

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.

M.Tech. (EXPLORATION GEOSCIENCES)

COURSE CODE : 306

Register Number :

*Signature of the Invigilator
(with date)*

COURSE CODE : 306

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. One of the following types of ore deposits is formed on the sea floor.

(A) sedimentary exhalative	(B) carbonate-hosted Pb-Zn
(C) sandstone type U	(D) unconformity type U

2. What is common to Nausahi ultramafic complex and Sittampundi anorthosite complex?

(A) Nickel sulphide and PGE	(B) Chromite and PGE
(C) Chromite and Nickel sulphide	(D) Nickel sulphide

3. Choose the odd pair of primary and secondary copper minerals.

(A) chalcopryire – chalcocite	(B) chalcopyrite – covellite
(C) chalcopyrite – cubanite	(D) chalcopyrite · malachite

4. Homogenization temperature of primary fluid inclusions in a mineral gives the

(A) lower limit of temperature of crystallization of the mineral
(B) upper limit of temperature of crystallization of the mineral
(C) temperature of crystallization of the mineral
(D) pressure during crystallization of the mineral

5. Identify the wrong pair of host rock and associated ore mineral.

(A) granite pegmatite – psilomelane
(B) komatiite – pentlandite
(C) lamproite – diamond
(D) skarn – scheelite

6. One of the following is the common host for ore deposits of REE.

(A) sedimentary carbonate formation	(B) carbonatite
(C) komatiite	(D) kimberlite

7. In one of the following list, manganese ore minerals are correctly arranged in order of increase in temperature of crystallization.

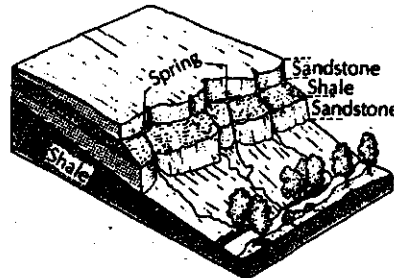
(A) bixbyite – hausmannite – pyrolusite	(B) hausmannite – pyrolusite – bixbyite
(C) pyrolusite – bixbyite – hausmannite	(D) pyrolusite – hausmannite – bixbyite

8. Evaporite bed is known from one of the following Proterozoic sedimentary basins.

(A) Cuddapah	(B) Vindhyan	(C) Marwar	(D) Bhima
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9. Carbonate formations of Aravalli Supergroup host large deposits of
 (A) Cu and Pb-Zn (B) Pb-Zn
 (C) Pb-Zn and phosphorite (D) phosphorite
10. Chromite is the chief economic mineral of Chromium. They are formed because of following ore forming process.
 (A) Early magmatic segregation of crystals
 (B) Late magmatic hydrothermal process
 (C) Sulfide liquid immiscibility
 (D) Supergene oxidation process
11. Porphyry type Cu deposits are associated with following type of magmatic intrusions
 (A) Calc-alkaline oxidised (magnetite bearing) I-type granite intrusions
 (B) Calc-alkaline reduced (ilmenite bearing) S-type granite intrusions
 (C) Mafic-intermediate composition
 (D) Ultramafic composition
12. Which one of the following sulfide mineral is translucent and show internal reflection?
 (A) Galena (B) Chalcopyrite (C) Pyrrhotite (D) Sphalerite
13. Ores of Li, Be, Cs associated with
 (A) Gabbro (B) Diorite
 (C) Granite-pegmatite pluton (D) Acid volcanic rocks
14. Which of the following oxide mineral is more likely to form placer deposit?
 (A) Magnetite (B) Pyrolusite (C) Cassiterite (D) Scheelite
15. Chalcocite-covellite-bornite mineral assemblage is characteristics of following type Cu deposit
 (A) Magmatic sulfide deposit
 (B) Porphyry type deposit
 (C) Supergene enrichment type deposits
 (D) Volcanogenic massive sulfide deposit
16. In a sedimentary succession you encounter following facies from bottom to top: mud dominated meandering fluvial facies grades to sand dominated braided fluvial facies and finally overlain by conglomerate dominated alluvial fan facies. The most likely tectonic setting for the above succession would be.
 (A) Regressive passive continental margin (B) Post orogenic foreland basin
 (C) Back arc basin (D) Pull apart basin

