

GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject: Geology

Paper name: Dynamics of the earth and Structural Geology

Paper No: XXI

Semester: Sixth semester

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A. Multiple choice questions [75 (15 from each unit)]

1. The difference between the equatorial and polar diameters of the earth is
 - a) 21 km
 - b) 43 km
 - c) 56 km
 - d) 28 km

2. The Mohorovicic discontinuity is a
 - a) Compositional boundary
 - b) Phase change boundary
 - c) Compositional as well as phase change boundary
 - d) none of these

3. The earth's crust is thickest under
 - a) Shield areas
 - b) Platforms
 - c) Phanerozoic orogenic belts
 - d) Archaean greenstone belts

4. Mohorovicic discontinuity is marked by
 - a) Abrupt increase in the seismic wave velocities
 - b) Abrupt decrease in the seismic wave velocities
 - c) Gradual increase in the seismic wave velocities
 - d) Gradual decrease in the seismic wave velocities

5. The seismic velocities attain their maximum value for the Earth in
 - a) Upper Mantle
 - b) Lower Mantle
 - c) Outer Core
 - d) Inner Core

6. Pratt's hypothesis of isostasy does not take into account
 - a) Thickness of the crust
 - b) Thickness of the substratum
 - c) Density of the crust
 - d) Density of the substratum

7. According to the doctrine of isostasy, a region of lower density shows
 - 1) Negative anomaly
 - 2) Mass deficiency
 - 3) Mass excess

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- 4) Positive anomaly
a) 1 only
b) 2 only
c) 1 and 3 only
d) 2 and 4 only
8. The Tethys sea was located between
a) North America and South America
b) North America and Eurasia
c) Eurasia and Africa
d) Antarctica and Australia
9. The oceanic crust is not older than
a) Permian
b) Triassic
c) Jurassic
d) Cretaceous
10. The fastest spreading of the sea floor is exhibited by the
a) South Atlantic Ridge
b) North Atlantic Ridge
c) Central Indian Ridge
d) East Pacific Rise
11. Rocks formed at the ridge crest which are younger than 0.69 M.Y are
a) Normally magnetized
b) Reversely magnetized
c) Either normal or reversely magnetized
d) None of the above
12. The plate boundary at the San Andreas fault is an example of
a) Constructive plate boundary
b) Consuming plate boundary
c) Convergent plate boundary
d) Conservative plate boundary
13. Earthquakes whose depth of focus ranges between 300-700 km are known as
a) Shallow focus earthquakes
b) Intermediate focus earthquakes
c) Deep focus earthquakes
d) Normal earthquake
14. Most of the earthquakes of the shallow focus range are caused due to
a) Normal faulting
b) Gravity faulting
c) Reverse faulting
d) Thrust faulting
15. Swarms are minor earthquakes which are mostly of
a) Shallow focus

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- b) intermediate focus
 - c) Deep focus
 - d) A combination of the above
16. Which of the following is a modified seismic scale having twelve divisions?
- a) Richter scale
 - b) Rossi-Forel Scale
 - c) Mercalli Scale
 - d) Beufort Scale
17. Low frequency, long wavelength seismic waves whose particle motion lies in a horizontal direction perpendicular to the direction of wave propagation are described as
- a) Push waves
 - b) Shear waves
 - c) Rayleigh waves
 - d) Love waves
18. The disaster sequence of the seismic waves is
- a) $P > S > I$
 - b) $I > P > S$
 - c) $P > L > S$
 - d) $P < S < L$
19. The most abundant light element present in the core is
- a) Either S or O
 - b) Either S or Al
 - c) K
 - d) Na
20. The radial extent of the core is
- a) 2886 km
 - b) 3486 km
 - c) 1227 km
 - d) 4113 km
21. The mantle does not contribute to the magnetic anomalies because
- a) It does not contain abundant metallic ions to induce a magnetic field
 - b) It contains only ultramafic rocks which are essentially non magnetic
 - c) It exhibits a more or less constant magnetic field
 - d) The temperatures are above the curie point of natural magnetic materials
22. Which of the following environments are not characterized by extensional stress regime?
- a) Oceanic ridges
 - b) Marginal sea basins
 - c) continental rifts
 - d) collision zones
23. Which of the following ocean exhibit a more or less constant spreading of its floor?
- a) Indian ocean

