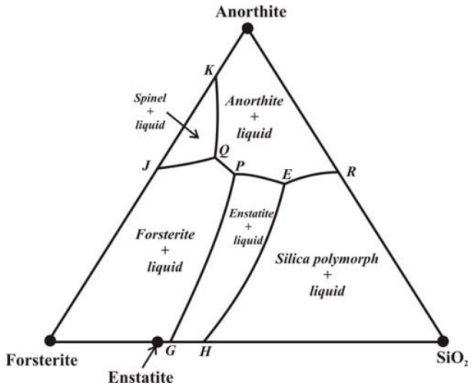


Fig. 3

a) Liquid (at P) = Forsterite + Anorthite + Enstatite
b) Liquid (at P) + Forsterite = Anorthite + Enstatite
c) Liquid (at P) + Forsterite + Anorthite = Enstatite
d) Liquid (at P) = Forsterite + Anorthite + Silica polymorph

60) A garnet peridotite contains 2400 ppm of nickel. After 20% partial melting, a basaltic melt is generated, leaving a residue comprising 60% olivine, 30% orthopyroxene and 10% clinopyroxene. Given the partition coefficients K_D (Ni) as: olivine = 10, orthopyroxene = 4, clinopyroxene = 2, the nickel concentration in the melt, assuming equilibrium batch melting, is ppm.

(GATE GG 2016)

61) Which one of the following mineral assemblages is stable in a pelitic rock in the greenschist facies?

(GATE GG 2016)

a) Albite-epidote-actinolite-chlorite-quartz
b) Muscovite-biotite-garnet-quartz
c) Tremolite-talc-calcite-quartz
d) Muscovite-biotite-garnet-sillimanite-quartz

62) Match the co-existing mineral pairs in Group I with the diagnostic metamorphic conditions they are associated with in Group II.

Group I	**Group II**
P. Talc-phengite	1. Ultrahigh temperature
Q. Cordierite-andalusite	2. Very low temperature
R. Spinel-quartz	3. Ultrahigh pressure
S. Laumontite-wairakite	4. Low pressure, high temperature

(GATE GG 2016)

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

63) Out of the following symmetry elements, which one is present in all classes of the cubic system?
(GATE GG 2016)

a) Four axes of 3-fold symmetry
b) Three axes of 4-fold symmetry
c) Six axes of 2-fold symmetry
d) Three mirror planes

64) Match the minerals in Group-I with their optical properties in Group-II.

Group I	**Group II**
P. Calcite	1. Uniaxial negative, low birefringence, high relief
Q. Nepheline	2. Uniaxial negative, high birefringence, moderately high relief
R. Apatite	3. Uniaxial positive, low birefringence, low relief
S. Quartz	4. Uniaxial negative, low birefringence, low relief

(GATE GG 2016)

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

Section 2 (Geophysics): Optional Section

65) Depth migration is applied to a stacked seismic section. Compared to the stacked section, dipping events in the migrated section
(GATE GG 2016)

(A) have a steeper slope and move updip.
(B) remain unchanged.
(C) have a gentler slope and move downdip.
(D) have a steeper slope and move downdip.

66) A monochromatic elastic wave of frequency 20 Hz propagates in a medium with average velocity 3 km/s. For zero offset reflection from horizontal reflectors, the thickness of the vertical first Fresnel zone is _____ m.
(GATE GG 2016)

67) The following figure shows a seismic reflection experiment above a reflector that dips 45°. The P-wave velocity in the medium is constant and equal to 2 km/s. The source is kept at location 'S' and the receiver is kept at location 'G'. The midpoint between S and G is denoted by 'M' and the depth to the reflector from 'M' is 1 km. The traveltime of the primary reflected arrival recorded at the receiver is equal to _____ seconds.
(GATE GG 2016)

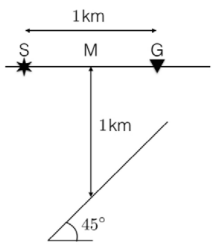


Fig. 4

68) Given a seismic wavelet $w = \{6, -4, -2\}$ and reflectivity series $r = \{0, 1, 0\}$, the corresponding seismic trace is _____.

(GATE GG 2016)

(A) $\{0, -4, 0, 0, 0\}$ (B) $\{0, -2, -4, 6, 0\}$ (C) $\{0, 6, 0, 0, 0\}$ (D) $\{0, 6, -4, -2, 0\}$

69) The time period of the signal $s(t) = \sin(3\pi t) + \cos(2\pi t)$ is _____ seconds.

(GATE GG 2016)

70) Assertion (a): The inverse of a minimum phase wavelet is causal and stable.
Reason (r): The Z-transform of a minimum phase wavelet has all its zeros outside the unit circle.

(GATE GG 2016)

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

71) The value of free-air correction (assuming sea level as datum plane) at an elevation of 150 m is _____ mGal.

