gg Gate 2011

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PART A: COMMON TO BOTH GEOLOGY AND GEOPHYSICS CANDIDATES

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

a) prolate tidal bulge
b) tidal friction
c) spring tide
d) bodily earth tide

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

a) basalt
b) gabbro
c) dunite
d) granite

3) The P-wave velocity of the earth's mantle at the Mohorovičić discontinuity is

a) 5.5 km/s
b) 6.0 km/s
c) 7.0 km/s
d) 8.0 km/s

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

a) decreasing
b) increasing
c) constant
d) fluctuating randomly

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

a) Temperature increases in both stratosphere and mesosphere
b) Temperature decreases in stratosphere and increases in mesosphere
c) Temperature increases in stratosphere and decreases in mesosphere
d) Temperature decreases in both stratosphere and mesosphere

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

a) thermohaline circulation
b) Coriolis effect
c) El Nino effect
d) monsoon effect

7) Tsunamis are

a) gravity waves
b) acoustic waves
c) capillary waves
d) internal waves

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

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

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

a) alluvial fan
b) natural levee
c) delta
d) point bar

10) Hanging valleys are formed by the geological action of

a) river
b) glacier
c) ocean
d) wind

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

a) disconformity
b) parallel unconformity
c) angular unconformity
d) nonconformity

12) The hardest oxide mineral in the Mohs' scale of hardness is

a) corundum
b) topaz
c) quartz
d) diamond

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

a) orthoclase
b) olivine
c) plagioclase
d) biotite

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

a) tuff
b) obsidian
c) volcanic breccia
d) pumice

15) The most suitable radioactive method for dating Holocene events is

a) U-Pb
b) Sm-Nd
c) Rb-Sr
d) C-14

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

a) Tipam Group
b) Bhima Group
c) Nallamalai Group
d) Semri Group

17) Rampura-Agucha in Rajasthan is known for the ore deposit of

a) gold
b) tungsten
c) zinc
d) iron

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

a) Cretaceous
b) Holocene
c) Oligocene
d) Miocene

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

a) induced polarization
b) self-potential
c) gravity
d) magnetic

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

a) sonic logging
b) resistivity logging
c) temperature logging
d) density logging

21) The acceleration due to gravity (g) and universal gravitational constant (G) are related by the expression (Me and Re are the mass and radius of the earth, respectively)

a) $g = \frac{GM_e}{R^2}$
b) $g = \frac{GM_e}{R}$
c) $g = \frac{GR_eM_e}{R_a}$
d) $g = \frac{GR_eM^2}{R^2}$

22) The metamorphic facies diagnostic of subduction zone is

a) hornblende hornfels b) pyroxene hornfels c) blueschist d) granulite

23) In a formation, if the density increases and elastic constants remain unchanged, then
a) both P and S wave velocities increase
b) P wave velocity increases and S wave velocity decreases
c) both P and S wave velocities decrease
d) P wave velocity decreases and S wave velocity increases

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

a) $\sigma = \frac{\lambda}{2(\lambda+\mu)}$ b) $\sigma = \frac{2\lambda}{2\lambda+\mu}$ c) $\sigma = \frac{\mu}{2(\lambda+\mu)}$ d) $\sigma = \frac{2\mu}{2\lambda+\mu}$

25) In seismic exploration, 'ground roll' represents

a) direct wave b) surface wave c) Stonely wave d) shear wave

PART B (SECTION 1): FOR GEOLOGY CANDIDATES ONLY

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

a) (100), (001), (100)
b) (010), (001), (010)
c) (010), (110), (100)
d) (110), (001), (110)

27) The twin plane in the Manebach law is

a) (010) b) (001) c) (100) d) (021)

28) The optic sign of a mineral showing increase (i) and decrease (d) in interference colors after insertion of mica plate is

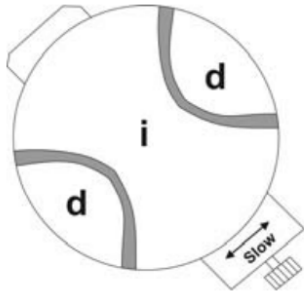

Fig. 1. Image for questions 28

a) uniaxial positive
b) uniaxial negative
c) biaxial positive
d) biaxial negative

