GATE-02

ee25btech11063-vejith

1) Choose the most appropriate word from the options given below to complete the following sentence.

A person suffering from Alzheimer's disease _____ short-term memory loss .

(GATE GG 2014)

a) experienced
b) has experienced
c) is experiencing
d) experiences

2) Choose the most appropriate word from the options given below to complete the following sentence.

_____is the key to their happiness; they are satisfied with what they have.

(GATE GG 2014)

a) Contentment b) Ambition c) Perseverance d) Hunger

3) Which of the following options is the closest in meaning to the sentence below?

"As a woman, I have no country."

(GATE GG 2014)

a) Women have no country.
b) Women are not citizens of any country.
c) Women's solidarity knows no national boundaries.
d) Women of all countries have equal legal rights.

4) In any given year, the probability of an earthquake greater than Magnitude 6 occurring in the Garhwal Himalayas is 0.04. The average time between successive occurrences of such earthquakes is _____ years.

(GATE GG 2014)

5) The population of a new city is 5 million

(GATE GG 2014)

a) 3 – 4 years b) 4 – 5 years c) 5 – 6 years d) 6 – 7 years

6) In a group of four children, Som is younger to Riaz. Shiv is elder to Ansu. Ansu is youngest in the group. Which of the following statements is/are required to find the eldest child in the group?
Statements
1. Shiv is younger to Riaz.
2. Shiv is elder to Som

(GATE GG 2014)

a) Statement 1by itself determines the eldest child.
b) Statement 2 by itself determines the eldest child.
c) Statements 1 and 2 are both required to determine the eldest child.
d) Statements 1 and 2 are not sufficient to determine the eldest child.

7) Moving into a world of big data will require us to change our thinking about the merits of exactitude. To apply the conventional mindset of measurement to the digital, connected world of the twenty-first century is to miss a crucial point. As mentioned earlier, the obsession with exactness is an artefact of the information-deprived analog era. When data was sparse, every data point was critical, and thus great care was taken to avoid letting any point bias the analysis.
From "$BIGDATA$" $ViktorMayer-Schonberger$ and $KennethCukier$ The main point of the paragraph is:

(GATE GG 2014)

a) The twenty-first century is a digital world
b) Big data is obsessed with exactness
c) Exactitude is not critical in dealing with big data
d) Sparse data leads to a bias in analysis

8) The total exports and revenues from the exports of a country are given in the two pie charts below. The pie chart for exports shows the quantity of each item as a percentage of the total quantity of exports. The pie chart for the revenues shows the percentage of the total revenue generated through export of each item. The total quantity of exports of all the items is 5 lakh

tonnes and the total revenues are 250 crore rupees. What is the ratio of the revenue generated through export of Item 1 per kilogram to the revenue generated through export of Item 4 per kilogram?

(GATE GG 2014)

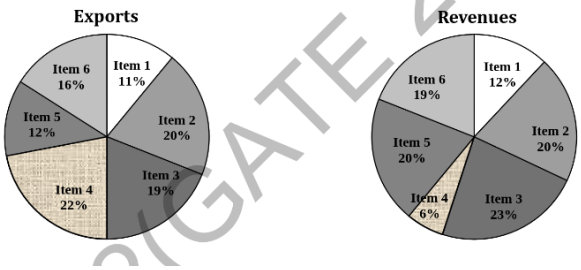

Fig. 8

a) 1 : 2
b) 2 : 1
c) 1 : 4
d) 4 : 1

9) X is 1 km northeast of Y. Y is 1 km southeast of Z. W is 1 km west of Z. P is 1 km south of W. Q is 1 km east of P. What is the distance between X and Q in km?

(GATE GG 2014)

a) 1 b) $\sqrt{2}$ c) $\sqrt{3}$ d) 2

10) 10% of the population in a town is HIV. A new diagnostic kit for HIV detection is available; this kit correctly identifies HIV individuals 95% of the time, and HIV individuals 89% of the time. A particular patient is tested using this kit and is found to be positive. The probability that the individual is actually positive is _____

(GATE GG 2014)

END OF THE QUESTION PAPER

1) Which one of the following planets has the highest bulk density?

(GATE GG 2014)

a) Jupiter b) Venus c) Saturn d) Mars

2) Mid-Oceanic ridges mark plate margins and can be traced by belts of focus earthquakes.

(GATE GG 2014)

a) constructive, shallow
b) destructive, shallow
c) constructive, deep
d) destructive, deep

3) From the surface to the Earth's interior, the velocity of P-wave decreases and the material density increases at the boundary between

(GATE GG 2014)

a) Outer core and inner core
b) Mantle and outer core
c) Crust and mantle
d) Upper crust and lower crust

4) The following gamma ray (GR) log data are recorded in a borehole:
GR log value against a formation = 30 API units,
Maximum GR log value = 45 API units,
Minimum GR log value = 20 API units.

