FEDERAL PUBLIC SERVICE COMMISSION

COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS
IN BPS-17 UNDER THE FEDERAL GOVERNMENT, 2001.

GEOLOGY, PAPER-I

TIME ALLOWED: THREE HOURS MAXIMUM MARKS: 100

NOTE: Attempt **FIVE** questions in all, including question **No.8** which is **COMPULSORY**. All questions carry **EQUAL** marks.

1. Classify the **fault** genetically and briefly describe with the help of suitable diagrams.
2. Discuss the **rock cycle** and explain how it is related to **plate tectonics**.
3. What are the basic **time stratigraphic** units and their corresponding **time units**? Why did geologist find it necessary to establish these two kinds of units?
4. Briefly describe **Phyllum Molluska** and give its classification up to class level with ages.
5. Briefly describe the major **plutonic and volcanic** rocks with their composition. Give some examples from Pakistan.
6. Write a comprehensive note on Geodynamics of Pakistan.
7. Write short notes on the following:
   (a) Differential weathering
   (b) Primary structures of igneous rock
   (c) Geomorphic cycle
   (d) Metamorphic Facies

COMPULSORY QUESTION

8. Write only the correct answers in the Answer Book. Do not reproduce the questions:

   (1) The two minerals calcite and aragonite are polymorphs .This means that they have the same:
   (a) crystal habit (b) hardness (c) crystalline structure
   (d) chemical composition (e) density (f) None of these.

   (2) The sentence "The present is the key to the past." is a common restatement of the:
   (a) law of superposition (b) principle of lateral continuity
   (c) principle of uniformitarianism (d) law of diminishing returns
   (e) principle of cross-cutting relationships (f) None of these.

   (3) When a conglomerate contains particles that are sharp and angular, geologists call it:
   (a) an arkose (b) a travertine (c) a breccia
   (d) a quartz arenite (e) a coquina (f) None of these

   (4) What type of rock makes up the greatest portion of the volume of the continental crust:
   (a) limestone (b) gabbro (c) granite
   (d) basalt (e) shale (f) None of these

(5) Geologists can recognize a gap in a sequence of sedimentary rocks that represents a hiatus in the record of geologic time by locating a feature know as:

(a) an exfoliation dome (b) an isograd
(c) a geologic column (d) a varve
(e) an unconformity (f) None of these.

(6) A fossil is most useful to geologists as an index fossil if:

(a) it is only found in one particular place in the world
(b) the species from which it formed had survived, unchanged, for an extremely long time.
(c) the species from which it formed is closely related to a modern species
(d) it is only found in sediments deposited during a short interval in Earth's history.
(e) it is very different in appearance from other fossils around it
(f) None of these.

(7) A geologist wants to distinguish between mineral samples by seeing how well they resist scratching. What standard should he use as the basis for comparing samples?

(a) the Richter scale (b) Steno's laws (c) the Mohs scale
(d) the Hutton scale (e) the Carnegie index
(f) None of these.

(8) Chalk, coquina , tufa , and travertine are names applied to different varieties of:

(a) mudstone (b) conglomerate (c) sandstone
(d) Evaporite (e) limestone (f) None of these.

(9) Seismic body waves

(a) travel more slowly than surface waves
(b) may be either compressional or shear waves
(c) are produced by the energy that is released at an earthquake epicenter
(d) cannot be detected by an inertial seismograph
(e) are produced in the Earth's outer core

(10) A geologist describing a fault discovers that rocks in the foot wall block have moved upward, relative to rocks in the hanging wall block. What kind of fault has he discovered?

(a) a strike-slip fault (b) a transform fault (c) a reverse fault
(d) a normal fault (e) an oblique fault (f) None of these

(11) According to the 19th century geologists who first developed the idea, a geosyncline is:

(a) filled almost entirely with volcanic rocks
(b) a huge fold in the middle of a craton
(c) produced by continental convergence
(d) a great trough that gradually deepens as it fills
(e) produced by seafloor spreading
(f) None of these.

(12) All of the *deep* earthquakes in the world are associated with

(a) spreading centers (b) mantle plumes (c) ocean trenches
(d) plate triple junctions (e) continental shelves (f) None of these

(13) The oldest rocks on the Earth are found

(a) in accreted terranes (b) on mid-ocean ridges (c) in cratons
(d) an orogens (e) in subduction zones (f) None of these

(14) One important outcome of H.F. Reid's study of the great 1906 earthquake in San Francisco was the development of a new concept called:
(a) isostasy (b) elastic rebound
(c) free oscillations (d) mantle convection (e) risk assessment
(f) None of these

(15) Ophiolite complexes that are located high in the Himalayas Mountains of Asia *were* probably once pieces of:
(a) an island arc (b) a craton (c) the outer core
(d) the oceanic crust (e) a continental shelf (f) None of these

(16) What part of the Earth is immediately beneath the Moho ?
(a) the outer core (b) the asthenosphere (c) the inner core
(d) the lower lithosphere (e) the mesosphere (f) None of these

(17) Andesitic magma is commonly produced by
(a) wet partial melting in subduction zones
(b) friction in fold-and-thrust mountains
(c) compression due to deep burial
(d) pressure release at midocean ridges
(e) heat rising in mantle plumes
(f) None of these.