29) The igneous rock falling in the shaded field of the diagram is

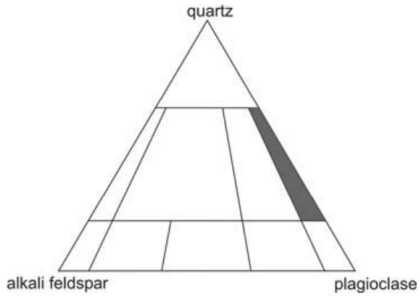

Fig. 2. Image for questions 29

a) granite b) syenite c) tonalite d) monzonite

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

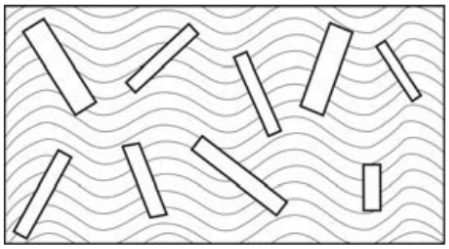

Fig. 3. Image for questions 30

a) pre-tectonic
b) early syn-tectonic
c) late syn-tectonic
d) post-tectonic

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

a) kyanite to sillimanite
b) sillimanite to kyanite
c) andalusite to kyanite
d) andalusite to sillimanite

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

a) prod cast
b) groove cast
c) flute cast
d) bounce cast

33) The echinoids transformed from epifaunal to infaunal type in the Jurassic times. Consider the following morphological changes:
P increase in size of spines
Q increase in number of spines
R development of phyllodes
S bulging of shell
Which of the above changes were functionally advantageous in this transformation?

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

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

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

a) P–1, Q–2, R–3, S–5
b) P–3, Q–2, R–1, S–4
c) P–2, Q–3, R–5, S–1
d) P–2, Q–4, R–5, S–3

35) Determine the correctness or otherwise of the following statements:
Assertion (a): The Lower Gondwana rocks in Central India, containing brachiopod genera Productus, Spiriferina and Reticularia, are considered to have formed by transgression of the Tethys Sea in Peninsular India during Permian.
Reason (r): The brachiopods are marine organisms and the stratigraphic ranges of the brachiopod species of the formation suggest Permian age.
a) Both (a) and (r) are true and (r) is the correct reason for (a)
b) (a) is true but (r) is false
c) (a) is false but (r) is true
d) Both (a) and (r) are true but (r) is not the correct reason for (a)

36) In the following lithostratigraphic units, which of the formations are of Palaeocene and/or Eocene age?
P Barail Formation
Q Subathu Formation
R Sylhet Limestone
S Kamlial Formation

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

37) The microfaunal assemblages in a fining upward stratigraphic sequence are given below:
Top: High abundance of *Globigerina, Globorotalia* and *Orbulina*
Middle: Moderate abundance of *Uvigerina, Cassidulina* and low abundance of *Globigerina*
Bottom: Moderate abundance of *Ammonia, Elphidium* and *Quinqueloculina* The sequence corresponds to

a) lowstand systems tract
b) highstand systems tract
c) transgressive systems tract
d) shelf margin systems tract

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

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

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

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

Group I	**Group II**
1. internal reflections	P. galena
2. bireflectance	Q. sphalerite
3. triangular pits	R. magnetite
4. pyrrhotite	S. pyrrhotite

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

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

a) 0.30–0.35 b) 0.53–0.58 c) 0.62–0.67 d) 0.74–0.78

41) Thermal maturation of hydrocarbon source rocks can be determined from
a) temperature of the borehole drilled into the source rock
b) $^{18}O/^{16}O$ ratio of the source rock
c) Mg/Ca ratio of foraminifera in the source rock
d) color of spores and pollens in the source rock

42) Determine the correctness or otherwise of the following statements:
Assertion (a) Strontium concentration in a basic magma decreases with fractional crystallization of plagioclase.
Reason (r) Strontium is a compatible trace element in plagioclase during magmatic crystallization.
a) Both (a) and (r) are true and (r) is the correct reason for (a)
b) (a) is true but (r) is false
c) (a) is false but (r) is true
d) Both (a) and (r) are true but (r) is not the correct reason for (a)

43) Which of the following is true for the coordination number n of aluminium?
a) $n = 4$ in both plagioclase and garnet
b) $n = 6$ in both plagioclase and garnet
c) $n = 4$ in plagioclase and $n = 6$ in garnet
d) $n = 6$ in plagioclase and $n = 4$ in garnet