What is the fraction of shale in the formation? (GATE GG 2014)

a) 0.33 b) 0.40 c) 0.66 d) 0.75

5) Cirques are formed by

(GATE GG 2014)

a) glaciers b) rivers c) lakes d) oceans

6) During which of the following geological eras did birds and mammals first appear on the Earth? (GATE GG 2014)

a) Cenozoic b) Mesozoic c) Paleozoic d) Proterozoic

7) Select the copper ore minerals from the following: (GATE GG 2014)

(P) Chalcopyrite
(Q) Pyrite
(R) Pyrrhotite
(S) Bornite
(T) sphalerite
(U) chalcocite

a) P, S, U
b) P, Q, R
c) S, T, U
d) Q, R, U

8) The reflection coefficient at the interface between two layers of resistivities 9 Ωm and 1 Ωm respectively is (GATE GG 2014)

a) 0.6
b) 0.7
c) 0.8
d) 0.9

9) In electromagnetic (EM) sounding, the depth of investigation with _____ increasing frequency. (GATE GG 2014)

a) increases
b) decreases
c) remains unchanged
d) varies randomly

10) The International Gravity Formula predicts the theoretical gravity value at a given point assuming a (GATE GG 2014)

a) non-rotating homogeneous spherical earth model
b) rotating inhomogeneous spherical earth model
c) rotating homogeneous oblate spheroidal earth model
d) rotating inhomogeneous oblate spheroidal earth model

11) The diurnal variation of geomagnetic elements is due to a system of electric currents flowing in the (GATE GG 2014)

a) ionosphere
b) Earth's outer core
c) inter-planetary medium
d) oceans

12) Match the mineral deposits (listed in Group I) with the most appropriate geophysical exploration methods(listed in Group II) (GATE GG 2014)

Group I	**Group II**
(P) Mineralized conductive veins	(1)Gravity
(Q) Disseminated sulphides	(2)Magnetic
(R) Massive barytes	(3)Induced Polarization
(S) Kimberlite pipes	(4) Resistivity profiling
	(5) Low frequency Magnetotellurics

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

13) In seismic refraction surveys, the critical distance (GATE GG 2014)

a) is always less than the crossover distance
b) is always more than the crossover distance

c) is always equal to the crossover distance
d) cannot be compared with the crossover distance

14) As compared to large earthquakes, small earthquakes are

(GATE GG 2014)

a) more frequent and caused by short fault slip and long rupture lengths
b) more frequent and caused by long fault slip and short rupture lengths
c) less frequent and caused by short fault slip and short rupture lengths
d) more frequent and caused by short fault slip and short rupture lengths

15) Match the type of well logs (listed in Group I) with the characteristics of measurement (listed in Group II).

(GATE GG 2014)

Group I	**Group II**
(P) Dipmeter	(1) Hydrogen concentration in pores
(Q) Neutron	(2) Velocity of compressional waves
(R) SP	(3) Correlation of resistivity changes
(S) Sonic	(4) Natural radioactivity
	(5) Natural electric potential

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

16) For earthquakes of magnitudes 6 and 7, the seismic wave amplitudes are A_6 and A_7 energies are E_6 and E_7 respectively. Which one of the following is true?

(GATE GG 2014)

a) $A_7 = (7/6)\ A_6$ and $E_7 = 10\ E_6$
b) $A_7 = 10\ A_6$ and $E_7 = 100\ E_6$
c) $A_7 = 10\ A_6$ and $E_7 = (7/6)\ E_6$
d) $A_7 = 10\ A_6$ and $E_7 = 32\ E_6$

17) Structure contours of a bedding plane at 100 m interval are spaced in such a manner that the horizontal equivalent is also 100m. The dip of the bedding plane is

(GATE GG 2014)

a) 30° b) 45° c) 60° d) 90°

18) Horizontal slickensides are observed on the surface of a vertical fault. What is the type of fault?

(GATE GG 2014)

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

19) Match the mineral habits(listed in Group I)with the minerals (listed in Group II)

(GATE GG 2014)

Group I	**Group II**
(P)Acicular	(1) Kyanite
(Q) Fibrous	(2) Beryl
(R) Bladed	(3) Sillimanite
(S) Columnar	(4)Chrysotile
	(5)Olivine

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

20) The correct chronological order (older to younger) of the following volcanic events is

(GATE GG 2014)

(P) Rajmahal volcano
(Q) Deccan volcanism
(R) Panjal volcanism
(S) Malani volcanism

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

21) A clastic rock dominantly composed of feldspar grains is

(GATE GG 2014)

a) shale b) arenite c) greywacke d) arkose

22) A metamorphic rock consists of pyroxene, plagioclase and quartz, and exhibits hornfelsic texture.The rock has undergone _____ metamorphism.

