

ES 1101, 2018, End Semester Examination
Full Marks 50, Time 3 Hours



Name: _____, ID _____

Question I : Fill up the blanks: 30 x 0.5=15

1. The three processes of chemical weathering are _____, _____, & _____.
2. An example of gravity-aided erosional process is _____.
3. Exfoliation domes are formed due to _____ during physical weathering.
4. A rock containing gravel sized rounded fragments is called _____.
5. Foliation is developed due to _____ pressure.
6. A composite igneous-metamorphic rock is called _____.
7. The affected thermally metamorphosed area at the contact of an igneous intrusion is called _____.
8. In normal sea water iron is expected to be carried as _____ ion (Valency).
9. Magmatic addition and _____ are the processes responsible for continental growth.
10. Detrital sedimentary rocks are classified on the basis of _____ of the grains.
11. Both pressure and temperature act as agents for _____ metamorphism.
12. Volcanoes throwing out both lava and ash are called _____ volcanoes.
13. The surface wave (generated by earthquake) moving like a wave is called _____ wave.
14. Velocity of shear wave depends on _____ and _____.
15. Two elements produced by non-stellar "r" process are _____ and _____.
16. The incoming solar radiation is in the form of _____ radiation, while the outgoing radiation is in the form of _____ radiation.
17. Reflectivity (of solar radiation) of earth materials is defined by the term _____.
18. A crystal having the relation $a=b\neq c$ and $\alpha=\beta=\gamma=90^\circ$, crystallizes in the _____ system.
19. A fold with curved axial surface is called a _____ fold.
20. Normal faulting takes place in response to _____ (compression / extension / shearing) and is characterized by the hanging wall going _____ with respect to the footwall.

21. Oldest representative of chordates are found in _____ era and is best represented by a fossil organism named _____.
22. A major difference between fauna found in "Burgess shale" and "Ediacara Hills" is the difference in _____ of the organism.
23. Gigantothermy does not explain the presence of _____ dinosaurs in cold regions.
24. The major problem of considering "Hydrothermal vent" as the birth-place of life is that it would not have permitted enough _____ of the organic molecules.
25. An index fossil should have _____ geographic span and _____ temporal span.
26. The Hadean is represented by _____ grains embedded in younger rocks.
27. If Ar escapes through the fracture of a crystal, the estimated age determined by K-Ar method would be _____ compared to the true age.
28. The reason behind an underestimation of Earth's age by Kelvin is due to the assumption that _____.
29. The two mass extinction events that define the boundary of Mesozoic are _____ and _____ (from old to young).
30. Dinosaurs share the most recent common ancestor with a living group called _____.

Question II : Please mark the correct answer only. There is only one correct option for each question. There is negative marking. For five wrong answers, two correct answers would be discredited. (40 x 0.5 = 20)

31. Which one is of the largest duration of in Milankovitch cycle?
(a) Precession, (b) obliquity, (c) eccentricity
32. Cratons are joined by
(a) shield, (b) fold belt, (c) platform
33. Fe is produced in the solar system by
(a) Proton capture, (b) neutron capture, (c) fusion of Si
34. Increase in number of sunspots and amount of incoming solar radiation are
(a) Positively correlated, (b) negatively correlated, (c) not related
35. The Earth's magnetic field
(a) shields us from solar wind, (b) shields us from ultraviolet rays, (c) protects the ozone layer
36. Which of the following elements is significantly enriched in the Earth's mantle as compared to the crust:
(a) Si, (b) Al, (c) Mg
37. The process by which an originally homogeneous Earth developed a dense core and a lighter mantle is called:
(a) Metamorphism, (b) Differentiation, (c) Accretion