44) If the dissociation constant of pure natural water at 50°C is 10^{-13}, the pH of the water will be

a) 6.00 b) 6.55 c) 7.00 d) 7.55

45) Choose the correct statement:
a) Sandstone forms aquifers and sandy shale forms aquifuges
b) Sandstone forms aquifers and sandy shale forms aquitards
c) Sandstone forms aquicludes and sandy shale forms aquifuges
d) Both sandstone and sandy shale form aquifuges

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

a) strain hardening b) stress stiffening c) work hardening d) creep

47) Which of the following lithostratigraphic units hosts lignite at Neyveli?

a) Ariyalur Formation
b) Cuddalore Formation
c) Kamthi Beds
d) Pali Beds

Common Data for Questions 48 and 49:

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

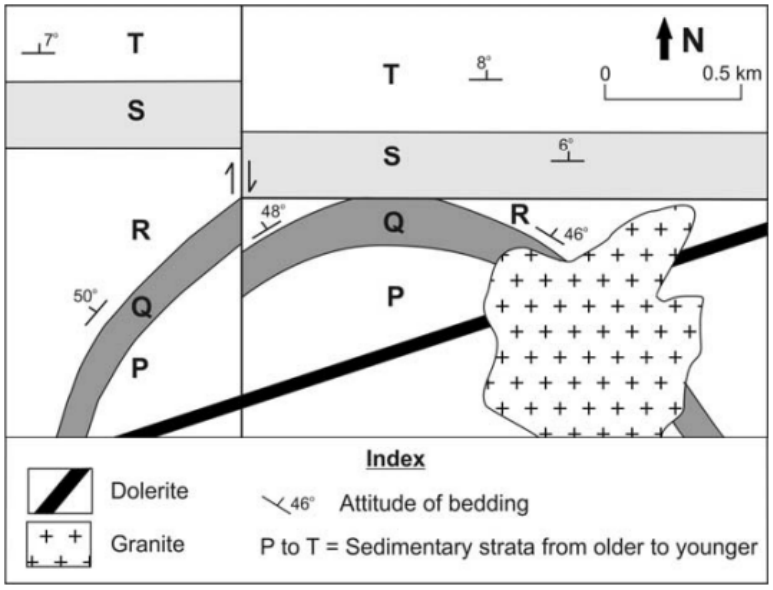

Fig. 4. Image for questions 48,49

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

a) north-plunging anticlinal antiform
b) south-plunging anticlinal antiform
c) north-plunging synclinal antiform
d) south-plunging synclinal antiform

49) The granite pluton intruded

a) before folding and faulting
b) before faulting but after folding
c) after development of unconformity but before faulting
d) after development of unconformity and faulting

Common Data for Questions 50 and 51:

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

50) The magma series typical of the arc is

a) alkaline
b) alkaline-shoshonitic
c) tholeiitic
d) calc-alkaline

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

a) Porphyry copper
b) Mississippi Valley lead and zinc
c) Besshi copper and zinc
d) Kuroko copper

Statement for Linked Answer Questions 52 and 53:

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

52) The sandstone belongs to the class

a) Quartz wacke
b) Arkosic wacke
c) Arkose
d) Quartz arenite

53) In which of the following conditions the correct sandstone class in the previous question might have formed?
P – Warm arid climate
Q – Humid tropical climate
R – Long exposure and transportation
S – Quick burial without much transportation

a) P – S
b) P – R
c) Q – R
d) Q – S

Statement for Linked Answer Questions 54 and 55:

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

54) Which of the following lithostratigraphic units is of Palaeoproterozoic age?

a) Aravalli Supergroup
b) Dharwar Supergroup
c) Vindhyan Supergroup
d) Sukma Group

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

a) chlorite schist – copper
b) dolomite – lead and zinc
c) banded haematite quartzite – iron
d) chlorite schist – antimony

PART B (SECTION 2): FOR GEOLOGY CANDIDATES ONLY

26) Rayleigh number associated with convection in the earth's interior is proportional to the ratio of
   a) buoyancy force to diffusive viscous force
   b) buoyancy force to gravitational force
   c) diffusive viscous force to gravitational force
   d) gravitational force to buoyancy force