(GATE GG 2014)

a) regional b) contact c) cataclastic d) impact

23) An igneous body with a flat top and a concave-upward base is known as a

(GATE GG 2014)

a) laccolith b) lopolith c) sill d) stock

24) The velocity discontinuity between the upper crust and the lower crust is known as _____ discontinuity.

(GATE GG 2014)

a) Lehman
b) Gutenberg
c) Mohorovicic
d) Conard

25) Match the items listed in Group I with those in Group II

(GATE GG 2014)

Group I	**Group II**
(P) Isopachs	(1) Contours of equal slope
(Q) Isotherms	(2) Contours of equal thickness
(R) Isochrons	(3) Contours of equal temperature
(S) Isotans	(4) Contours of equal core thickness
	(5) Contours of equal age

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

PART B (SECTION 1): FOR GEOLOGY CANDIDATES ONLY

26) Match the items in Group I with those in Group II

(GATE GG 2014)

Group I	**Group II**
(P) Interference colour	(1) Property of a single grain seen under microscope in polarized light
(Q)Twinkling	(2) Property of a single grain seen under microscope under crossed nicols
(R) Pleochroism	(3) Property seen when several grains are viewed collectively under microscope in polarized light
(S) Play of colours	(4) Property of a mineral seen in hand specimen

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

27) Which one of the following represents a closed crystallographic form?

(GATE GG 2014)

a) Hexagonal prism
b) Hexagonal dipyramid
c) Tetragonal pyramid
d) Ditetragonal prism

28) In the figure given below a, b and c are the crystallographic axes of a crystal. The Miller Index of the crystal face PQR is:

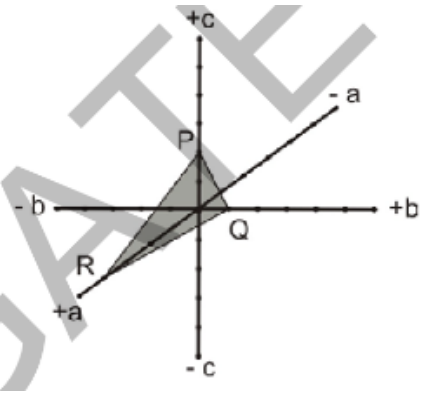

Fig. 28

(GATE GG 2014)

a) (421)
b) (124)
c) (142)
d) (214)

29) Match the alkaline rocks listed in Group I with their characteristics listed in Group II

(GATE GG 2014)

Group I	**Group II**
(P) Basanite	(1) Volcanic rock lacking feldspar
(Q) Nephelinite	(2) Ultrapotasic volcanic rock
(R) Shonshonite	(3) Feldspathoid-bearing basalt
(S) Lamproite	(4) K-rich basalt

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

30) In a metamorphic terrain, crenulations at the hinge zone of a fold along with the development of axial plane foliation is an evidence of (GATE GG 2014)

a) one phase of deformation
b) at least two phases of deformation
c) no deformation
d) extensional regime of the deformation

31) A phase-diagram with a specified bulk-composition is known as (GATE GG 2014)

a) isograd diagram
b) AFM diagram
c) pseudosection
d) ACF diagram

32) The uniaxial interference figure of a mineral given below shows the changes in the position of color bands when a mica plate is inserted in the accessory slot of the microscope as shown. The changes in the interference figure are due to

(GATE GG 2014)

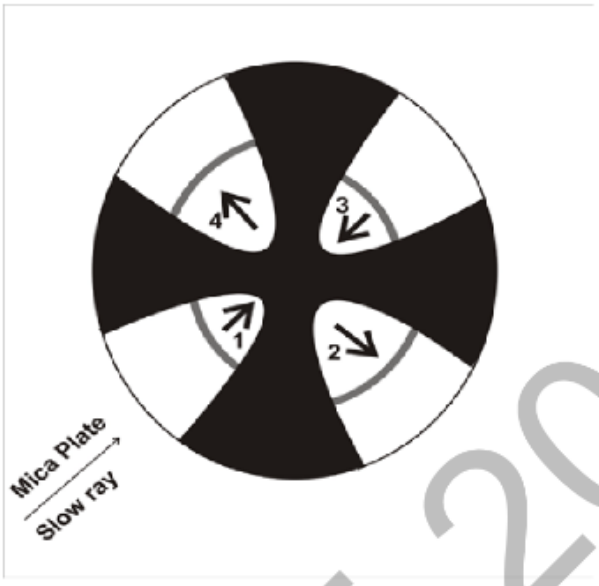

Fig. 32

a) increase in retardation along the quadrants 1 and 3
b) increase in retardation along the quadrants 2 and 4
c) decrease in retardation along the quadrants 1 and 3
d) increase in retardation in all quadrants

