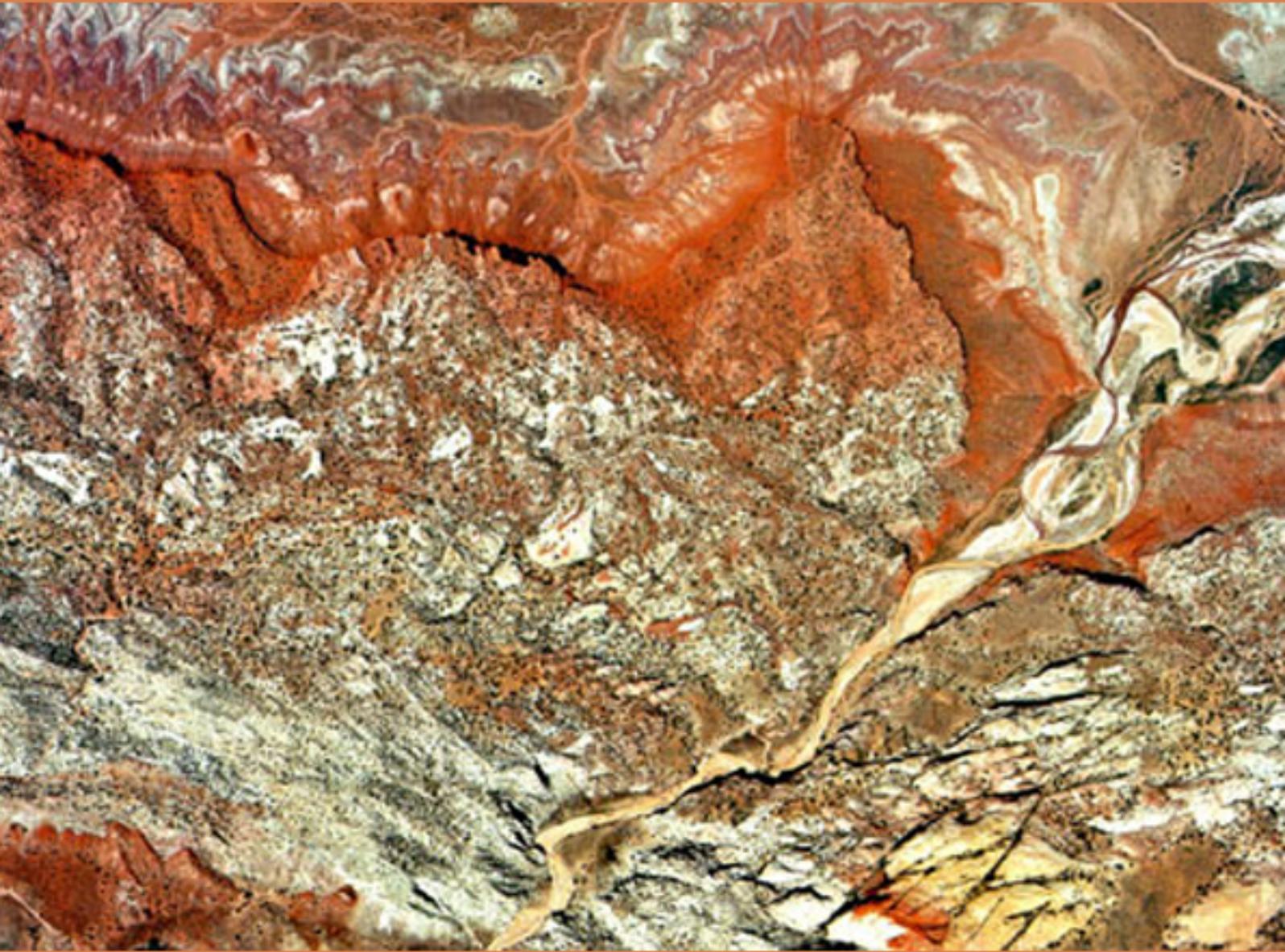


GATE



**Geology and Geophysics
Previous Year Question Papers
With Answers
(2016-2012)**

Q. 1 – Q. 5 carry one mark each.

Q.1 The volume of a sphere of diameter 1 unit is _____ than the volume of a cube of side 1 unit.
(A) least (B) less (C) lesser (D) low

Q.2 The unruly crowd demanded that the accused be _____ without trial.
(A) hanged (B) hanging (C) hankering (D) hung

Q.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.