(18) Porosity is a measure of:
(a) the percentage of a sediment's (or a rock's) volume that is open space
(b) how high the water pressure in a rock or sediment can be
(b) the shape and average size of open spaces in a rock or sediment
(d) how well the open spaces in a rock or sediment are connected to each other
(e) how easily water will flow through a rock or sediment
(g) None of these.

(19) Geologists use the equation called Darcy's Law to calculate :
(a) the depth to the water table
(b) the discharge through an aquifer
(c) the water pressure in an aquifer
(d) the volume of an aquifer
(e) the porosity of an aquifer
(f) None of these.

(20) A sinkhole is caused by:
(a) pumping water from a well (b) collapse of the land over a cave
(c) a violent eruption of heated groundwater
(d) tectonic settling between normal faults
(e) melting of buried ice
(f) None of these.

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NOTE: Attempt **FIVE** questions in all, including question **No.8** which is **COMPULSORY**. All questions carry **EQUAL** marks.

1. Briefly describe the case histories of the following oil and gas fields.
   (a) **Mari** Gas Field (b) **Khaskhaili** Oil Field
   (c) **Dhulian** Oil Field (d) **Dhodhak** Condensate Field

2. How **gravity and magnetic techniques** are useful in hydrocarbon exploration?

3. Describe **various kinds of gemstones** and give their occurrences from Pakistan.

4. Describe the environmental conditions of the **transformation** of organic matter into **kerogen**. How the **expulsion** occurs from the **source rock**?

5. Write a detail note on **salinity and water logging** problems in **Sindh** Region.

6. How sites for **dams** construction are investigated? Which site you will suggest for **dam** construction on **Indus River**? Discuss.

7. Write SHORT NOTES on the following:
   (a) Types of **aquifers** (b) **Geochemical** exploration technique
   (c) **Radio active minerals** of Pakistan (d) **Metallogeny** of Pakistan

COMPULSORY QUESTION

8. write only the correct answers in the answer books. Do not reproduce the questions.

   (1) The most necessary property of a reservoir is
   (a) Porosity (b) voids
   (c) Permeability (d) None of these.

   (2) The oldest coal field of Pakistan is found in rock of
   (a) Cambrian age (b) Tertiary age
   (c) Permian age (d) None of these.

   (3) The youngest oil reservoir rock of Indus Basin is
   (a) Khera sandstone (b) Murree sandstone
   (c) Pab Sandstone (d) None of these.

   (4) The dam situated on Kabul River in Pakistan is known as
   (a) Warsak dam (b) Hub dam
   (c) Tarbela dam (d) None of these.

   (5) The toposheet that is used for geological mapping is usually of scale
   (a) 1:50,000 (b) 1:100,000
   (c) 1:63,360 (d) None of these.

   (6) One ton of oil is equal to US bbl
   (a) 7.33 (b) 3.77
   (c) 37.7 (d) None of these.

(7) In Khewra Salt mines which method is used for mining salt
(a) open mining (b) Pillar & room
(c) None of these.

(8) Best quality of Barite is reported from
(a) Khuzdar (b) Kallat
(c) Ziarat (d) None of these.

(9) In which of the following carbon content is the highest
(a) Peat (b) Bituminous
(c) Lignite (d) None of these.

(10) Measuring units for natural gas is
(a) BTU (b) MMCF
(c) BBL (d) None of these.

(11) The Petroleum geology of Pakistan book is written by
(a) V.N.Qadri (b) S.M.G.J.Qadri
(c) I.B.Qadri (d) None of these.

(12) Velocity of P waves is minimum in
(a) Salt dome (b) Basalt
(c) Shale (d) None of these.

(13) Isopach contour map represent
(a) True thickness (b) Drill thickness
(c) Apparent thickness (d) None of these.

(14) The Travertine mineral is considered to be the result of
(a) Placer deposit (b) Hot spring deposit
(c) Fluvial deposit (d) None of these.

(15) Aquifer is a rock which has one of the following water
(a) Connate water (b) Percolated water
(c) Meteoric water (d) None of these.

(16) Major causes of land slide is
(a) Gravity (b) Vertical bedding
(c) Rainfall (d) None of these.

(17) The instrument which measure the intensity of earthquake is
(a) Geophone (b) Seismograph
(c) Magnetometer (d) None of these.

(18) Coal is found in one of the following environment
(a) Marine (b) Terrestrial
(c) Shoreline (d) None of these.

(19) Remote Sensing Exploration is highly useful for
(a) water (b) mineral
(c) hydrocarbon (d) None of these.

(20) Which one of the following is a trace element in petroleum hydrocarbon
(a) C (b) H
(c) S (d) None of these.

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