33) The relative enrichment factors (△ values) of sulphur isotopes of two sulphide minerals A and B in equilibrium with H_2S at the same P-T-X conditions are +5.9% and −11.2% respectively. If A and B are in equilibrium under the same P-T-X conditions and $\delta^{34}\delta$ value of A is +6.8%, then the $\delta^{34}\delta$ value of B is (GATE GG 2014)

a) −10.3%
b) +10.3%
c) −9.3%
d) +9.3%

34) If $Fe^{2+} \rightarrow Fe^{3+} + e^-$, E° = +0.77 volt, E_h = 0.6 volt,K=$\frac{[Fe^{3+}]}{[Fe^{2+}]}$and the basic equation to be used is:$E_h = E^\circ + \frac{0.059}{n} \log k$ Then the value of $\frac{Fe^{2+}}{Fe^{3+}}$ in the solution is _____ (GATE GG 2014)

35) In an ore mine exposing stratified sulfide ore with sulfide bands having thickness between 10 and 100 cm, which one of the following sampling methods is the most appropriate? (GATE GG 2014)

a) Chip sampling
b) Channel sampling
c) Bulk sampling
d) Grab sampling

36) From the given Eh-pH diagram, which one of the following pairs can be inferred to be a disequilibrium assemblage? (GATE GG 2014)

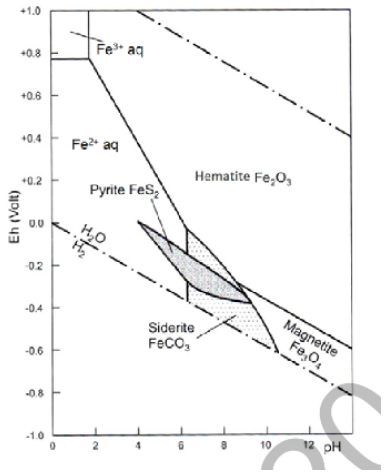

Fig. 36

a) Hematite-magnetite
b) Magnetite-Pyrite
c) Pyrite-siderite
d) Hematite-siderite

37) Metal content (in metric tonnes) of an ore having specific gravity and assay values of 2.86 and 1.49% respectively in a mining block 40 m long, 30 m wide and with an average thickness of 2.13 m is_____ (GATE GG 2014)

38) From the list of planktic foraminifera below, the pair having a supplementary sutural aperture is
(*P*)Globineria
(*Q*)Globorotilia
(*R*)Globigerinoides
(*S*)Orbulina (GATE GG 2014)

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

39) Match the morphological features (listed in Group I) with their corresponding fuels (listed in Group II) (GATE GG 2014)

Group I	**Group II**
P. Axial lobe	1. Graptolite
Q. Coiled chambers	2. Gastropod
R. Colonial corallites	3. Conodont
S. Conical shell	4. Foraminifer
	5. Trilobite
	6. Coral

a) P-2; Q-3; R-1; S-6
b) P-5; Q-3; R-1; S-2
c) P-3; Q-1; R-4; S-2
d) P-2; Q-3; R-4; S-6

40) Which one of the following marine environments is indicated by the assemblage of benthic foraminifera *Quinqueloculina*, *Lenticulina*, *Ammonia*, *Elphidium*? (GATE GG 2014)

a) Abyssal
b) Bathyal
c) Shelf
d) Hadal

41) The correct chronological order (older to younger) of the following geological units is: (GATE GG 2014)
(*P*)Talchir Tillite
(*Q*)Muth Quartzite
(*R*)Umia Ammonites Bed
(*S*)Umaria Marine Bed

a) P – R – S – Q
b) Q – P – S – R
c) R – Q – P – S
d) P – Q – R – S

42) The best match of terms in **Group I** with those in **Group II** is: (GATE GG 2014)

Group I	**Group II**
P. Alkali reaction	1. Tunneling in hard rocks
Q. Arching	2. Earth dam
R. Rip rap	3.Slope protection
S. Clay core	4.Gravity dam

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

43) Knick points indicate change in the (GATE GG 2014)
a) attitude of beds
b) strike of a fault
c) attitude of joints
d) stream gradient

44) A confined sandy aquifer has a thickness of 10m and transmissivity of $0.75 m^2$per day. Its hydraulic conductivity is; (GATE GG 2014)

45) A geological reconnaissance survey is being carried out using remote sensing multispectral data. Which set of the two band data of the following is most appropriate for mapping limonite bearing zones? (GATE GG 2014)
a) Near infrared band and Thermal infrared band image data

b) Visible band and Near infrared band image data
c) Shortwave infrared band and Thermal infrared image data
d) Thermal infrared band and X-band radar image data

