

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

24-0006-AB

TEST BOOKLET

Time Allowed: 3.00 hours

PAPER - II

Maximum Marks: 300

INSTRUCTIONS TO CANDIDATES

Read the instructions carefully before answering the questions:

1. This Test Booklet consists of 12 (twelve) pages and has 75 (seventy-five) items (questions).
2. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS BOOKLET *DOES NOT* HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
3. **Please note that it is the candidate's responsibility to fill in the Roll Number and other required details carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet and the Separate Answer Booklet. Any omission/discrepancy will render the OMR Answer Sheet and the Separate Answer Booklet liable for rejection.**
4. Do not write anything else on the OMR Answer Sheet except the required information. Before you proceed to mark in the OMR Answer Sheet, please ensure that you have filled in the required particulars as per given instructions.
5. Use **only Black Ball Point Pen** to fill the OMR Answer Sheet.
6. This Test Booklet is divided into 4 (four) parts – **Part – I, Part – II, Part – III and Part – IV.**
7. All four parts are **Compulsory.**
8. **Part-I consist of Multiple Choice-based Questions.** The answers to these questions have to be marked in the OMR Answer Sheet provided to you.
9. **Part – II to Part – IV consist of Conventional Questions.** The answers to these questions have to be written in the **Separate Answer Booklet** provided to you.
10. In Part-I, each item (question) comprises of 04 (four) responses (answers). You are required to select the response which you want to mark on the OMR Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
11. After you have completed filling in all your responses on the OMR Answer Sheet and the Answer Booklet(s) and the examination has concluded, you should hand over to the Invigilator **only the OMR Answer Sheet and the Answer Booklet(s).** You are permitted to take the Test Booklet with you.
12. **Penalty for wrong answers in Multiple Choice-based Questions:**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to the question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to the question.
 - (iii) If a question is left blank. i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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PART – I

(Multiple Choice Questions)

Choose the correct answer for the following questions.

Each question carries 3 marks. (3x50=150)

1. In Digboi oil field, the oil bearing formation is the Tipam sandstone which is of:
 - a. Miocene age
 - b. Eocene age
 - c. Oligocene age
 - d. Pliocene age

2. The discontinuity present between the outer core and inner core is referred to as-
 - a. Lehman discontinuity
 - b. Mohorovicic discontinuity
 - c. Repetiti discontinuity
 - d. Gutternberg discontinuity

3. Which of the following belongs to siliceous ooze?
 - a. Diatom ooze
 - b. Pteropod ooze
 - c. Globigerina ooze
 - d. Coccolithophore ooze

4. The hardness of a knife blade in Mohs scale is-
 - a. 4.5
 - b. 5.5
 - c. 2.5
 - d. 3.5

5. Which of the following minerals is also known as '*fool's gold*'?
 - a. Calcite
 - b. Pyrite
 - c. Apatite
 - d. Gypsum

6. Which among the following era was dominated by dinosaurs?
 - a. Cenozoic
 - b. Mesozoic
 - c. Precambrian
 - d. Palaeozoic

7. When the grain size changes vertically through the layer it is called -
 - a. Graded bedding
 - b. Foliated
 - c. Cross bedding
 - d. Not found in nature

8. The density of heavy minerals are above -
- 2.6 g/cm³
 - 2.1 g/cm³
 - 2.9 g/cm³
 - 3.9 g/cm³
9. Ophitic texture is commonly seen in-
- Lamprophyre
 - Trachyte
 - Dolerite
 - Andesite
10. Which of the following is in order of *lowest to highest* grade metamorphism?
- Gneiss, schist, phyllite, slate
 - Slate, phyllite, schist, gneiss
 - Slate, phyllite, gneiss, schist
 - Phyllite, slate, schist, gneiss
11. Manganese deposits are found in which formation of sausar group?
- Chorbaoli formation
 - Sitasong formation
 - Lohangi formation
 - Mansar formation
12. Which is the lowermost Mesozoic formation in Kutch region?
- Katrol
 - Umia
 - Patcham
 - Chari
13. The crustal thickness is the maximum at which kind of boundaries?
- Ocean-ocean convergent plate boundary
 - Ocean-ocean divergent plate boundary
 - Ocean-continent convergent plate boundary
 - Continent-continent convergent plate boundary
14. The titaniferous vanadiferous magnetite deposits of Mayurbhanj district of Odisha are associated with -
- Banded magnetite quartzite
 - Basic igneous rocks
 - Felsic rocks
 - Kimberlites
15. The term used for an episode of mountain building -
- Shield
 - Craton
 - Orogeny
 - Epeirogeny