(A) (i) and (iii) only (B) (iii) only (C) (i) and (ii) only (D) (ii) and (iii) only

Q.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?

- (A) If (iii), then (iv).
- (B) If (i), then (iii).
- (C) If (i), then (ii).
- (D) If (ii), then (iv).

Q.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 _____.

(A) 1.43 (B) 2.06 (C) 2.68 (D) 2.88

Q. 6 – Q. 10 carry two marks each.

Q.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**?

- (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.

Q.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.

- (A) (i) and (iv) only
- (B) (ii) and (iii) only
- (C) (iv) only
- (D) (i) only

Q.8 Find the missing sequence in the letter series.

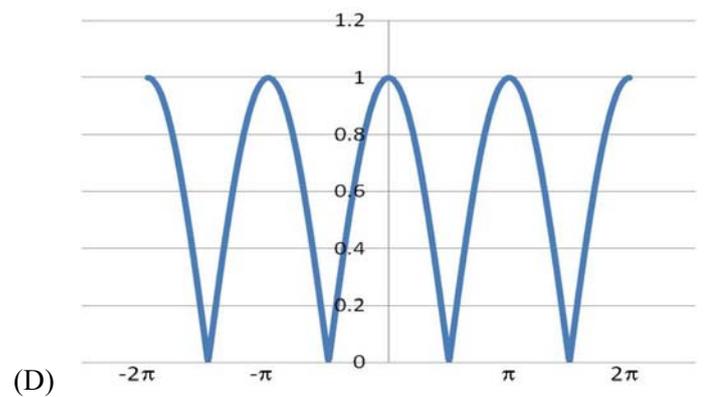
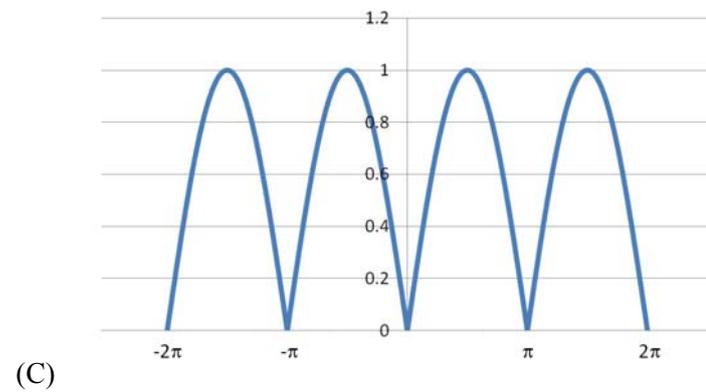
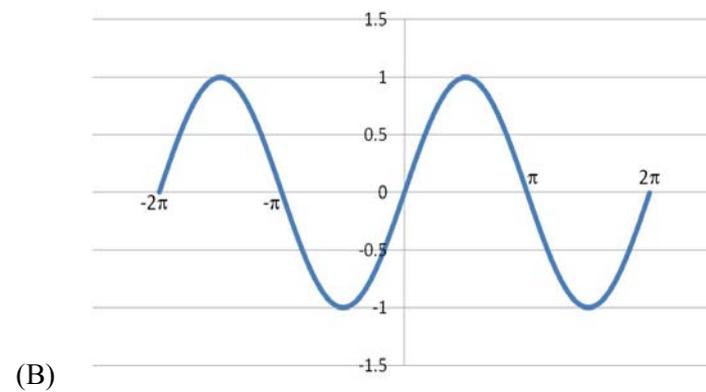
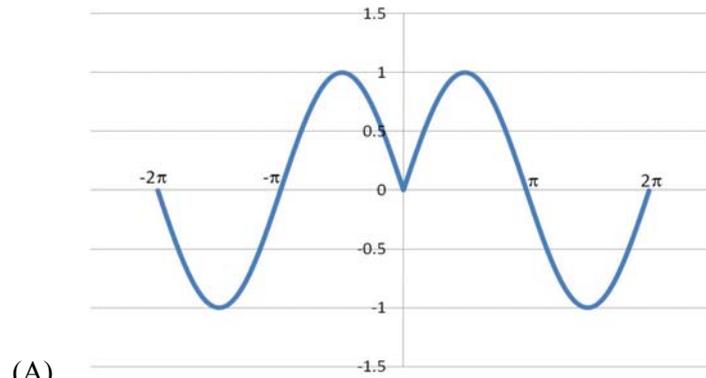
B, FH, LNP, _ _ _ _.