46) The maximum amount of hydrogen (dry mineral matter free basis) in bituminous-anthracite is: (GATE GG 2014)

a) less than 10%
b) 10–15%
c) 15–20%
d) 20–25%

47) The standard free energy change (in kJ) at 25°C of the dissolution of anhydrite at equilibrium in the equation $CaSO_4 \rightleftharpoons Ca^{2+} + SO_4^{2-}$,given $K = 3.4 \times 10^5$ and $R = 8.314$ J/mol/K, is: (GATE GG 2014)

a) 43.7 b) 37.4 c) 30.2 d) 25.5

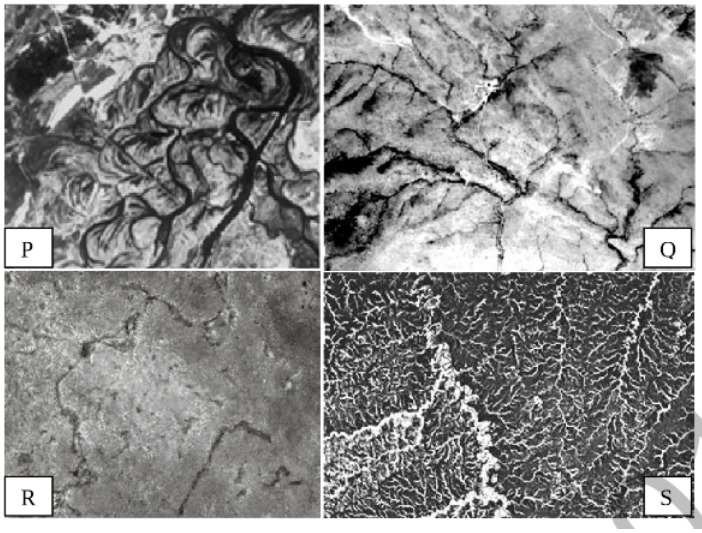

Fig. 48

48) Drainage patterns observed in four areas are shown in black-and-white panchromatic images P,Q,R,S. Field work in these areas has indicated presence of the following lithology/geological unit? (GATE GG 2014)

1. Fractured quartzite
2. Shale
3. Limestone
4. Alluvial plain

The correct match of the drainage patterns with the lithology/geological unit is

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

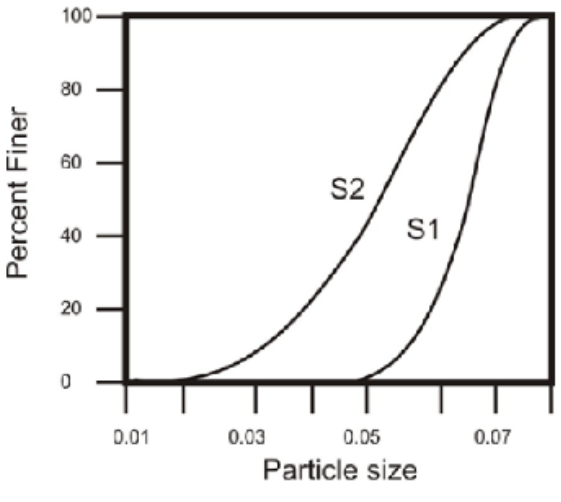

Fig. 49

49) The given figure shows the grain size distribution of two soil samples S1 and S2. The uniformity coefficient is defined as $U = d_{60}/d_{10}$, where d_{60} and d_{10} represent particle sizes corresponding to 60 and 10 percent finer, respectively. Determine the correctness or otherwise of the Assertion (a) and Reason (r)
Assertion (a): S1 has a higher value of uniformity coefficient than S2.
Reason (r): S1 has less variation in grain-size than S2. (GATE GG 2014)

a) Both (a) and (r) are true, and (r) is the correct reason for (a).
b) Both (a) and (r) are false.
c) (a) is false but (r) is true, (r) being not the correct reason for(a).
d) (a) is true but (r) is false.

50) The geological map given below shows beds in a normal stratigraphic order. Which one of the following statements is true in respect of features near locations P and Q? (GATE GG 2014)

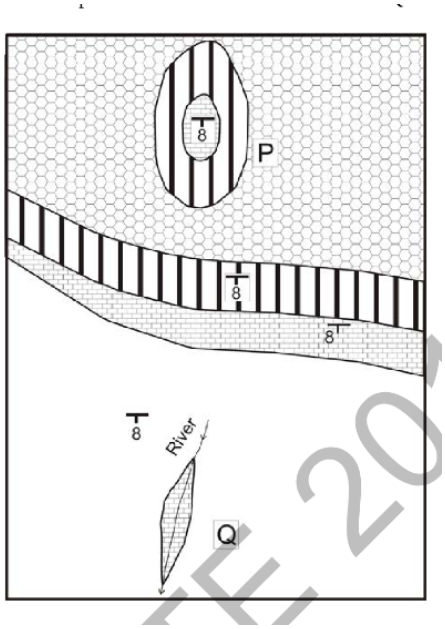

Fig. 50

a) P is an anticline and Q is a syncline
b) Q is an anticline and P is a syncline
c) P is an outlier and Q is an inlier
d) Q is an outlier and P is an inlier