16. The asteroid belt is present between-
- Mars and Jupiter
 - Earth and Venus
 - Sun and Mercury
 - Jupiter and Saturn
17. The structure “Widmanstätten figure” is the characteristic feature of -
- Siderites
 - Siderolites
 - Aerolites
 - Tektite
18. In which part of India is the only active volcano present?
- Barren island
 - Narcondam island
 - Kanyakumari
 - Kerala coast
19. Match column 1 with column 2 correctly using the codes given below:
- | Column 1 | Column 2 |
|--------------|-------------|
| P. Arête | 1. Volcanic |
| Q. Tuff | 2. Glacial |
| R. Tombolo | 3. Fluvial |
| S. Point bar | 4. Coastal |
- CODES:
- P-2, Q-1, R-4, S-3
 - P-1, Q-2, R-3, S-4
 - P-4, Q-2, R-1, S-3
 - P-3, Q-1, R-2, S-4
20. The apparent dip of a plane is measured to be 46° towards NE. The true dip of the plane is-
- 49° towards ENE
 - 55° towards SSW
 - 40° towards E
 - 35° towards W
21. What kind of unconformity is present between Talchir Formation and the underlying Precambrian basement?
- Paraconformity
 - Angular unconformity
 - Disconformity
 - Nonconformity

22. Spinifex texture is seen in-
- Kimberlite
 - Lamprophyre
 - Komatite
 - Granite
23. Shallow focus earthquakes with tensional focal mechanism are observed in -
- Mid-oceanic ridge
 - Subduction zones
 - Transform faults
 - Continental rift zones
24. Rampura-Agucha mines are known for which of the following?
- Pb-Zn
 - Fe-Cu
 - Co-Ni
 - Au
25. Which of the following is not a greenhouse gas?
- Methane
 - Nitrous oxide
 - Carbon dioxide
 - Oxygen
26. Which kind of coiling does Planorbis show?
- Dextral
 - Sinistral
 - Hexagonal
 - Planar
27. Nummulites are-
- Diatom
 - Pteropod
 - Planktic foraminifera
 - Benthic foraminifera
28. Suture lines with smooth rounded saddle and finely divided lobes in a cephalopod is known as
- Goniatite type
 - Ceratite type
 - Ammonoid type
 - Nautiloid type
29. Which kind of drainage pattern is developed in a volcanic cone?
- Dendritic
 - Trellis
 - Radial
 - Rectangular

30. From which of the following is *Ptilophyllum* reported?
- Upper Gondwana
 - Middle Gondwana
 - Lower Gondwana
 - None of these
31. Which of the following is not related with Air photos interpretation?
- Shape
 - Size
 - Tone
 - SAR
32. The instruments which emit artificial radiation to monitor the earth's surface or atmospheric features are called -
- Sensors
 - Passive sensors
 - Active sensors
 - All of these
33. The basic requirement of any sensor system is -
- spatial resolution
 - spectral resolution
 - temporal resolution
 - All of these
34. Which one of the following digital numbers has 8 bit satellite data?
- 250
 - 0
 - 150
 - 256
35. In digital remote sensing, land water contrast is best identified in the _____ wavelength band.
- Ultraviolet
 - Near IR
 - Thermal IR
 - Middle IR
36. The cosmic abundance of elements is influenced by -
- Supernova explosions
 - Continental drift
 - Ocean currents
 - Atmospheric pressure
37. The Earth's mantle is composed mainly of -
- Silicate minerals
 - Metallic alloys
 - Carbonate rocks
 - Sulfide minerals

38. The primary type of chemical bond in sodium chloride (NaCl) is -
- Covalent bond
 - Ionic bond
 - Metallic bond
 - Hydrogen bond
39. The behaviour of trace elements in magmatic systems follows -
- Raoult's Law
 - Henry's Law
 - Fick's second Law
 - First Law of Thermodynamics
40. Fly ash disposal can lead to -
- Air pollution and soil contamination
 - Improved air quality
 - Enhanced biodiversity
 - Reduced greenhouse gas emissions
41. If all of the Earth's ice melted, the increase in sea level would approximately be -
- 100 meters
 - 150 meters
 - 70 meters
 - 50 feet
42. The Mercalli scale measures the-
- Intensity of earthquakes
 - Magnitude of earthquakes
 - Wind speed in tornadoes
 - Volume of floodwaters

43. Consider the following pairs:

List I	List II
A. Pir Panjal	1. Arunachal Pradesh
B. Dhauladhar	2. Uttarakhand
C. Nag Tibba	3. Jammu & Kashmir
D. Mishmi Hills	4. Himachal Pradesh

Choose the correct option from the codes given below:

- A - 3 ; B - 4 ; C - 1 ; D - 2
- A - 4 ; B - 3 ; C - 1 ; D - 2
- A - 4 ; B - 3 ; C - 2 ; D - 1
- A - 3 ; B - 4 ; C - 2 ; D - 1

44. Match List-I with List-II and select the correct answer using the codes given below –

List I	List II
A. Alps	1. Block Mountain
B. Vosges	2. Volcano Mountain
C. Vindhya	3. Folded Mountain
D. Fujiyama	4. Residual Mountain

Codes: A B C D

- a. 1 3 2 4
- b. 2 4 1 3
- c. 1 4 3 2
- d. 3 1 4 2

45. The hydrological cycle depicts continuous movement of water within the earth and atmosphere and includes many different processes. Choose the correct sequence showing the various processes involved.