(GATE GG 2016)

72) A spherical cavity of radius 8 m has its centre 15 m below the surface. If the cavity is full of sediments of density $1.5 \times 10^3\,\text{kg/m}^3$ and is in a rock body of density $2.4 \times 10^3\,\text{kg/m}^3$, the maximum value of its gravity anomaly is _____ mGal.

(GATE GG 2016)

73) Match the items (listed in Group I) with the corresponding corrections applied for reduction of marine gravity data (listed in Group II).

(GATE GG 2016)

Group I
P. Effect of rotating homogeneous ellipsoidal Earth
Q. Effect of deficit mass from mean sea level to average depth to ocean floor
R. Effect of relative motion of ship with respect to revolving Earth
S. Effect of elastic creep of gravimeter spring system and Earth tides
Group II
1. Drift correction
2. Latitude correction
3. Bouguer correction
4. Eotvos correction

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

74) Which one of the following Natural Remanent Magnetization (NRM) gives a primary, stable magnetization for igneous rocks?

(GATE GG 2016)

(A) Depositional Remanent Magnetization (DRM)
(B) Thermo Remanent Magnetization (TRM)
(C) Chemical Remanent Magnetization (CRM)
(D) Isothermal Remanent Magnetization (IRM)

75) The following figure shows the total magnetic field intensity anomaly above a spherical body polarized by the present day geomagnetic field. From among the options below, identify the region in which such an anomaly could be observed.

(GATE GG 2016)

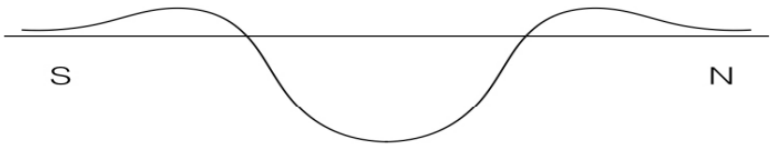


Fig. 5

(A) Equator (B) Latitude 27° (C) North pole (D) South pole

76) Which one of the following is the ray path for the P-wave that converts to S-wave while passing through the solid inner core?

(GATE GG 2016)

(A) PKiKP (B) PKIKP (C) pPcP (D) PKJKP

77) Which one of the following statements is CORRECT for the stress drop ($\Delta\sigma$) of an earthquake?

(GATE GG 2016)

(A) Large slip on a small fault will cause more stress drop.
(B) Small slip on a large fault will cause more stress drop.
(C) Stress drop is inversely proportional to the slip of the fault.
(D) Stress is directly proportional to the rupture dimension.

78) The energy released by an earthquake of magnitude 7 is _____ times the energy released by an earthquake of magnitude 4 (use Kanamori's formula).

(GATE GG 2016)

79) In resistivity logging using a 'Normal device', the distance between electrodes A and M is 0.40 m. If 20 mA current generates 10 mV potential, the apparent resistivity of the layer between the electrodes is _____ Ωm. (Use π = 3.14)

(GATE GG 2016)

80) A cylindrical sandstone core sample of diameter 0.02 m and length 0.04 m is fully saturated with brine solution of resistivity 0.5 Ωm. The resistance of the saturated sample measured in the laboratory is 500 Ω. The formation factor of the sample is _____. (Use π = 3.14)

(GATE GG 2016)

81) A Schlumberger array with current electrode separation 50 m and potential electrode separation 5 m is placed over an inhomogeneous medium. If the measured potential difference is 50 mV and the computed apparent resistivity is 100 Ωm, then the magnitude of current passing through the subsurface is _____ mA. (Use π = 3.14)

(GATE GG 2016)

82) Two horizontal layers have resistivities and thicknesses of 10 Ωm, 5 m and 50 Ωm, 10 m, respectively. If the two layers are reduced to a single layer, then the coefficient of electrical anisotropy will be _____.

(GATE GG 2016)

83) The five-layer Schlumberger resistivity sounding curve given below represents _____.

(GATE GG 2016)

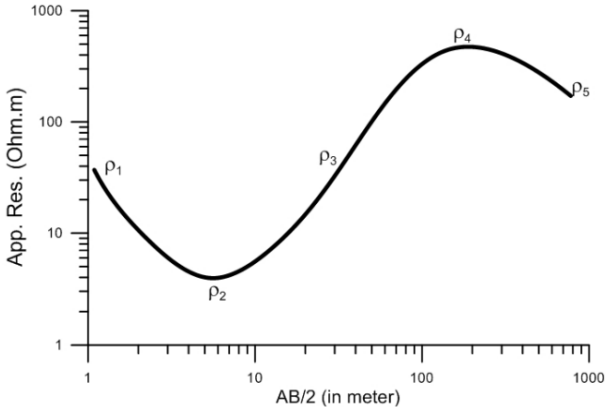


Fig. 6

(A) HAQ-type (B) HKQ-type (C) HKH-type (D) HAK-type

84) How are the numerical values of the real and imaginary components of the impedance tensor (Z) in Magnetotelluric (MT) method related over a homogeneous half-space?