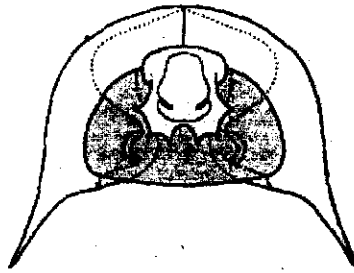
17. Hummocky cross stratification is a product of storm induced unidirectional current and they are generally formed in following depositional areas of a marine basin
- (A) Outer shelf region (B) Inner shoreface region
(C) Outer shoreface region (D) Foreshore region
18. Graywacke-shale assemblage is characteristics of following tectonic setting
- (A) Foreland basin (B) Active continental margin
(C) Passive Continental margin (D) Intracratonic basin
19. The wilting point of the soil occurs when:
- (A) Surface tension of the soil-water interface higher than osmotic pressure
(B) Surface tension of the soil-water interface lower than osmotic pressure
(C) Surface tension of soil water interface equals osmotic pressure
(D) No change in surface tension and osmotic pressure
20. The ratio of volume of water that drains from a saturated rock owing to the attraction of gravity to the total volume of the rock is known as :
- (A) Specific yield (B) specific retention
(C) Storage capacity (D) Storage coefficient
21. The term base flow is used when:
- (A) Groundwater contributes to stream (B) Stream contributes to groundwater
(C) Flow due to excess rainfall (D) Flow from the streams
22. The measure of the amount of water that can be transmitted horizontally through a unit width by the full saturated thickness of the aquifer under a hydraulic gradient of 1 is known as:
- (A) Transmissivity (B) Storativity
(C) Permeability (D) Porosity
23. Identify the spring type from the given diagram:



- (A) Depression spring
(B) Contact spring
(C) Joint spring
(D) Fault spring

24. The process by which ionic and molecular species dissolved in water move from areas of higher concentration to lower concentration is known as:
 (A) Diffusion (B) Advection (C) Dispersion (D) Retardation
25. The release of molecules and ions from the solid phase to solute causing groundwater contamination is known as:
 (A) Retardation (B) Desorption (C) Sorption (D) Adsorption
26. The log used to measure the diameter of the bore hole is known as:
 (A) Dip meter log (B) Sonic log
 (C) Temperature log (D) Caliper log
27. Permeable part of the casing in a bore-well is known as:
 (A) Well screen (B) Filter pack (C) Grout (D) Well points
28. The dominant forms of microfossils in the abyssal region are
 (A) Radiolarians (B) Foraminifers (C) Ostracods (D) Diatoms
29. In closed-packed ionic crystal, ratio of tetrahedral sites to octahedral sites is
 (A) 1:2 (B) 2:1 (C) 3:1 (D) 1:1
30. Partial melting of a source having 5 ppm Zr generated melt with 50 ppm of Zr. The bulk distribution coefficient between solid and melt for Zr is 0.01. What was the extent of melting?
 (A) 5% (B) 10% (C) 50% (D) 1%
31. Which of the following elements is classified as high field strength element?
 (A) Rb (B) Ba (C) Ag (D) Nb
32. Which of the following belongs to the order 'Dibranchia' of the Cephalopoda?
 (A) Orthoceras (B) Nautilus (C) Belemnites (D) Baculites
33. The first vertebrates appeared during
 (A) Cambrian (B) Ordovician (C) Silurian (D) Devonian

34. Identify the type of facial suture of a trilobite cephalon in the given diagram



- (A) Proparian (B) Opisthoparian (C) Gonatoparian (D) Hypoparian

35. Taphonomy is the

- (A) study of the conditions of preservation of fossils
 (B) reconstruction of paleoenvironments by means of fossils
 (C) study of types of fossils
 (D) study of fossil pollens and spores