38. The asthenosphere is
 (a) hot and weak, (b) hot and strong, (c) cool and weak
39. Which of the following is not characteristic of P-waves?
 (a) Arrive after surface wave, (b) Travels faster than S-wave, (c) Can pass through liquid
40. Reduction in P-wave velocity at the mantle-outer core boundary is due to a sharp increase in ___
 (a) shear modulus, (b) bulk modulus, (c) density
41. Sub-oceanic mantle and sub-continental ^{mantle} at a particular depth should be at
 (a) same temperature, (b) former at higher temperature, (c) former at lower temperature
42. P-wave reflected back to the surface from the mantle-outer core boundary is called
 (a) PP, (b) PCP, (c) PKP
43. The boundary between the upper mantle and Transition zone is marked by conversion of alpha-olivine to _____.
 (a) Ringwoodite, (b) Wadsleyite, (c) Perovskite
44. Benioff zone is demarcated by
 (a) volcanic eruption, (b) focus of earthquakes, (c) strike-slip faulting
45. Formation of the Red Sea is due to
 (a) Rifting in oceanic setting, (b) rifting in continental setting, (c) transform faulting
46. The Petroleum window depends on
 (a) Nature of original organic matter, (b) composition of sea water, (c) temperature
47. Conversion of olivine to pyroxene is shown in Bowen's Reaction Principle as
 (a) discontinuous reaction series, (b) continuous reaction series, (c) the conversion never takes place
48. A coarse grained igneous rock with olivine, calcic plagioclase and pyroxene can be called _____ rock.
 (a) mafic volcanic, (b) intermediate volcanic, (c) mafic plutonic
49. Maximum effect of contact metamorphism will be due to
 (a) granitic magma intruding the middle crust as a one meter thick dyke,
 (b) granitic magma intruding upper crust as 100 meter thick dyke,
 (c) basaltic magma intruding middle crust as 100 meter thick dyke
50. Which one is the highest-grade metamorphic rock?
 (a) Schist, (b) Gneiss, (c) Phyllite
51. Which series represents increasing carbon content?
 (a) Lignite-peat-anthracite-bituminous coal, (b) Peat-lignite-bituminous coal- anthracite
 (c) Bituminous coal-anthracite-lignite-peat
52. Which factor does not contribute to high viscosity of a magma?
 (a) Temperature, (b) water content, (c) depth of emplacement
53. Which statement is not correct?
 (a) Streak has always the same color as the body color of a mineral, (b) Talc is the softest mineral in Moh's scale, (c) Quartz on the Earth's surface is of alpha-variety