27) Shadow zones for direct P- and S-waves lie between
   a) 102° to 142° for both direct P- and S-waves
   b) 102° to 180° for direct P-wave and 102° to 142° for direct S-wave
   c) 102° to 180° for both direct P- and S-waves
   d) 102° to 142° for direct P-wave and 102° to 180° for direct S-wave

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

   a) amplitude b) direction c) energy d) phase

29) In seismic reflection, the seismic trace is modeled as
   a) convolution of source wavelet with the reflection coefficient series
   b) multiplication of source wavelet with the reflection coefficient series
   c) correlation of source wavelet with the reflection coefficient series
   d) addition of source wavelet with the reflection coefficient series

30) From the following figure, choose the correct multiple reflection events encountered in seismic exploration

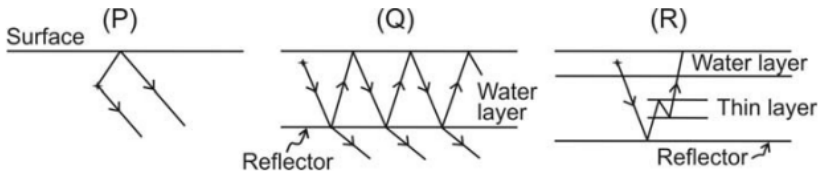

Fig. 5. Image for questions 30

   a) P is peg leg multiple, Q is ghost, R is long path multiple
   b) P is ghost, Q is simple multiple, R is reverberation
   c) P is peg leg multiple, Q is simple multiple, R is reverberation
   d) P is ghost, Q is reverberation, R is peg leg multiple

31) Match the items in **Group I** with those in **Group II**

Group I	**Group II**
	1. Reciprocal of total signal duration
P. Correlation in frequency domain	2. Aliasing
Q. Phase spectrum	3. Product of Fourier transform and its conjugate
R. Frequency interval	4. Autocorrelation
S. Undersampling	5. Hilbert transform

   a) P–3, Q–5, R–1, S–2 c) P–3, Q–4, R–1, S–2
   b) P–3, Q–4, R–2, S–1 d) P–2, Q–3, R–4, S–5

32) The derivative of the following boxcar function is

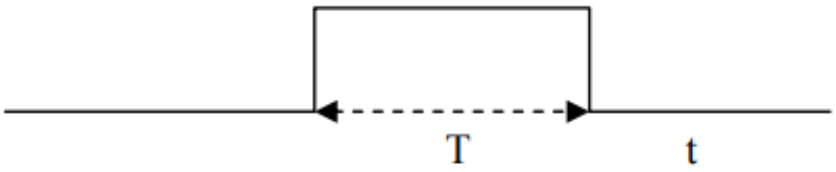

Fig. 6. Image for questions 33

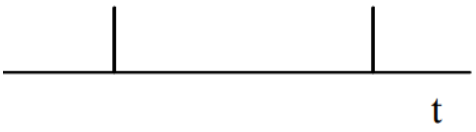

Fig. 7. Image for questions 33

a)

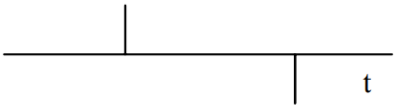

Fig. 8. Image for questions 33

b)

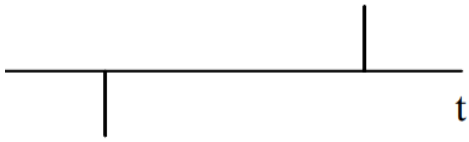

Fig. 9. Image for questions 33

c)

Fig. 10. Image for questions 33

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

a) +38.5 b) +24.5 c) –35.5 d) –39.5

35) Isostatic residual anomaly over a mountainous terrain is due to
a) gravitational effect of compensating mass
b) long wavelength variations of topography
c) short wavelength variations of topography
d) density inhomogeneities in the upper and middle crust

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

a) 0.015 b) 0.030 c) 0.045 d) 0.060

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

a) 1890 b) 2020 c) 2130 d) 2420

38) Gamma ray log measurements are used to quantify
a) hydrocarbon saturation
b) porosity of the formation

c) density of the formation
d) volume of shale in the formation

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

a) neutron log b) latero log c) induction log d) NMR log

40) Compton scattering takes place if the energy of gamma rays lies in the range of
a) 10 KeV to 50 KeV
b) 50 KeV to 100 KeV
c) 100 KeV to 2.0 MeV
d) 2.0 MeV to 3.5 MeV