51) Four aqueous-vapor fluid inclusions P, Q, R and S are petrographically identical at room temperature, and contain approximately 90% liquid and 10% vapor. The freezing temperatures of the fluid inclusions are: $P = -5.3\,^{\circ}\text{C}, Q = -16.6\,^{\circ}\text{C}, R = -21.2\,^{\circ}\text{C}, S = -8.7\,^{\circ}\text{C}$ With respect to P, Q, R and S, the correct statement is: (GATE GG 2014)

a) salinity of p is highest but density is lowest
b) both salinity and density of Q are lowest
c) both salinity and density of R are highest
d) both salinity and density of S are lowest

52) Which one of the following is the youngest marine formation in the Himalaya? (GATE GG 2014)

a) Dagshahi Formation
b) Subathu Formation
c) Kasauli Formation
d) Karewa Formation

53) Which one of the following environments is represented by molasse facies? (GATE GG 2014)

a) Atectonic
b) Pre-tectonic
c) Syn-tectonic
d) Post-tectonic

54) In the given ternary diagram (Fo = forsterite; Di = diopside; An = anorthite) eutectic diagram, the point A represents the composition of magma. What will be the sequence of crystallization during cooling of this magma? (GATE GG 2014)

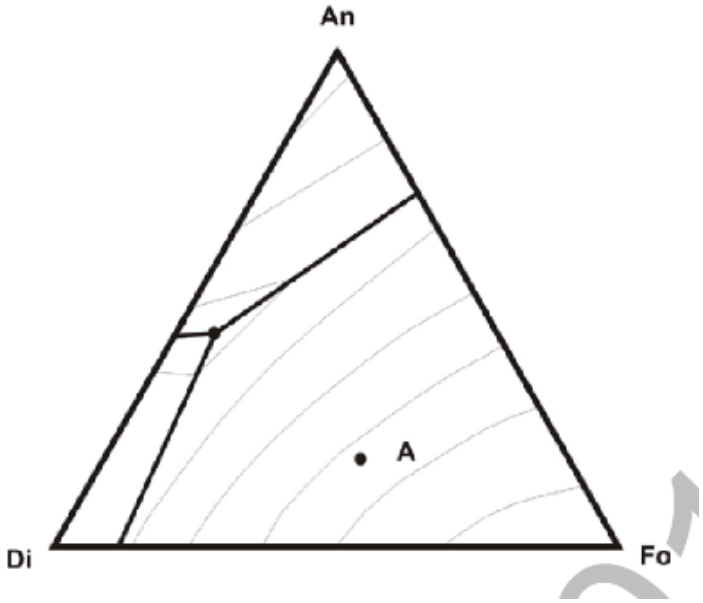

Fig. 54

a) olivine and olivine+plagioclase
b) olivine and olivine+pyroxene
c) olivine,olivine+plagioclase and olivine+plagioclase+pyroxene
d) olivine,olivine+pyroxene and olivine+pyroxene+plagioclase

55) Which one of the following is the best suited mining method for a low-dipping, tabular-shaped, hard and compact ore body with 2 to 2.5m thickness sandwiched between hard and compact roof and floor rock? (GATE GG 2014)

a) Cut and fill method
b) Shrinkage stope method
c) Open stope method
d) Caving method

PART B (SECTION 2): FOR GEOPHYSICS CANDIDATES ONLY

26) A gaseous hydrocarbon-bearing zone can be best identified by a combined analysis of: (GATE GG 2014)

a) Density and Self potential (SP) logs
b) Density and Neutron logs
c) Sonic and Neutron logs
d) Natural gamma ray (GR) and Neutron logs

27) In general, geophysical inverse problems dealing with real data obtained from field measurements are: (GATE GG 2014)

a) grossly over determined
b) even determined
c) over determined
d) grossly underdetermined

28) In vector calculus, Stoke's theorem relates: (GATE GG 2014)

a) line-integral to volume integral
b) surface integral to volume integral
c) scalar product integral to norm
d) line integral to surface integral

29) The radial dependence of the solution of the Laplace equation in cylindrical coordinates is expressed in terms of: (GATE GG 2014)

a) Bessel function
b) Legendre polynomial
c) Exponential function
d) Hermite polynomial