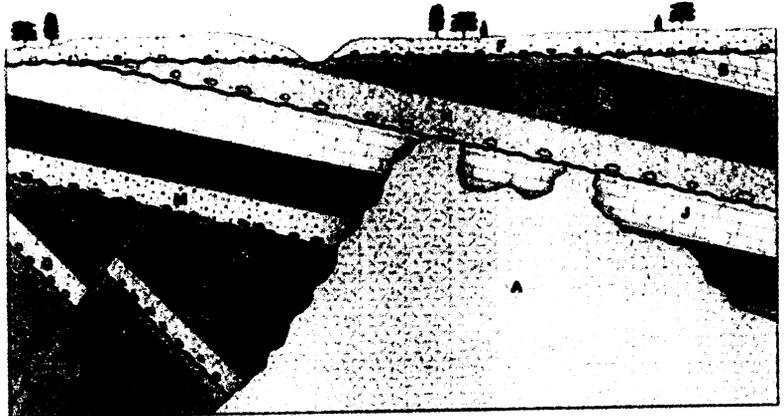
54. The D'' layer is located at the
 (a) Crust-mantle boundary, (b) core-mantle boundary, (c) inner-outer core boundary
55. Diamond is expected to occur at
 (a) Sub-oceanic lithospheric mantle, (b) sub-continental lithospheric mantle,
 (c) Upper mantle beneath thickened continental crust
56. Ionic substitution in minerals will not be possible if
 (a) difference in ionic radii is 30%, (b) ions are of same charge,
 (c) ions have similar electronegativity
57. Other factors remaining same, increase in silica content in magma will lead to _____ in viscosity.
 (a) decrease, (b) increase, (c) no change
58. The supercontinent Rodinia is sandwiched between (in time) the supercontinents
 (a) Gondwana and Pangea, (b) Columbia and Gondwana, (c) none of the above
59. Precipitation of Fe and Mn from sea water is expected under _____ condition
 (a) strongly acidic pH and reducing, (b) alkaline pH and reducing,
 (c) alkaline pH and oxidizing
60. Asymmetrical folds have _____ axial plane.
 (a) vertical, (b) inclined, (c) horizontal
61. Which of the following is **NOT** an agent of metamorphism?
 (a) Pore pressure (b) Confining pressure (c) Directed pressure
62. Which mineral will commonly be found in detrital sedimentary rocks?
 (a) Olivine, (b) Pyroxene (c) K-feldspar
63. Lithosphere is
 (a) Crust + whole mantle, (b) Upper mantle + transition zone, (c) Crust + uppermost mantle
64. The Low Velocity Zone below the Lithosphere exists possibly due to
 (a) presence of water, (b) presence of melt, (c) sharp rise in temperature
65. The major sources of energy for the Earth are _____ and solar radiation.
 (a) Primordial energy, radioactive energy (b) Volcanic eruptions, radioactive energy
 (c) Primordial energy, volcanic eruptions
66. Settling of crystals in a magma chamber can be caused by
 (a) assimilation, (b) fractional crystallization, (c) magma mixing
67. Pillow lava is indicative of _____ eruption.
 (a) Sub-aerial, (b) Sub-aqueous, (c) Sub-surface
68. Which element was not produced during Big Bang?
 (a) H, (b) He, (c) C
69. Chalcophile elements typically have _____ bond.
 (a) Ionic, (b) Covalent, (c) Metallic

70. Which one of the following is not a chemical sedimentary rock?

- (a) Breccia, (b) Chert, (c) Evaporite

Question III : Choose the correct answer using the figures (8 x 0.5 = 4)

This is a cross-section of rock-units observed in the field. H indicates a fault and A represents a volcanic rock. Other alphabets represent sedimentary rock units. Rocks B, K, N, J has high concentration of CaCO_3 .



71. Which of the following statement is definitely TRUE?

- a) G is of same age as E
 b) Event H is older than event A
 c) D is younger than A
 d) N is older than A

72. Which of the following units might produce "marble"?

- a) B, b) K, c) N, d) J

73. Would you find marble throughout this layer?

- a) Yes, b) No, c) Not enough information to deduce that.

74. The boundary that exists between J and N can NOT be termed as

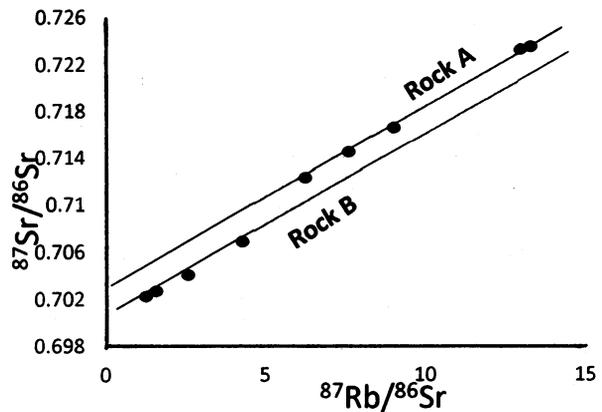
- a) angular unconformity, b) disconformity, c) conformity

75. Which of the following age-pairs show an error in dating technique?

- a) A-30my, D-25my, b) N - 5my, J - 28my c) E - 100my, G - 90my d) All are correct

76. A and B represent two rocks of _____.

- (a) similar age and similar initial Sr isotope ratio,
 (b) similar age and different initial Sr isotope ratio,
 (c) different age and similar initial Sr isotope ratio,
 (d) different age and different Sr isotope initial ratio