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- b) Pacific ocean
 - c) South Atlantic ocean
 - d) North Atlantic ocean
24. In the plate tectonic concept, the plates are made up of
- a) Continental crust only
 - b) Oceanic crust only
 - c) Both continental and oceanic crust
 - d) Continental crust, oceanic crust and outer parts of the upper mantle.
25. A pattern of deep trench and island arc develops as a result of
- a) Ocean-continent collision
 - b) Ocean-ocean collision
 - c) Continent-continent collision
 - d) None of these
26. Passive margins are characterized by
- i) Aseismicity
 - ii) Lack of any considerable degree of subsidence
 - iii) Thick sedimentary sequences
 - iv) Their location bordering young and expanding oceans
- a) (i) and (ii) are correct
 - b) (i), (ii) and (iv) are correct
 - c) (i), (iii) and (iv) are correct
 - d) (ii), (iii) and (iv) are correct
27. A typical active margin has
- a) A trench and island arc along its oceanic side
 - b) A trench and an island arc along its landward side.
 - c) A trench along its oceanic side and an island arc along its landward side
 - d) An island arc on its oceanic side and a trench on the landward side
28. The Low velocity zone apart from reduced seismic velocities is also characterized by
- a) low heat flow
 - b) low heat flow and high electrical conductivity
 - c) High heat flow and high electrical conductivity
 - d) High heat flow and low electrical conductivity
29. The Low velocity zone (LVZ) is not poorly developed in the regions of
- a) Shield areas
 - b) Platforms
 - c) Marine trenches
 - d) Mid-oceanic ridges
30. The linear magnetic anomalies occurring as parallel bands along many MORs are most probably caused by the rocks of:
- a) Layer 1 of the oceanic crust
 - b) Layer 2 of the oceanic crust
 - c) Basaltic layer of the continental crust
 - d) Ultramafic rocks of the mantle

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31. The oldest of all the scales devised to measure the intensity of seismic waves is
- Richter scale
 - Rossi-Forel Scale
 - Mercalli Scale
 - Beaufort scale
32. “At a certain level in the earth’s crust all columns of material having unit-cross sectional area must have the same mass”. This statement refers to:
- Base level of erosion
 - Principle of isostasy
 - Law of conservation of mass
 - Dirac’s principle
33. According to Airy’s principle of isostasy:
- The density of the crust and the substratum is uniformly same throughout
 - The thickness of the crust and the substratum is uniformly same throughout
 - The crust and the substratum each have uniform but different densities
 - The crust has a constant thickness at the top whereas the substratum has a constant thickness at the bottom.
34. In the Gondwanaland, India was not adjacent to
- Africa
 - Australia
 - Antarctica
 - South America
35. The oldest of the magnetic epochs in the Geo-Magnetic timescale is
- Gauss reversed
 - Gilbert reversed
 - Gauss normal
 - Gilbert normal
36. Which of the following is/are characteristics of a subduction zone?
- Melting of old plates
 - Mountain building and upliftment
 - Generation of earthquakes and volcanoes
 - All of these
37. Transform faults which retain a constant length as a function of time are known as
- Ridge-Ridge
 - Ridge-Trench
 - Trench-Trench
 - None of these
38. Which of the following is not a closing ocean basin?
- Black Sea
 - Red Sea
 - Caspian Sea
 - Mediterranean Sea