- (A) SUWY
- (B) TUVW
- (C) TVXZ
- (D) TWXZ

Q.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 _____.

- (A) 0
- (B) 1
- (C) 2
- (D) 10

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



END OF THE QUESTION PAPER

Geology: Common Section

Q. 1 – Q. 25 carry one mark each.

- Q.1 The first continental red beds appeared in the _____ Eon.
(A) Proterozoic (B) Archaean (C) Hadean (D) Phanerozoic
- Q.2 Which one of the following is a chronostratigraphic unit?
(A) Eon (B) Period (C) Era (D) System
- Q.3 _____ is a well-sorted sandstone containing up to 75% quartz, with rock fragments in excess of feldspar.
(A) Arkose (B) Lithic arenite (C) Quartz arenite (D) Feldspathic arenite
- Q.4 International Geomagnetic Reference Field (IGRF) is used in processing regional magnetic data
(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.
- Q.5 Which one of the following layers of the Earth has the largest volume?
(A) Upper Mantle (B) Lower Mantle
(C) Outer core (D) Inner Core
- Q.6 The S-wave shadow zone of the Earth ranges from _____.
(A) 103° to 180° (B) 103° to 160° (C) 103° to 153° (D) 103° to 143°
- Q.7 According to Airy's model, gravity anomalies for fully isostatically compensated topography are characterized by
(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.

Q.8 Match the metals (listed in Group I) with the localities of their deposits (listed in Group II).

Group I

- P. Iron
- Q. Zinc
- R. Gold
- S. Chromium

Group II

- 1. Boula
- 2. Gadag
- 3. Bellary
- 4. Agucha

- (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

Q.9 In a region, given the palaeomagnetic inclination (I_R), the palaeolatitude (λ_R) can be calculated using the formula _____.

- (A) $\cos I_R = \sin \lambda_R$
- (B) $\tan I_R = \tan \lambda_R$
- (C) $\tan I_R = 2 \tan \lambda_R$
- (D) $\sin I_R = 2 \cos \lambda_R$

Q.10 Which one of the following parent-daughter systems has the longest half life?

- (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) $^{187}\text{Os} \rightarrow ^{187}\text{Re}$

Q.11 For a soil, Liquidity Index = (Natural Water Content – X) / Plasticity Index.
Here, X is _____.

- (A) Shrinkage Limit
- (B) Plastic Limit
- (C) Liquid Limit
- (D) Activity

Q.12 Match the following features (listed in Group I) with the different agents of erosion (listed in Group II).

Group I

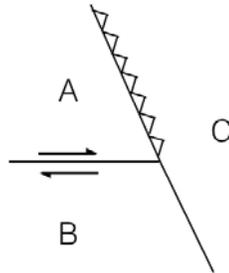
- P. Earth pillar
- Q. Fjord
- R. Pot hole
- S. Yardang

Group II

- 1. River
- 2. Wind
- 3. Glacier
- 4. Rain

- (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

- Q.20 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 _____.