- a. Evaporation, Transpiration, Condensation, Precipitation
- b. Condensation, Evaporation, Transpiration, Precipitation
- c. Precipitation, Condensation, Transpiration, Evaporation
- d. Transpiration, Precipitation, Condensation, Evaporation

46. If the hydraulic conductivity of an aquifer is location independent but varies with the direction of measurement, then the aquifer is -

- a. Homogeneous and isotropic
- b. Heterogeneous and anisotropic
- c. Homogeneous and anisotropic
- d. Heterogeneous and isotropic

47. A spring emerging from karst aquifer flows over the surface as a channel whose average width is 4 meter and average depth of water in the channel is 0.5 meter. A laminar flow condition occurs in the channel upto a distance of 20 meter between locations (A) and (B), with a mean velocity of 60 seconds (one minute). The velocity area method indicates the amount of water draining through the channel is –

- a. 0.44 cubic meter /minute
- b. 0.66 cubic meter /minute
- c. 0.50 cubic meter /minute
- d. 0.65 square meter /minute

48. IS10500:2012, is the latest Bureau of Indian Standard code, providing specification for drinking water. The following table depicts the maximum permissible limits for various chemical water quality parameters in drinking water in absence of alternate sources. Choose the correct option as per above mentioned Indian Standard code.

Option	Parameters	Permissible Limit (mg/L)
a	Total dissolved solids, Calcium, Magnesium, Fluoride, Arsenic, Sulphate, Zinc	2000, 200, 100, 1.5, 0.05, 400, 15
b	Total dissolved solids, Calcium, Magnesium, Fluoride, Arsenic, Sulphate, Zinc	500, 75, 30, 1, 0.01, 200, 5
c	Total dissolved solids, Calcium, Magnesium, Fluoride, Arsenic, Sulphate, Zinc	2000, 400, 100, 200, 15, 1.5, 0.05, ,
d	Total dissolved solids, Calcium, Magnesium, Fluoride, Arsenic, Sulphate, Zinc	2000, 200, 15, 100, 0.05, 1.5, 400

49. Morphometry is concerned with the generalization of land surface geometry by quantitatively determining the linear, aerial and relief aspects of the basin. Choose the correct sequence which includes variables from all the three morphometric aspects of the drainage basin.

- Bifurcation ratio, Drainage density, Stream order
- Ruggedness number, Relative relief, Drainage texture
- Elongation ratio, Sinuosity index, Ruggedness number
- Bifurcation ratio, Drainage texture, Ruggedness number

50. The interface depth between fresh and saline water can be approximated under static hydraulic conditions. This phenomenon is described by -

- Glover equation
- Strack's equation
- Ghyben-Herzberg relation
- None of the above

PART – II
(Short Answer Type Questions)

Answer any 10 (ten) of the following questions.

Each question carries 5 marks.

(5x10=50)

- Write about the economic importance of Singhbhum Craton.
- Describe the Tertiary Succession of Assam.
- Mention some of the significance of Radiolaria.
- Describe the Global Sea-Level changes, its causes and impacts.

55. What does Palaeo current Analysis indicate? How it is useful in the interpretation of the past environment?
56. Describe the Continental Drift briefly.
57. What is Global Positioning System? How it is useful in the field of geology?
58. What are joints and their classification?
59. Describe an Aquifer along with its classifications.
60. Write about the Seismic methods in petroleum exploration.
61. What are clay minerals? Describe its properties briefly.
62. Describe the Bowen's Reaction Series.
63. Write the differences between Metamorphism and Metasomatism.

PART – III
(Long Answer Type Questions)

Answer any 10 (ten) of the following questions.

Each question carries 10 marks.

(10x5=50)

64. What do you understand by sedimentary depositional environment? Describe fluvial environment in detail.
65. Discuss in detail the different types of landslides, factors causing landslides and its mitigation steps.
66. Describe the stratigraphy, classification and Indian distribution of Gondwana Supergroup. Add a note on its economic significance.
67. Discuss the major mass extinction events in Earth's Geological History.
68. What is Geographic Information System (GIS)? Write down its applications in disaster management.
69. Describe the factors responsible for magma generation. Add a note on magma generation in convergent plate boundaries.
70. Expound the concept of metamorphic facies with a suitable diagram. Add a note on metamorphic facies on the basis of increasing rock temperature.
71. Write notes on the following:-
 - a. The different types of shear zones.
 - b. The different types of planar and linear structures with suitable diagrams.

PART – IV
(Essay Type Questions)

Answer any 2(two) of the following questions.

Each question carries 25 marks.

(25x2=50)

72. Explain the interior structure of the earth in detail. Add a note on the different types of seismic discontinuities present inside the earth at several depths and the compositional changes associated with it.
 73. Describe the different kinds of microfossils. Explain the application of microfossils in solving geological problems.
 74. Describe the different types of bridges. Add a note on geological consideration for the selection of bridge and tunnel sites.
 75. Illustrate the following:-
 - a. Fluoride and Arsenic contamination of groundwater in India and its treatment methods.
 - b. Rainwater Harvesting and its significance in managing groundwater depletion in India.
-