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39. In a double arc, the folded and thrust sediments are found in
- Outer arc only
 - Inner arc only
 - Both outer and inner arcs
 - none of the above
40. Exfoliation is a form of
- Physical weathering
 - Chemical weathering
 - Bochemical weathering
 - Mass wasting
41. Exfoliation, a dominant physical process, is also assisted by some chemical processes. The most important part is played by
- Hydration
 - Oxidation
 - Hydrolysis
 - Carbonation
42. Mushroom shaped structures having slender columns and wide tops resulting from the abrasive action of wind are described as
- Venifacts
 - Brazil nuts
 - Pedestal rocks
 - Draas
43. Inselbergs characteristically consists of
- Isolated pillar like masses in desert
 - U-shaped troughs formed by winds
 - Cup shaped depressions formed by glacial erosion
 - Sink hole ponds formed by solution action in karst regions
44. The knob and kettle topography is encountered in the regions of
- glacial environment
 - fluvial environment
 - deltaic environment
 - arid environment
45. Natural levee is an example of
- point bar deposit
 - Channel-fill deposit
 - Flood plain deposit
 - Flood basin deposit
46. The horse shoe shaped lakes formed in the cut off menders of a river are known as
- oxbow lakes
 - Mort lakes
 - Billabongs
 - All of the above

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47. An erosional ridge having a long, gentle slope on one side and an abrupt slope on the other is known as
- Gloup
 - Groyne
 - Cuesta
 - Hogback
48. Which of the following is not an erosional feature of wind?
- Zeugen
 - Yardang
 - Serir
 - Hohlweg
49. Flat topped hills or small mountains formed by stream action are called
- mesas
 - buttes
 - cuestas
 - stram terraces
50. An interlaced network of high sinuosity channels is a feature exhibited by
- Meandering streams
 - Braided streams
 - Anastomosing streams
 - incised meanders
51. The property of a rock whereby they break along approximately parallel surfaces is termed
- bedding fissility
 - rock cleavage
 - lineation
 - foliation
52. The term "Continuous cleavage" includes
- Slaty cleavage and schistosity
 - Slaty cleavage and fracture cleavage
 - Fracture cleavage and crenulation cleavage
 - Axial plane cleavage and bedding cleavage
53. The term spaced cleavage includes
- Fracture cleavage+Slaty cleavage
 - Fracture cleavage+Flow cleavage
 - Fracture cleavage+Schistosity
 - Fracture cleavage+Shear cleavage+Slip cleavage
54. When sausage-shaped bodies of one rock layer are sandwiched between layers of different rock types, the structure is described as a
- boudinage
 - mullion
 - mineral lineation

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- d) crenulation
55. Mullions are formed under
- compressive stress regime
 - tensile stress regime
 - shearing
 - all of the above
56. A shear zone may be defined as
- a brittle zone between two undeformed rocks
 - a zone of ductile deformation between two undeformed rocks
 - a zone of relative displacement between two deformed rocks
 - none of the above
57. Pi diagrams and beta diagrams are used for analyzing
- folds
 - faults
 - folds and faults
 - joints
58. A clinometer compass is used to measure
- strike direction
 - strike and dip direction
 - strike directions, dip direction and dip amount
 - none of the above
59. The greatest principal stress is vertical in
- Normal faults
 - Reverse faults
 - Thrust faults
 - Strike-slip faults
60. Substances that undergo a large plastic deformation before rupture is called
- brittle
 - ductile
 - amorphous
 - malleable
61. When the strain is recoverable but is also time dependent, the deformation is known as
- elastic
 - anelastic
 - plastic
 - ductile
62. In the common geologic practice a compressive stress is considered to be
- positive
 - negative
 - either positive or negative
 - neither positive nor negative