36. Which of the following is NOT a living fossil?

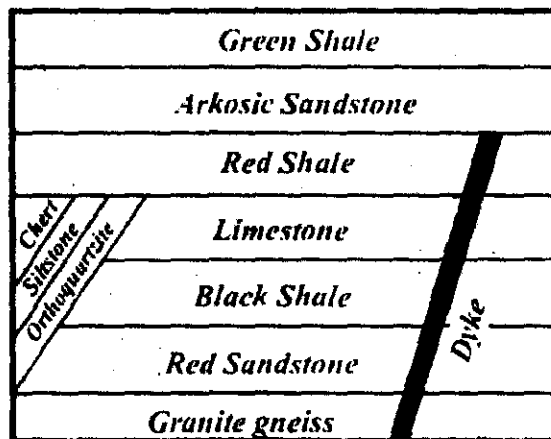
- (A) Lingula (B) Nucula (C) Nautilus (D) Numulites

37. Trace fossils are best preserved in

- (A) sandstones (B) limestone (C) shale (D) marl

38. The immediate ancestors of the mammoths were

- (A) Stegodon (B) Mastodon (C) Laxodont (D) Phiomia



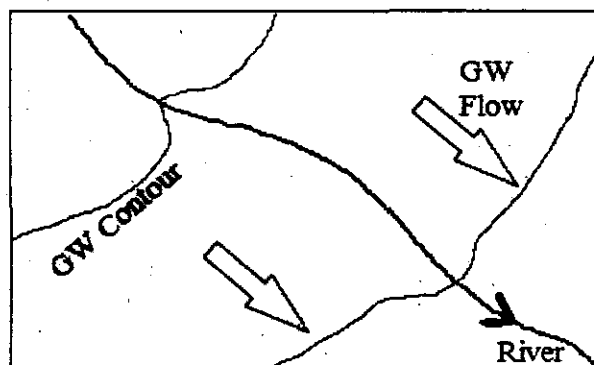
39. The given geological section contains sedimentary succession interrupted by a dyke and is having no tectonic discontinuities. How many unconformities can be identified?
 (A) 3 (B) 4 (C) 5 (D) 2
40. In the above succession, a disconformity occurs between
 (A) Granite Gneiss - Red Sandstone (B) Limestone - Red Shale
 (C) Red Shale - Arkosic Sandstone (D) Granite Gneiss - Orthoquartzite
41. Grenvillian orogeny is related to _____ supercontinent formation.
 (A) Pangea (B) Rodinia (C) Gondwana (D) Columbia
42. Ages Lutetian, Ypresian and Barterian belongs to
 (A) Cambrian (B) Eocene (C) Triassic (D) Proterozoic
43. Plagioclase feldspar crystals in diorite show normal compositional zoning which could have been formed as a result of
 (A) equilibrium crystallization
 (B) magma reaction with plagioclase xenocrysts
 (C) disequilibrium crystallization
 (D) plagioclase reacting with diopside
44. Magmas formed in island-arc tectonic setting are depleted in the trace element
 (A) Sr (B) Nb (C) Ce (D) Zr
45. Magmas R and S both having density of 3000 kg/m^3 were generated at a depth of 60 km and 120 km respectively. Assuming that density of continental crust is 2770 kg/m^3 and mantle is 3300 kg/m^3 , which of the following is true?
 (A) R and S erupt as lavas on continent
 (B) R and S will intrude continental crust
 (C) R intrudes and S forms Lava
 (D) R forms lava and S intrudes
46. Presence of diamonds in kimberlite signifies that its magma
 (A) formed from C-rich mantle source
 (B) assimilated C-bearing sediments
 (C) formed at continental crust-mantle boundary
 (D) formed at pressure $> 3 \text{ GPa}$