(GATE GG 2016)

(A) Imaginary component is one third of the real component.
(B) Imaginary component is half of the real component.
(C) Imaginary component is equal to the real component.
(D) Imaginary component is twice that of the real component.

85) The strike of a 2-D geological structure is in Y-direction. From the following options, choose the field components required to compute the apparent resistivity in E-Polarization mode for plane wave electromagnetic signals.

(GATE GG 2016)

(A) E_x and H_x (B) E_x and H_y (C) E_y and H_y (D) E_y and H_x

86) Dip angle electromagnetic methods are suitable to delineate

(GATE GG 2016)

(A) both vertical and horizontal conductors.
(B) horizontal conductors only.
(C) vertical and dipping conductors.
(D) horizontal and dipping conductors.

87) Which one of the following equations is CORRECT for a time invariant field?

(GATE GG 2016)

(A) $\nabla \times \mathbf{E} = 0$
(B) $\nabla \cdot \mathbf{B} = 0$
(C) $\nabla \times \mathbf{H} = \mathbf{J} + \dfrac{\partial \mathbf{D}}{\partial t}$
(D) $\nabla \times \mathbf{H} = \mathbf{J}$

88) The solution to the Laplace equation $\nabla^2\Phi = 0$ in a spherical coordinate system with spherical symmetry is _____. A and B are constants and r is the distance of the observation point from the source.
(GATE GG 2016)

(A) $\Phi(r) = \dfrac{A}{r^2}$ (B) $\Phi(r) = A + \dfrac{B}{r}$ (C) $\Phi(r) = A \ln r + B$ (D) $\Phi(r) = Ar + \dfrac{B}{r}$

89) If J is the Jacobian matrix in a geophysical inverse problem, then the addition of the regularization parameter, λ, as $J^T J + \lambda I$, in finding the inverse leads to
(GATE GG 2016)

(A) unstable solution with increased parameter resolution
(B) stable solution with increased parameter resolution
(C) unstable solution with decreased parameters resolution
(D) stable solution with decreased parameter resolution

90) The Singular Value Decomposition of a square nonsingular matrix J is given by $J = U\Sigma V^T$. The inverse of matrix J will be
(GATE GG 2016)

(A) $J^{-1} = U\Sigma^{-1}V^T$
(B) $J^{-1} = V\Sigma^{-1}U^T$
(C) $J^{-1} = V\Sigma U^T$
(D) $J^{-1} = U\Sigma V^T$

91) The fraction of a radioactive nuclide remaining after 10 half-lives is closest to
(GATE GG 2016)

(A) 0.1 (B) 0.01 (C) 0.001 (D) 0.0001

92) The correct relationship between the residual amount P of the parent radionuclide and amount D of the daughter product in a radioactive decay is
(GATE GG 2016)

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

93) Which one of the following resistivity sounding curves exhibits both 'Equivalence' and 'Suppression' type ambiguities in interpretation of data?
(GATE GG 2016)

(A) HA-type
(B) AH-type
(C) HK-type
(D) KH-type

94) For land seismic data acquisition, the following figure is a schematic plot of arrival times of seismic waves recorded at several detectors placed along the x-axis. The shot is placed at the origin ($x = 0$). (Match the events labelled in the figure listed in Group I with their corresponding types listed in Group II.)

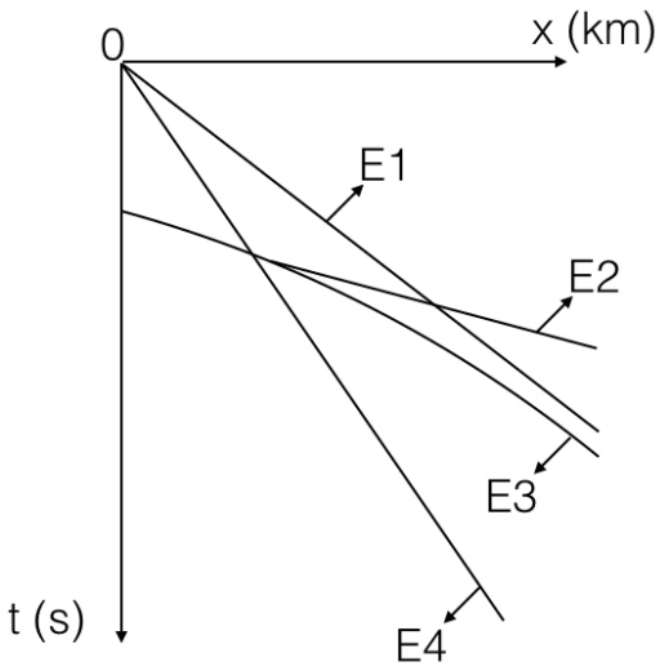


Fig. 7

(GATE GG 2016)

Group I
P. E1
Q. E2
R. E3
S. E4

Group II
1. Ground roll
2. Direct arrival
3. Refracted energy
4. Primary reflection

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

END OF THE QUESTION PAPER