

**ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.**

**M.Sc. (APPLIED GEOLOGY)**

**COURSE CODE : 367**

Register Number :

\_\_\_\_\_  
*Signature of the Invigilator*  
*(with date)*

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**COURSE CODE : 367**

Time : 2 Hours

Max : 400 Marks

*Instructions to Candidates :*

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each of the question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. By the **plate-tectonic processes**, magma generation is highest in the following tectonic setting
  - (A) **Convergent plate boundaries**
  - (B) **Continental intra-plate region**
  - (C) **Oceanic intra-plate region**
  - (D) **Oceanic ridges**
  
2. The last mineral to crystallize from magma, according to the Bowen's reaction series is
  - (A) Plagioclase
  - (B) Olivine
  - (C) Quartz
  - (D) Pyroxene
  
3. The plutonic equivalent of andesite is
  - (A) Granite
  - (B) Gabbro
  - (C) Diorite
  - (D) Tonalite
  
4. Ophitic texture is the key characteristics of which one of following rocks
  - (A) Gabbro
  - (B) Basalt
  - (C) Dolerite
  - (D) Peridotite
  
5. Majority of world's coal resources are restricted to the following geological time period
  - (A) Triassic
  - (B) Permo-Carboniferous
  - (C) Cambro-Ordovician
  - (D) Eocene
  
6. Which one of the following facies represent highest grade of metamorphism?
  - (A) Zeolite facies
  - (B) Granulite facies
  - (C) Green schist facies
  - (D) Amphibolite facies
  
7. The average thickness of the continental crust is about
  - (A) 35 – 40 km
  - (B) 100 – 200 km
  - (C) 1000 – 2000 km
  - (D) 5 – 10 km
  
8. Which one of the following index minerals represents the highest grade of regional metamorphism?
  - (A) Chlorite
  - (B) Sillimanite
  - (C) Biotite
  - (D) Garnet
  
9. Which of the following sedimentary structures represents the highest flow energy condition?
  - (A) Trough cross bed
  - (B) Planar Cross bed
  - (C) Wavy bedding
  - (D) Plane bedding with parting lineation

10. The tendency of water to pass directly from solid state to vapor state is known as  
 (A) Sublimation (B) Oxidation (C) Dissolution (D) Dissociation
11. The average amount of time that a water molecule resides in a particular reservoir before transferring to another reservoir is known as  
 (A) Residence time (B) Infiltration  
 (C) Ion exchange (D) Base exchange
12. The measure of suspended and colloidal matter in water such as clay, silt, organic matter and microscopic organisms is known as  
 (A) Conductivity (B) Turbidity  
 (C) Biochemical oxygen demand (D) Total dissolved load
13. Exogenic geomorphic processes are primarily driven by  
 (A) earth's internal heat (B) only gravity  
 (C) only solar energy (D) solar energy and gravity
14. Which of the following minerals is the most susceptible to weathering in humid climate?  
 (A) Quartz (B) K-feldspar (C) Biotite (D) Olivine
15. 'Glacial clay' is dominantly  
 (A) Kaolinite (B) Illite (C) Feldspar (D) Quartz
16. Which of the following is an erosional landform?  
 (A) Barrier island (B) Barchan (C) Cirque (D) Floodplain
17. Hawaii is an example of  
 (A) Shield volcano (B) Strato volcano  
 (C) Tephra cone (D) Pyroclastic dome
18. Shutter ridges and Sag ponds are associated with  
 (A) Strike slip faults (B) Thrust faults  
 (C) Grabens (D) Volcanoes
19. The movement of water from the ground surface into the soil is termed as  
 (A) Percolation (B) Infiltration (C) Seepage (D) Gravity Flow

- 20.. Urbanisation can cause  
 (A) increase in net infiltration  
 (B) decrease in base flow  
 (C) decrease in amplitude of stream hydrograph  
 (D) decrease in overland flow
21. The linear zone separating two adjacent offset segments of a mid-oceanic ridge is  
 (A) gravity fault (B) detachment zone  
 (C) transform fault (D) thrust fault
22. In a black and white aerial photograph, a totally reflecting object on earth (example dry sand) will appear  
 (A) black (B) white (C) dark gray (D) medium gray
23. Blue colour of sky is due to \_\_\_\_\_ of light by the aerosols.  
 (A) absorption (B) adsorption (C) scattering (D) emission
24. Which of the following rock has high porosity and high permeability?  
 (A) shale (B) greywacke (C) sandstone (D) quartzite
25. A dike measures 10 cm in length on a geological map prepared in 1 : 50,000 scale. What is the actual length of the dike?  
 (A) 10 cm (B) 50 m (C) 500 m (D) 5 km
26. GPS is acronym for  
 (A) Global Positioning System (B) Global Polar System  
 (C) Global Position Satellite (D) Global Polar Satellite
27. In a toposheet, a series of 'V' shaped contours represent  
 (A) ridge (B) valley (C) mountain (D) road
28. The ultraviolet rays do not reach earth's surface. This is because absorption of the rays by  
 (A) Ozone (B) carbon monoxide  
 (C) Water vapour (D) oxygen
29. To observe interference colour of a mineral under petrological microscope, the correct settings are  
 (A) polarizers crossed and rotate 90° off extinction  
 (B) parallel polarizers and rotate 45° off extinction  
 (C) polarizers crossed and rotate 45° off extinction  
 (D) parallel polarizers and rotate 90° off extinction