47. The number of crystal classes (point groups) in the triclinic system are
 (A) 2 (B) 3 (C) 4 (D) 6
48. Which of the following would be expected to result from the collision of a continental lithospheric plate and oceanic lithospheric plate?
 (A) A volcanic island arc
 (B) A chain of coastal volcanic mountains
 (C) Mid oceanic ridge
 (D) Transform fault
49. Which of the following parameter is uniquely resolved by residual gravity anomaly data?
 (A) lateral density contrast (B) absolute density
 (C) excess/ deficit mass (D) shape of the body
50. The source of magnetic anomalies extend upto
 (A) upper mantle (B) lower mantle
 (C) core-mantle boundary (D) curie point isotherm
51. The commonly used geophysical method of exploration in delineating the deep structure of oceanic crust
 (A) seismic reflection (B) seismic refraction
 (C) resistivity (D) induced polarization
52. The Mohorovicic discontinuity below the Himalayan orogen is at a depth greater than that below the Indian Craton. This is because of :
 (A) isostatic mass adjustment
 (B) lateral density variation
 (C) upwelling material below the Indian craton
 (D) less tectonic activity in the Himalayan region.
53. The electrical method used for prospecting of disseminated ore is
 (A) induced polarization (B) self potential
 (C) Electromagnetic (D) resistivity
54. The magnetic field intensity is _____ at the equator and _____ at the poles
 (A) Minimum, minimum (B) minimum , maximum
 (C) maximum, minimum (D) maximum, maximum

55. In magnetic prospecting, the strength of magnetic field is commonly expressed in units of _____.
- (A) mGal (B) nano tesla (C) N/m² (D) gm/cm³
56. In which of the following islands mid-oceanic ridge is exposed above sealevel?
- (A) Japan (B) Seachelles (C) Hawaii (D) iceland
57. The velocity of seismic waves varies through Earth because
- (A) Temperature varies within the earth
 (B) Density varies within the earth
 (C) the composition of rocks varies within the earth
 (D) all of these
58. Median valley is generally found in
- (A) Fast spreading mid oceanic ridges (B) Slow spreading mid oceanic ridges
 (C) Fracture zones in oceans (D) Oceanic plateau
59. Zircons from a basal conglomerate horizon yielded ages ranging from 3300 to 2500 Ma. This implies that the sedimentation in the basin started
- (A) before 3300 Ma ago (B) 3000 to 2500 Ma ago
 (C) 3300 to 3000 Ma ago (D) After 2500 Ma ago
60. The reason for magma generation in island-arc setting is due to
- (A) decrease in pressure (B) frictional heating
 (C) influx of fluid (D) mantle convection
61. A vertical aerial photograph has tilt angle between
- (A) 0°-3° (B) 3° - 30° (C) 30° - 60° (D) >60°
62. The datum used for surveying an area is
- (A) Mean Sea level (B) Bench mark
 (C) Triangulation point (D) None of the above
63. A 2D GPS gives _____ of any location
- (A) latitude and longitude (B) latitude, longitude and elevation
 (C) longitude and elevation (D) latitude and elevation
64. A clear, deep water body on a false colour composite will appear as
- (A) blue (B) green (C) black (D) red