- (A) mid-oceanic ridge
 (B) subduction zone
 (C) sinistral transform fault
 (D) dextral transform fault
- Q.21 In Gondwanaland reconstructions, much of the present west coast of India is placed adjacent to _____.
- (A) South America
 (B) Madagascar
 (C) Antarctica
 (D) Australia
- Q.22 Two vertically dipping limbs of a fold have perpendicular strikes. The fold can be classified as _____.
- (A) an antiformal fold
 (B) a synformal fold
 (C) a vertical fold
 (D) a recumbent fold
- Q.23 Match the crystal forms (listed in Group I) with their corresponding number of faces (listed in Group II).

Group I

- P. Cube
 Q. Tetrahedron
 R. Pinacoid
 S. Dodecahedron

Group II

1. Two
 2. Four
 3. Six
 4. Twelve

- (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

Q.24 Match the rocks in Group I with their essential mineral assemblages in Group II.

Group I

- P. Granodiorite
- Q. Harzburgite
- R. Gabbro
- S. Diorite

Group II

- 1. Hornblende-plagioclase
- 2. Plagioclase-quartz
- 3. Olivine-orthopyroxene
- 4. Clinopyroxene-plagioclase

- (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

Q.25 Which one of the following mineral assemblages is stable under eclogite facies conditions?

- (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

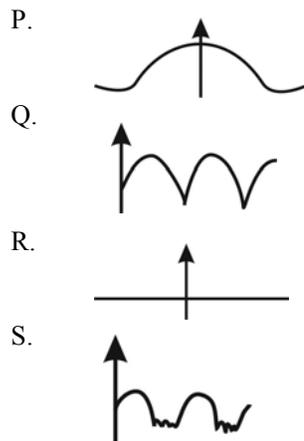
Q. 26 – Q. 55 carry two marks each.

Q.26 Select the CORRECT statement from the following options.

- (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.

Q.27 Match the following patterns (listed in Group I) with their appropriate Cephalopod sutures (listed in Group II). Arrow gives the direction of aperture.

Group I



Group II

- 1. Ceratitic
- 2. Nautilitic
- 3. Goniatic
- 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

Q.28 Match the following test composition (listed in Group I) with the microfossil taxa (listed in Group II)

Group I

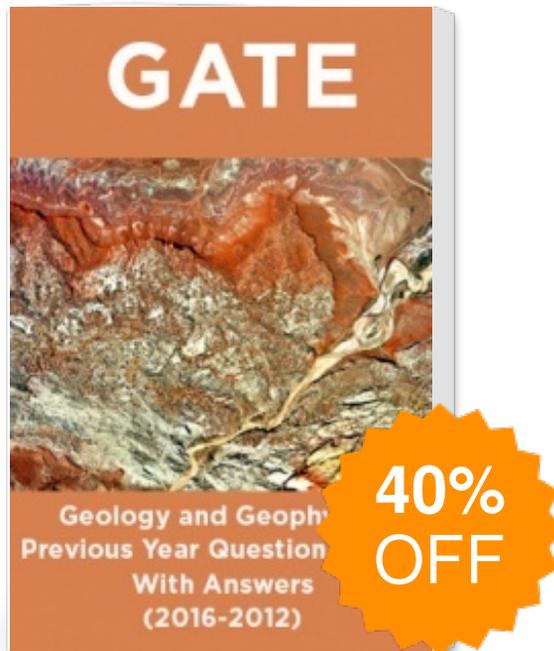
- P. Organic-walled
- Q. Siliceous
- R. Phosphatic
- S. Calcareous

Group II

- 1. Radiolaria
- 2. Conodont
- 3. Foraminifera
- 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

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