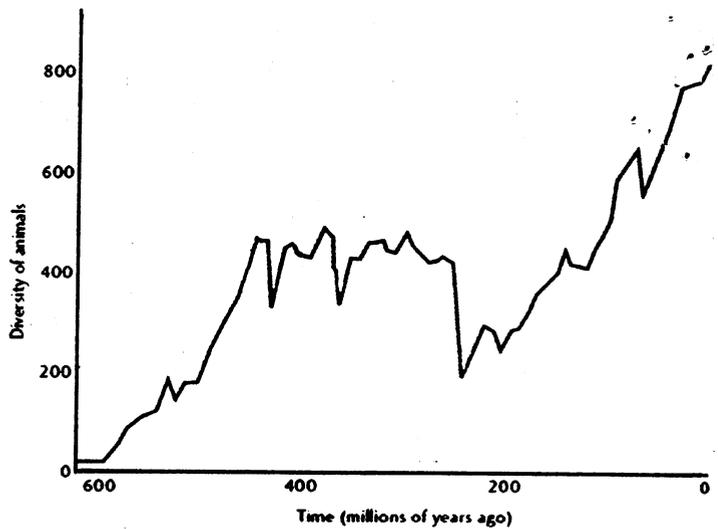


77. The estimated number of groups that have ever lived on the earth is _____.

- (a) $(0.2 \cdot 600 \cdot 800) / 5$,
- (b) $(0.2 \cdot 600 \cdot 800) / 100$,
- (c) $(0.5 \cdot 600 \cdot 800) / 5$,
- (d) $(0.5 \cdot 600 \cdot 800) / 100$

78. The living groups of today make up _____ % of all groups that have ever lived on the Earth.

- (a) 32,
- (b) 22,
- (c) 12,
- (d) 2



Question IV: Write true or false for each statement (16 x 0.5 = 8)

- 79. Modern oceans are stratified with respect to dissolved oxygen in water producing an oxygen minimum zone at the bottom. _____
- 80. Deep marine manganese deposits are of very young age. _____
- 81. Venus is affected by Plate Tectonics just as the Earth. _____
- 82. Giant impact possibly tilted the axis of rotation of the Earth. _____
- 83. Transform plate boundaries, such as the Hawaiian island chain, are characterized by strike-slip faults. _____
- 84. Well sorted and well rounded sediments indicate long transportation. _____
- 85. Meteoroid enters the atmosphere and produces meteorite. _____
- 86. Cosmochemical classification of elements is done on the basis of condensation temperature. _____
- 87. The inner core of the Earth must have a different composition than the outer core since it is solid at higher temperatures. _____
- 88. Subducted oceanic plates can reach only upto the Transition Zone in the mantle because of density inversion at this depth. _____
- 89. The mechanism of death was identical for the surficial and deep marine fauna during end Cretaceous mass extinction. _____
- 90. Presence of microspherules indicate the Deccan volcanism to be the cause of the youngest mass extinction. _____
- 91. The absence of BIF in Early Archean is NOT due to an oxygenated atmosphere. _____
- 92. Proterozoic Stromatolite is a type of body fossil of Cyanobacteria. _____
- 93. The ocean floor formed in the Earth's crust before the accumulation of liquid water due to condensation. _____
- 94. Miller's experiment demonstrated that the RNA can function as an enzyme. _____

Question V :Match the following: (6 x 0.5 = 3)

- | | |
|-----------------------|--|
| 95. Cambrian _____ | a. End is marked by an extinction |
| 96. Archean _____ | b. Existence of bioturbated rock record |
| 97. Proterozoic _____ | c. No record of unmetamorphosed sedimentary rock |
| 98. Paleozoic _____ | d. Only nonskeletonized multicellular organisms |
| 99. Phanerozoic _____ | |
| 100. Mesozoic _____ | |