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63. If the orientations of the principal stress axes X, Y and Z have changed during the deformation, the process is known as
- Pure shear
 - simple shear
 - Axial strain
 - triaxial stress
64. In a general stress (triaxial stress) system
- the three principal stresses are equal
 - the three principal stresses are unequal
 - the three principal stresses are unequal and have non-zero values
 - None of the above
65. The average value of Poisson's ratio for rocks is
- 0.25
 - 0.50
 - 1.00
 - 1.50
66. The behavior of perfectly elastic bodies is governed by
- Hooke's law
 - Hilt's law
 - Lambert's law
 - Bode's law
67. Hooke's law is applicable in the case of
- stretching
 - bending
 - twisting
 - all of the above
68. Liquids and gases possess
- Bulk modulus of elasticity
 - Young's modulus of elasticity
 - Both a and b
 - Rigidity modulus of elasticity
69. Compressibility can be described as the reciprocal of
- bulk modulus
 - young's modulus
 - rigidity modulus
 - none of the above
70. Poisson's ratio is the ratio between
- tangential stress and shearing strain
 - transverse pressure and axial strain
 - hydrostatic pressure and volume strain
 - None of the above

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71. Feather joints are formed due to
- tectonic stresses
 - residual stresses
 - shearing
 - tensional forces
72. For strongly linear fabrics the relationship between principal strain axes is such that
- $X > Y > Z$
 - $X \approx Y > Z$
 - $X > Y \approx Z$
 - $X = Y = Z$
73. The simplest relationship between shear stress σ and normal stress τ at failure is given by the formula $\tau = C + \mu\sigma$ where C and μ are constants. This relationship is described as
- Mohr equation
 - Mohr failure envelope
 - Coulomb failure criterion
 - Griffith failure criterion
74. A material which basically obeys the viscous law but which behaves elastically for stresses of short duration is termed
- viscoelastic
 - elastoviscous
 - plastic
 - ductile
75. A B-tectonite exhibits
- penetrative linear fabric
 - penetrative planar fabric
 - non-penetrative linear fabric
 - non-penetrative planar fabric

B. Fill up the blanks [15 (3 from each unit)]

- Beneath the oceans, the MOHO lies at the depth of _____
- The _____ occupies the largest % of the crust.
- The most accurately known physical parameter in the deep earth is _____
- The largest and the only outcrop of an oceanic ridge is _____.
- The highest pressures in the earth's crust is encountered in _____
- According to Wegener, the movement of continents was effected by _____ and pohlflucht forces.
- Laurasia and Gondwanaland collided in the _____ to form a single continent Pangea
- Plates are essentially _____ regions of the earth.
- According to Wegener, the continents had drifted generally towards _____
- Loess is a non-stratified, well sorted aeolian deposit composed of _____ grade fragments
- A beach of sand/gravel that connects two islands or an island with mainland is called _____
- Glaciers approximately occupy _____ % of the world's area

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13. A planar flattening fabric, such as slaty cleavage, schistosity or gneissosity lies in _____ plane of the strain ellipsoid
14. Direct stress acts _____ to the surface of the body
15. Very small ridges and depressions on the surface of joints are described as _____

Key Answers

A. Multiple choice questions [replace x]

1. b) 2. c) 3. c) 4. a) 5. b) 6. b) 7. c)
8. c) 9. c) 10. d) 11. a) 12. d) 13. c) 14. d)
15. a) 16. c) 17. d) 18. d) 19. a) 20. b) 21. d)
22. d) 23. c) 24. d) 25. b) 26. c) 27. c) 28. b)
29. d) 30. b) 31. b) 32. b) 33. c) 34. d) 35. b)
36. d) 37. a) 38. b) 39. a) 40. a) 41. a) 42. c)
43. a) 44. a) 45. c) 46. a) 47. c) 48. c) 49. b)
50. c) 51. d) 52. a) 53. d) 54. a) 55. a) 56. b)
57. a) 58. c) 59. a) 60. b) 61. b) 62. a) 63. b)
64. c) 65. a) 66. b) 67. d) 68. a) 69. a) 70. b)
71. c) 72. c) 73. c) 74. b) 75. b)

B. Fill up the blanks [replace x]

1. 7-9 km
2. Oceanic crust
3. Seismic wave velocity
4. Iceland
5. Oceanic trenches
6. Tidal forces
7. Hercynian orogeny
8. Inert/aseismic
9. north
10. silt
11. tombolo
12. 10
13. XY
14. normal
15. plumose markings