30. Oldest backboned animals are  
 (A) Pisces (B) Reptilia (C) Amphibia (D) Aves
31. Gangamopteris can be differentiated from Glossopteris by  
 (A) Presentation of venation (B) Absence of midrib  
 (C) Acute leaf margin (D) Size of the leaves
32. The bivalvia shells are jointed together at dorsal side by  
 (A) adductor muscle (B) hinge plate  
 (C) ligament (D) delthyrium
33. Which is the oldest fossil?  
 (A) trilobita (B) algae (C) fish (D) graptoloidea
34. Gastropod exhibit \_\_\_\_\_ symmetry.  
 (A) bilateral (B) radial (C) biradial (D) lack of
35. Echinoidea are \_\_\_\_\_ water animals.  
 (A) marine (B) brackish (C) fresh (D) terrestrial
36. Lamellibranches with two unequal adductors are  
 (A) isomyaria (B) aniosomyria (C) monomyria (D) dimyaria
37. Of the following which group consists of the fastest moving invertebrates?  
 (A) Cephalopoda (B) Gastropoda (C) Brachiopoda (D) Trilobita
38. Which combination represents the Phanerozoic?  
 (A) Cenozoic, Precambrian, Paleozoic (B) Eocene, Cretaceous, Archean  
 (C) Precambrian, Cenozoic, Eocene (D) Cenozoic, Mesozoic, Paleozoic
39. Copper Belt Thrust (CBT) also known as  
 (A) Singhbhum Shear Zone (B) Great Boundary Fault  
 (C) Older Metamorphic Group (D) Main Boundary Fault
40. Archaean rocks in Kashmir-Hazara area are known as  
 (A) Salkhala Series (B) Champian Gneiss  
 (C) Buxa Series (D) Darjeeling Series

41. Who proposed the Principle "the present is the key to the past"?
- (A) William Smith (B) James Hutton  
(C) d'Orbigny (D) Carl von Linnaeus
42. The first fundamental generalization of stratigraphy is
- (A) Order of superposition (B) Principle of uniformitarianism  
(C) Stratigraphic analysis (D) Law of faunal succession
43. Coal is absent from \_\_\_\_\_ Formation.
- (A) Raniganj (B) Panchet  
(C) Mahadeva (D) Motur / Barren Measures
44. Neogene period includes
- (A) Paleogene and Eocene (B) Paleogene, Eocene and Oligocene  
(C) Oligocene, Miocene and Pliocene (D) Miocene and Pliocene
45. The discontinuity which represents the boundary between crust and mantle is termed
- (A) Moho (B) Conrad (C) Gutenberg (D) Lehman
46. Benioff zone is associated with
- (A) subducted slab (B) mid ocean ridges  
(C) transform faults (D) mountains
47. Which of the following is seismic surface wave
- (A) P wave (B) S wave (C) Rayleigh wave (D) PKP wave
48. The transfer of heat by the physical movement of material is called
- (A) conduction (B) convection (C) radiation (D) scattering
49. Himalayan mountains have formed primarily as a result of
- (A) compressive deformation between Indian and Asian tectonic plates  
(B) relative uplift of sediments in the Tethys Ocean in an extensional setting  
(C) strike-slip deformation between Indian and Eurasian plates  
(D) extrusion of volcanic material over a long period of time on the Tethys ocean floor.
50. The average density of the Earth is
- (A) 3.5 g/cm<sup>3</sup> (B) 4.5 g/cm<sup>3</sup> (C) 5.5 g/cm<sup>3</sup> (D) 6.5 g/cm<sup>3</sup>