65. Plot of the spectral reflectance against the wavelength is called _____.
- (A) spectral signature (B) spatial signature
(C) emission spectra (D) radiation
66. Principal point of an aerial photograph can be determined by the intersection point formed by joining four opposite -----
- (A) nadir point (B) isocenter
(C) fiducial marks (D) all of the above
67. Optical remote sensing operates in _____ wave-length region.
- (A) 0.4 – 0.7 μ m (B) 0.4 – 0.9 μ m
(C) 0.9 – 1.5 μ m (D) 0.4 -2.5 μ m
68. Four different minerals crystallizing from same magma incorporated same initial ratio of $^{87}\text{Sr}/^{86}\text{Sr}$ but different ratios of $^{87}\text{Rb}/^{87}\text{Sr}$. After 2 Ga of crystallization, if these minerals are analyzed for Sr isotope ratios, they would have
- (A) same and unchanged ratio of $^{87}\text{Sr}/^{86}\text{Sr}$.
(B) same $^{87}\text{Sr}/^{86}\text{Sr}$ ratio but higher than the initial
(C) different $^{87}\text{Sr}/^{86}\text{Sr}$ ratios, higher than the initial
(D) Same $^{87}\text{Sr}/^{86}\text{Sr}$ ratio but lower than the initial
69. In an X-ray diffraction pattern of a mineral
- (A) peaks at smaller 2θ angles correspond to planes with smaller d-spacing
(B) peaks at smaller 2θ angles correspond to planes with larger d-spacing
(C) peaks at smaller 2θ angles are diffraction peaks while peaks at larger angles are reflection peaks
(D) peak-heights are proportional to the d-spacing.
70. If size of a cation is one third of an anion in a crystal structure, the number of anions that can simultaneously be tangent to the cation is
- (A) 2 (B) 4 (C) 6 (D) 8
71. The deposits laid down-slope of a breach in natural levee are termed as :
- (A) Point Bar deposits (B) Crevasse-Splay deposits
(C) Channel Lag deposits (D) Fan deposits
72. The maximum sediment size entrained and transported by a stream is termed as the stream's:
- (A) Capacity (B) Load (C) Grade (D) Competence

73. Which of the following shows a positive relationship with stream order:
- (A) Total number of streams (B) Stream gradient
 (C) Drainage density (D) Total length of streams
74. In the context of landforms developing on stratified rocks, choose the correct sequence in the order of increasing dip of the strata:
- (A) Mesa – Hogback – Cuesta (B) Mesa – Cuesta – Hogback
 (C) Cuesta – Mesa – Hogback (D) Hogback – Cuesta – Mesa
75. In the Strahler's stream ordering scheme, when two tributaries of different orders, (i) and (i+1), join together, the order of the resultant stream is equal to:
- (A) i
 (B) i+1
 (C) i+2
 (D) 2i+1
76. Which of the followings moves along the coastline?
- (A) Longshore current (B) Swash and Backwash
 (C) Rip current (D) Breaker
77. In the figure given below, which of the following statements on exchange of water between river and groundwater is correct (GW = Groundwater):

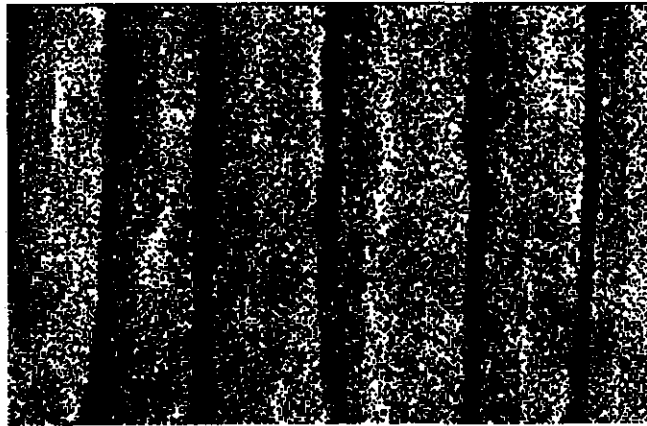


- (A) river is losing to groundwater
 (B) river is gaining from groundwater
 (C) river is losing in the downstream region
 (D) river is losing in the upstream region