30) For an electrostatic field, the Maxwell's equations reduce to: (GATE GG 2014)

a) Wave equation
b) Diffusion equation
c) Helmholtz equation
d) Poisson equation

31) Which one of the following functions is used as a source-term to obtain the Green's function of a boundary value problem? (GATE GG 2014)

a) Heaviside unit step function
b) Exponential function
c) Rectangular function
d) Dirac delta function

32) The heat flow through a unit area of the Earth's surface is given by the product of: (GATE GG 2014)

a) vertical thermal gradient and thermal conductivity
b) horizontal thermal gradient and thermal conductivity
c) vertical thermal gradient and thermal diffusivity
d) horizontal thermal gradient and thermal diffusivity

33) The S-wave velocity of a medium having a Poisson's ratio and a P-wave velocity of 0.5 and 3km/s respectively is _____km/s. (GATE GG 2014)

34) The PKiKP phase denotes the passage of a seismic wave in the Earth as: (GATE GG 2014)

a) P in mantle, S in outer core, reflected as P from inner outer core, boundary S in outer core ,P in mantle and crust
b) P in crust, P in mantle, reflected as P from core mantle boundary, P in mantle, P in crust
c) P in mantle, P in outer core, P in inner core, P in outer core, P in mantle and crust
d) P in mantle, P in outer core, reflected as P from inner outer core boundary, P in outer core, P in mantle and crust

35) Match the items of **Group I** with those in **Group II**: (GATE GG 2014)

Group I	**Group II**
(P) proton precission magnetometer	Induction in a pair of high permeable cores
(Q) Alkali vapor magnetometer	SQUID
(R) Fluxgate magnetometer	Radio spectroscopy
(S) Superconducting magnetometer	Nuclear magnetic resonance

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

36) Konigsberger ratio refers to: (GATE GG 2014)

a) anisotropy of magnetic susceptibility
b) ratio of remanent magnetization and induced magnetization
c) ratio of longitudinal and transverse electrical resistivities
d) ratio of P and S wave velocities

37) The Poisson's relation linking the gravity and magnetic potentials assumes the same anomaly source with: (GATE GG 2014)

a) inhomogeneous density and intensity of magnetization
b) uniform density contrast and inhomogeneous intensity of magnetization
c) uniform density contrast and homogeneous intensity of magnetization
d) inhomogeneous density and homogeneous intensity of magnetization

38) Compute the coefficient of anisotropy from the following parameters estimated from a Vertical Electric Sounding (VES) survey: (GATE GG 2014)

Resistivity of first layer, $\rho_1 = 15\ \Omega$−m
Resistivity of second layer, $\rho_2 = 4\ \Omega$−m
Resistivity of lower half-space, $\rho_3 = 50\ \Omega$−m
Thickness of first layer, $h_1 = 3m$
Thickness of second layer, $h_2 = 16m$

a) 1.43
b) 1.28
c) 1.19
d) 1.12

39) The convolution of two finite length sequences $x_n = [1, 0, -2]$ and $y_n = [1, -1]$ is (GATE GG 2014)

a) $[-1, 1, 2, -2]$
b) $[1, -1, -2, 2]$
c) $[1, 0, -2, 2]$
d) $[-1, 0, -2, 1]$

40) Arrange the following electrode configurations in the ascending order of their depth of investigation: (GATE GG 2014)
Dipole– Dipole
Schlumberger
Wenner

Pole–Pole

a) R–S-Q-p
b) P–Q-S-R
c) R–Q-P-S
d) R–Q-S-P

41) Which one of the following transforms relates the real and imaginary components of harmonic functions? (GATE GG 2014)

a) Hilbert transform
b) Laplace transform
c) Fourier transform
d) Wavelet transform

42) Which one of the following geophysical methods is most suitable for exploration of possible hydrocarbon-bearing sediments underlying the Deccan Traps?

(GATE GG 2014)

a) Seismic
b) Magnetotellurics
c) DC resistivity
d) Airborne EM

43) A collection of traces having a common mid-point is called a CMP gather. The number of traces in an n-fold survey in a CMP gather is:

(GATE GG 2014)

a) n-1 b) n + 1 c) n d) $\frac{n}{2}$

44) In seismic prospecting, migration is the process of moving data elements from:

(GATE GG 2014)

a) midpoint locations to subsurface locations
b) subsurface locations to midpoint locations
c) midpoint locations to surface locations
d) subsurface locations to surface locations

45) An 80 Hz seismic signal is sampled at a rate of 100 samples/s. What will be its aliased period (*inseconds*) in the sampled signal?