51. The value of gravity becomes zero at  
 (A) the surface of the earth (B) the centre of the earth  
 (C) equator (D) poles
52. Earthquakes are generated due to  
 (A) plastic flow of rocks and release of plastic strain energy  
 (B) folding of rock layers  
 (C) sudden release of elastic strain energy during fracture propagation  
 (D) sudden release of viscous strain accumulated in rocks
53. Which of the following statements about Earth's core is true?  
 (A) entire core is in liquid state  
 (B) entire core is in solid state  
 (C) outer core is in solid state and inner core is in liquid state  
 (D) outer core is in liquid state and inner core is in solid state
54. Outer planets in our solar system are gaseous because  
 (A) In rotating nebula the gases did not move to the center  
 (B) gases experience more centrifugal force  
 (C) gases are driven away by the Sun's heat  
 (D) rocks were pulled inside the solar system by the Sun's gravity
55. Which one of the followings is a sulphide ore mineral?  
 (A) Scheelite (B) Siderite (C) Sphalerite (D) Celestite
56. Which one of the following minerals has the highest specific gravity?  
 (A) Galena (B) Diamond (C) Native silver (D) Native gold
57. Which one of the following economic minerals does not belong to the category of magmatic deposits?  
 (A) Chromite (B) Titaniferous magnetite  
 (C) Cu-Ni sulphide (D) Magnesite
58. Porphyry copper deposits are formed by which one of the following ore forming process?  
 (A) magmatic (B) magmatic hydrothermal  
 (C) sedimentary (D) metamorphic

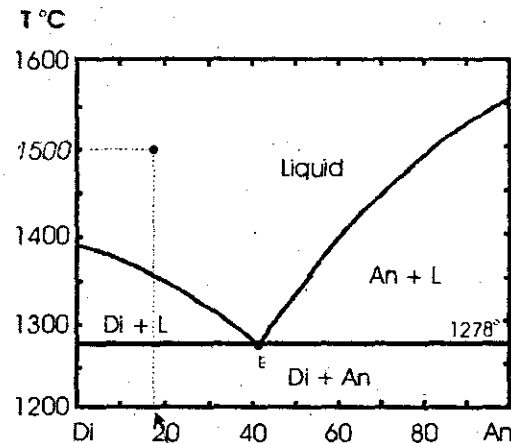
59. In India, which one of the following ore minerals is produced mostly from beach sand?  
 (A) cassiterite (B) hematite (C) ilmenite (D) magnetite
60. Which one of the following metals occurs as native metal, oxide and sulphide in the earth's crust?  
 (A) iron (B) copper (C) uranium (D) gold
61. Identify the odd pair of minerals among the following  
 (A) Goethite - siderite (B) Pyrite - marcasite  
 (C) Pyrite - pyrrhotite (D) Hematite - magnetite
62. In which one of the following lists, minerals are arranged in order of increasing temperature of crystallization?  
 (A) Galena - gibbsite - chromite (B) Gibbsite - galena - chromite  
 (C) Gibbsite - chromite - galena (D) Galena - chromite - gibbsite
63. Which one of the following isotopes is the naturally occurring fissile atom of interest in nuclear reactors?  
 (A)  $^{238}\text{U}$  (B)  $^{235}\text{U}$  (C)  $^{234}\text{U}$  (D)  $^{232}\text{Th}$
64. Petroleum and Natural gas are chiefly composed of  
 (A) Hydrogen (B) Hydrogen and Carbon  
 (C) Nitrogen (D) Oxygen
65. The general trend of the Aravalli mountain range is  
 (A) North - South (B) East - West  
 (C) Northeast - Southwest (D) Northwest - Southeast
66. Fossilised contents of alimentary canal of animals are known as  
 (A) burrows (B) mould (C) trails (D) coprolites
67. Flat topped sea mounts are termed as  
 (A) Guyots (B) Mesa (C) Inselberg (D) Monodnock
68. The drainage pattern which signifies an area lacking structural control is  
 (A) radial (B) rectangular (C) dendritic (D) trellis



69. Hercynian or Variscan orogeny took place during  
 (A) Silurian (B) Devonian  
 (C) Permo carboniferous (D) Jurassic
70. The two words in Binomial nomenclature of organisms designate  
 (A) order and family (B) family and genus  
 (C) genus and species (D) phylum and class
71. When did the Trilobite disappear from the Earth?  
 (A) end of Ordovician (B) end of Devonian  
 (C) end of Permian (D) end of Jurassic
72. Fossils of Archean life forms is widely represented by  
 (A) Graphite (B) Stromatolites  
 (C) Porifera (D) Echinodermata
73. High pressure polymorph of quartz is  
 (A) tridymite (B) cristobalite (C) coesite (D)  $\beta$ -quartz
74. Muscovite and biotite are distinguished based on  
 (A) lustre (B) cleavage (C) habit (D) color
75. Intersection of two sets of cleavages at  $87^\circ$  and  $93^\circ$  in basal section of crystals is observed in  
 (A) calcite (B) pyroxene (C) hornblende (D) kyanite
76. Three fold axis of rotational symmetry is present in  
 (A) Only in hexagonal system  
 (B) Only in cubic system  
 (C) Hexagonal and cubic systems  
 (D) Tetragonal, hexagonal and cubic systems
77. Classification of minerals into various groups is based on  
 (A) anion or anionic complex (B) cation or cationic complex  
 (C) abundance in the crust (D) hardness