78. Which of the following correctly depicts the increasing order (slowest to fastest) of the time taken for water to travel from a hill-slope to the nearest channel or lake:
- (A) Overland flow – Interflow – Baseflow
 (B) Overland flow – Baseflow – Interflow
 (C) Baseflow – Interflow – Overland flow
 (D) Inteflow – Overland flow – Baseflow
79. Hypsometric Integral approaches 1 for:
- (A) Rugged mountains (B) Plateau with a few deep valleys
 (C) Lowlands with a few hills (D) Flat plains
80. Which of the following rocks possess higher amount of primary porosity?
- (A) sandstone (B) claystone (C) limestone (D) siltstone
81. Which group provides the fast moving invertebrate ?
- (A) cephalopoda (B) echinodermata (C) gastropoda (D) brachiopoda
82. Which rock type makes a good cap rock for oil and gas reservoirs?
- (A) Conglomerate (B) Limestone (C) Sandstone (D) Shale.
83. Why don't calcareous sediments form in the deep oceans?
- (A) It is too cold
 (B) There is no sunlight for growth
 (C) Calcium carbonate dissolves at great depths
 (D) There is no oxygen
84. Bays and headlands are generally found in shoreline of
- (A) submergence (B) emergence (C) neutral (D) faulted
- S- or Z-shaped inclusion trails in garnets indicate**
- (A) Syn-tectonic crystallization (B) Pre-tectonic crystallization
 (C) Post-tectonic crystallization (D) None of the above
- Which of the following statements about metamorphism of a shale is false?
- (A) During metamorphism, the clay minerals breakdown to form micas
 (B) During metamorphism, the grain size of the minerals gets smaller
 (C) During metamorphism, foliation develops
 (D) During metamorphism, the amount of water decreases

87. An overturned fold is characterized by _____ .
- (A) two limbs at right angles to one another
 - (B) two limbs dipping in the same direction - with one tilted beyond vertical
 - (C) two limbs dipping in opposite directions
 - (D) two limbs not parallel to each other
88. How do rock particles move during the passage of a P wave through the rock?
- (A) back and forth parallel to the direction of wave travel
 - (B) back and forth perpendicular to the direction of wave travel
 - (C) in a rolling circular motion
 - (D) the particles do not move
89. Hydrothermal metamorphism is very common in which of the following settings?
- (A) at continental collision zones
 - (B) along shallow faults
 - (C) at mid-ocean ridges
 - (D) in mid-continental regions
90. Foreland basins are associated with _____ .
- (A) crustal extension
 - (B) strike slip faults
 - (C) thrust loading
 - (D) thermal contraction
91. Structural classification of silicate minerals is based on _____ .
- (A) crystal symmetry
 - (B) X-ray diffraction studies
 - (C) extent of sharing of corners among tetrahedrons
 - (D) extent of sharing of corners among octahedrons
92. Coral reefs are generally found in _____ .
- (A) polar region
 - (B) sub polar region
 - (C) tropical region
 - (D) all regions
93. The crystal class 432 has the following rotational axes of symmetry _____ .
- (A) four 4-fold, three 3-fold and two 2-fold axes
 - (B) three 4-fold, four 3-fold and six 2-fold axes
 - (C) four 4-fold, six 3-fold and two 2-fold axes
 - (D) three 4-fold, two 3-fold and six 2-fold axes
94. The space group $P4_12_12$ has how many screw axis?
- (A) One
 - (B) Two
 - (C) Three
 - (D) Four

95. How many identi points belong to unit cell of the space group I4/m?
 (A) One (B) Two (C) Three (D) Four
96. High order interference colors observed for standard thinsections of minerals under polarizing microscope is due to
 (A) high refractive indices (B) strong pleochroism
 (C) strong dispersion (D) large difference in refractive indices
97. Quartz and nepheline can be distinguished with aid of polarizing microscope using
 (A) optic sign (B) extinction angle
 (C) interference color (D) relief
98. Petrographic observation on thin section of a rock shows that olivine phenocrysts are set in a fine grained matrix consisting of pyroxene and plagioclase with trace amount of opaque minerals. The name of the rock is
 (A) Andesite (B) Basalt (C) Gabbro (D) Norite
99. The olivine phenocrysts in the above rock have corroded margins rimmed by orthopyroxene. This is as a result of
 (A) exsolution of orthopyroxene (B) resorption of orthopyroxene
 (C) subsolidus reaction (D) peritectic reaction
100. A field sketch of an outcrop of mafic dikes is given. Each of the dikes show chilled margin on one side of contacts only.



This set of dikes is known as

- (A) sheeted dike complex (B) mafic intrusive complex
 (C) dike swarm (D) differentiated dike complex