(GATE GG 2014)

a) 30 b) 10 c) 0.1 d) 0.05

46) The Fourier transform and integral of the Dirac delta function respectively are:

(GATE GG 2014)

a) 1 and 1
b) 0 and 0
c) 0 and 1
d) 1 and ∞

47) A signal $x_n = [2, 1]$ is input to a system whose impulse response is $h_n = [8, 4, 2, 1]$. The z-transform of the output is:

(GATE GG 2014)

a) $16 + 16z^{-1} + 3z^{-2} + 4z^{-3} + z^{-4}$
b) $10 + 5z^{-1} + 2z^{-2} + 4z^{-3} + z^{-4}$
c) $16 + 16z^{-1} + 8z^{-2} + 4z^{-3} + z^{-4}$
d) $16 + 16z + 8z^{-2} + 2z^{-3} + z^{-4}$

48) Calculate the formation water saturation, S_w, from the following well log data: Resistivity of completely saturated formation, $R_0 = 1.8\ \Omega$·m .True resistivity of formation, $R_t = 25\ \Omega$·m (GATE GG 2014)

a) 31%
b) 29%
c) 27%
d) 25%

49) Consider the four systems of algebraic equations (listed in Group I). The systems (Q), (R), and (S) are obtained from (P) by restricting the accuracy of data or coefficients or both, respectively, to two decimal places. (GATE GG 2014)

Group I	**Group II**
(P) $x + 1.0000y = 2.0000$	
$x + 1.0001y = 2.0001$	(1) Instability
(Q) $x + 1.0000y = 2.00$	
$x + 1.0001y = 2.00$	(2) Inconsistency
(R) $x + 1.00y = 2.0000$	
$x + 1.00y = 2.0001$	(3) Non-uniqueness
(S)$x + 1.00y = 2.00$	
$x + 1.00y = 2.00$	(4) Exact

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

50) The eigenvalue (Λ) and eigenvector (U) matrices for singular value decomposition of the matrix $\begin{pmatrix}2 & 1\\ 2 & 0\end{pmatrix}$ respectively are: (GATE GG 2014)

a) $\Lambda = \begin{pmatrix}3 & 0\\ 0 & 1\end{pmatrix}$ and $U=\frac{1}{\sqrt{2}}\begin{pmatrix}1 & -1\\ 1 & 1\end{pmatrix}$
b) $\Lambda = \begin{pmatrix}3 & 0\\ 0 & 1\end{pmatrix}$ and $U=\frac{1}{\sqrt{2}}\begin{pmatrix}1 & -1\\ 1 & -1\end{pmatrix}$
c) $\Lambda = \begin{pmatrix}2 & 0\\ 0 & 2\end{pmatrix}$ and $U=\frac{1}{\sqrt{2}}\begin{pmatrix}1 & -1\\ 1 & 1\end{pmatrix}$
d) $\Lambda = \begin{pmatrix}2 & 0\\ 0 & 2\end{pmatrix}$ and $U=\frac{1}{\sqrt{2}}\begin{pmatrix}1 & 1\\ 1 & 1\end{pmatrix}$

51) The amplitude spectrum of a band pass filter, A_B, can be obtained by a combination of spectra of a low pass filter, A_L, and that of a high pass filter, A_H, as: (GATE GG 2014)

a) $A_B = A_L \times A_H$
b) $A_B = A_L + A_H$
c) $A_B = A_L - A_H$
d) $A_B = \frac{A_L}{A_H}$

52) Compute the maximum value of gravity anomaly in μGal over a buried sphere from the following data: (GATE GG 2014)
Radius of a sphere = 5m
Density contrast 0.1gm/cc
Depth to centre of sphere = 11m
G=6.673×10^{-8}dyne-cm^2/gm^2

a) 2887.58 b) 288.76 c) 28.88 d) 2.89

53) Given the potential field anomaly data at the datum level z = 0 , match the spatial frequency expressions (listed in Group I) with the corresponding operations (listed in Group II).(k is wave number) (GATE GG 2014)

Group I	**Group II**
(P) exp(-zk)	(1)Second vertical derivative at the datum level
(Q) $k$exp(-zk)	(2) Analytic continuation into upper half-space
(R) k^2	(3)Analytic continuation into lower half-space
(S) $k$exp(zk)	(4) First vertical derivative of upward continued values
	(5) First vertical derivative of downward continued values

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

54) **Assertion (a):** An efficient marine seismic survey should use an implosive source.
Reason (r): The performance of a marine seismic source is rated by high pulse-to-bubble ratio. (GATE GG 2014)

a) Both (a) and (r) are true and (r) is the correct reason for (a)
b) Both (a) and (r) are true but (r) is not the correct reason for (a)
c) (a) is true but (r) is false
d) (a) is false but (r) is true

55) The electric field intensity vector (E) and the displacement vector (D) are given by $(E) = 2\hat{\imath} + 2\hat{\jmath} + 4\hat{k}$ and $(D) = \hat{\imath} + \hat{\jmath} + \hat{k}$ The energy of the field is: (GATE GG 2014)

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

END OF THE QUESTION PAPER