78. Complete solid solution is observed between the minerals  
 (A) tremolite – cummingtonite (B) calcite – magnesite  
 (C) forsterite - fayalite (D) diopside - enstatite
79. Basalt is mainly made up of  
 (A) pyroxene, calcic plagioclase and olivine  
 (B) amphibole, orthoclase and leucite  
 (C) albite, orthoclase and quartz  
 (D) albite, hornblende and nepheline
80. An igneous rock is fully crystalline and made up of equidimensional crystals of about 3 mm in size. What are the conditions of its emplacement and crystallization?  
 (A) Surface of continental crust, sudden cooling  
 (B) Shallow depth in crust, fast cooling  
 (C) Moderate depth in crust, slow cooling  
 (D) On ocean floor, sudden cooling
81. A Composition of magma erupted along the mid-Ocean ridges is  
 (A) andesite (B) basalt (C) syenite (D) granoiorite
82. A suite of igneous rocks with gradual changes in composition found at Island arc is known as  
 (A) calc-alkaline series (B) alkaline series  
 (C) tholeitic series (D) syenitic series
83. Where do komatiites usually occur?  
 (A) Recent island-arc belts (B) Cretaceous basins  
 (C) Gondwana basins (D) Archean greenstone belts
84. The following sequence of rocks is exposed on continent: pillow basalt, sheeted dykes, gabbro and peridotite. This is called as  
 (A) greenstone belt (B) ophiolite  
 (C) layered igneous complex (D) volcanic flows

Study the phase diagram and answer the following four questions



85. What was the degree of freedom when magma marked '•' reached the liquidus curve?  
 (A) 0 (B) 1 (C) 2 (D) 3
86. The magma cooled further and reached eutectic then it will crystallize  
 (A) only anorthite (B) only diopside  
 (C) diopside and anorthite (D) quartz, anorthite and diopside
87. At what temperature the last drop of magma will crystallize?  
 (A) 1350 (B) 1278 (C) 1500 (D) 1225
88. On complete crystallization of the magma, rock formed will be made up of  
 (A) 40 % diopside and 60 % anorthite (B) 60 % diopside and 40 % anorthite  
 (C) 18 % diopside and 82 % anorthite (D) 82 % diopside and 18 % anorthite
89. A crystal that has only a center of symmetry belongs to point group  
 (A)  $\bar{1}$  (B) 1 (C) m (D) m/1
90. The relative displacement between two adjacent points on either side of the fault plane is known as  
 (A) offset (B) separation (C) net slip (D) throw
91. Hangingwall anticline structure is a feature associated with  
 (A) thrust fault (B) normal fault  
 (C) strike-slip fault (D) scissor fault

92. Which of the following lineation cannot be used for stress analysis?  
 (A) mineral lineation (B) boudin axis  
 (C) slickensides (D) stretching lineation
93. The true dip direction of an inclined plane is always \_\_\_\_\_ to the line of intersection of the inclined plane with an imaginary horizontal plane.  
 (A) parallel (B) perpendicular (C) at 45° (D) oblique
94. Shear strain is measured by  
 (A) change in length of a line (B) change in angle between two lines  
 (C) displacement of a line (D) distortion of a plane.
95. The crystal with the point group 222 belongs to  
 (A) Triclinic system (B) monoclinic system  
 (C) Orthorhombic system (D) cubic system
96. A Miller index of a face, whose Weiss symbol is  $2a : 2b : 1c$ , is  
 (A) (221) (B) (212) (C) (112) (D) (236)
97. Two non-parallel faces in a crystal that can be related to each other by a mirror plane constitute the form  
 (A) pinacoid (B) prism (C) pyramid (D) dome
98. The optical indicatrix of an isotropic mineral is  
 (A) prolate ellipsoid (B) oblate ellipsoid  
 (C) spheroid (D) irregular in shape
99. Which of the following is not a silicate mineral?  
 (A) Garnet (B) Magnetite (C) Mica (D) Olivine
100. Which of the following minerals is a chain silicate  
 (A) Feldspar (B) Olivine (C) Pyroxene (D) Quartz