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

a) $\nabla \times \mathbf{E} = \mathbf{J}$
b) $\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$
c) $\nabla \cdot \mathbf{D} = \rho$
d) $\nabla \cdot \mathbf{B} = 0$

42) The apparent resistivity sounding curve representing the resistivity structure $\rho_1 > \rho_2 < \rho_3 < \rho_4$ is

a) HK-type
b) HA-type
c) KH-type
d) KQ-type

43) Forced movement of fluids through porous rocks gives rise to

a) streaming potential
b) Nernst potential
c) mineralization potential
d) liquid junction potential

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

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

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

45) Arrange the following electromagnetic methods in the decreasing order of depth of investigation.
P – Time domain EM method
Q – Magnetotelluric method
R – VLF method
S – Ground Penetrating Radar method

a) $P > Q > S > R$
b) $S > Q > P > R$
c) $Q > P > R > S$
d) $Q > R > P > S$

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

a) $(G^TG)^{-1}G^T$
b) $(G^TG)^{-1}$
c) $G^T(GG^T)^{-1}$
d) $(GG^T)^{-1}$

47) The primary field (H_p) in EM prospecting is represented by $H_p = K\sin(\omega t)$. Which is the correct expression for induced e.m.f. (e_s) in the subsurface conductor? (K and K' are constants)
a) $e_s = K'\sin(\omega t - \phi)$
b) $e_s = K'\cos(\omega t - 2\phi)$
c) $e_s = K'\sin(\omega t - \frac{\phi}{2})$
d) $e_s = K'\cos(\omega t - \phi)$

Common Data for Questions 48 and 49:

Time series P and Q are given by P = {1, -1, -2, 0, 1} Q = {1, 0, -1}

48) The convolution of P and Q is
a) {-1, 0, 3, 1, -3, -1, 1}
b) {1, -1, -3, 1, 3, 0, -1}
c) {1, -1, -3, -1, 3, 1, -1}
d) {1, 0, 3, 1, -3, -1, 1}

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

a) 0 b) 1 c) 2 d) 3

Common Data for Questions 50 and 51:

An asymmetric split spread extends from $x_1 = -400$ m to $x_2 = 800$ m. A reflection observed on the spread yields $t_1 = 0.997$ s at $x_1 = -400$ m, $t_2 = 1.025$ s at $x_2 = 800$ m, $t_0 = 1.0$ s at $x = 0.0$ m, velocity = 2800 m/s.

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

a) 5 and 30 ms b) 8 and 35 ms c) 10 and 41 ms d) 15 and 45 ms

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

a) 700 m b) 1400 m c) 2100 m d) 2800 m

Linked Answer Questions 52 and 53:

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

52) What is the depth to the center of the ore deposit?

a) 3100 m b) 1820 m c) 1560 m d) 1450 m

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

Table 1		Table 2		Table 3	
Distance (m)	**Gravity anomaly (mGal)**	**Distance (m)**	**Gravity anomaly (mGal)**	**Distance (m)**	**Gravity anomaly (mGal)**
0	0.25	2400	3.50	4800	1.50
400	0.35	2800	4.00	5200	0.80
800	0.50	3200	5.00	5600	0.50
1200	0.80	3600	4.00	6000	0.35
1600	1.50	4000	3.50	6400	0.25
2000	2.50	4400	2.50		

a) 1.615×10^8 b) 2.165×10^8 c) 1.312×10^9 d) 1.825×10^9

Statement for Linked Answer Questions 54 and 55:

An axial dipole–dipole configuration is given below:

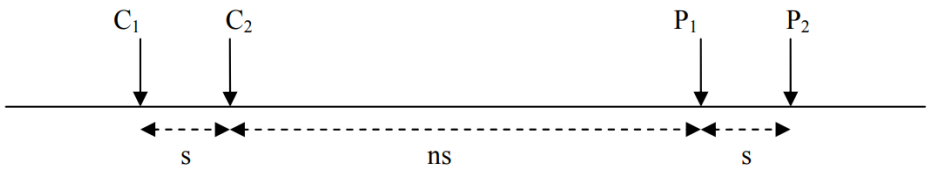

Fig. 11. Image for questions 54,55

54) The geometrical factor for the above axial dipole array is

a) $\pi n(n+1)s$ b) $\pi n(n+2)s$ c) $\pi(n+1)(n+2)s$ d) $\pi n(n+1)(n+2)s$

55) What is the apparent resistivity (in Ωm) if 1.0 Amp current flowing between C1 and C2 produces 10 mV potential difference between P1 and P2 for $s = 10\,\text{m}$ and $n = 10$? (Use $\pi = 3.14$)

a) 414.48 b) 41.45 c) 37.68 d) 34.54

General Aptitude (GA) Questions

56) Choose the most appropriate word or phrase from the options given below to complete the following sentence. **The environmentalists hope the lake _____ its pristine condition.**
   a) in restoring
   b) in the restoration of
   c) to restore
   d) restoring

57) Choose the word from the options given below that is most nearly opposite in meaning to the given word: **Polemical**
   a) imitative
   b) conciliatory
   c) truthful
   d) ideological

58) Choose the most appropriate word from the options given below to complete the following sentence. **Despite the mixture's _____ nature, we found that by lowering its temperature in the laboratory we could dramatically reduce its tendency to vaporize.**
   a) acerbic
   b) resilient
   c) volatile
   d) heterogeneous

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

   a) 100 days b) $m/100$ days c) $100/m$ days d) m days

60) Choose the most appropriate words from the options given below to complete the following sentence. **Because she had a reputation for _____, we were surprised and pleased when she greeted us so _____.**
   a) insolence ..... irately
   b) insouciance .....curtly
   c) graciousness .....amiably
   d) querulousness ..... affably

61) The number of solutions for the following system of inequalities is

$$x_1 \geq 0, \quad x_2 \geq 0, \quad x_1 + x_2 \leq 10, \quad 2x_1 + 2x_2 \geq 22$$

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

62) In a class of 300 students in an M.Tech programme, each student is required to take at least one subject from the following three:
   M600: Advanced Engineering Mathematics
   C600: Computational Methods for Engineers
   E600: Experimental Techniques for Engineers
   The registration data for the M.Tech class shows that 100 students have taken M600, 200 students have taken C600, and 60 students have taken E600. What is the maximum possible number of students in the class who have taken all the above three subjects?

a) 20 b) 30 c) 40 d) 50

63) Three sisters (R, S, and T) received a total of 24 toys during Christmas. The toys were initially divided among them in a certain proportion.n. Subsequently, R gave some toys to S which doubled the share of S. Then S in turn gave some of her toys to T, which doubled Tś share. Next, some of Tś toys were given to R, which doubled the number of toys that R currently had. As a result of all such exchanges, the three sisters were left with equal number of toys. How many toys did R have originally?

a) 8 b) 9 c) 11 d) 12

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

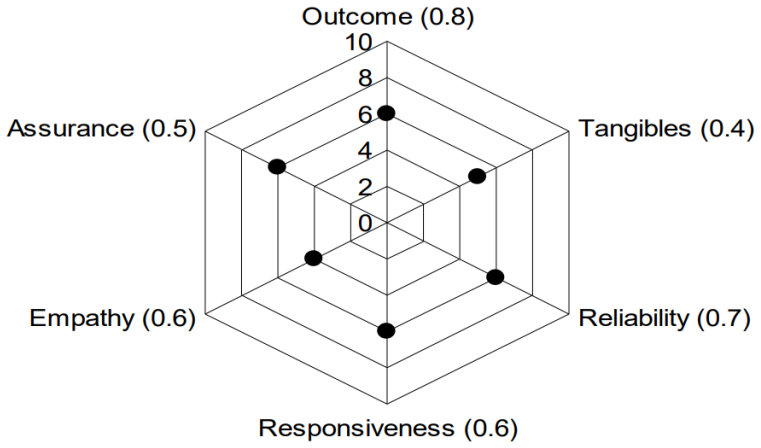

Fig. 12. Image for questions 64

Which factor contributes the least?

a) 10 b) 20 c) 24 d) 40

65) **In order to develop to full potential, a baby needs to be physically able to respond to the environment.** It can be inferred from the passage that

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