THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

Ph. D. ENTRANCE TEST (PET) 2025

Signature of Invigilator

Roll. No. | | | | | | |

Paper - II
Earth Science

Maximum Marks: 50 **No. Of Printed Pages: 8**

Instruction for the Candidate:

1. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
2. There is no Negative Marking for Wrong Answer.
3. A separate OMR Answer Sheet has been provided to answer questions. Your answers will be evaluated based on your response in the OMR Sheet only. No credit will be given for any answering made in question booklet.
4. Defective question booklet or OMR if noticed may immediately replace by the concerned invigilator.
5. Write roll number, subject code, booklet type, category and other information correctly in the OMR Sheet else your OMR Sheet will not be evaluated by machine.
6. Select most appropriate answer to the question and darken appropriate oval on the OMR answer sheet, with black / blue ball pen only. DO NOT USE PENCIL for darkening. In case of over writing on any answer, the same will be treated as invalid. Each question has exactly one correct answer and has four alternative responses (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example: Ⓐ ● Ⓒ Ⓓ where (B) is correct response.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. Calculators, Log tables any other calculating devices, mobiles, slide rule, text manuals etc are NOT allowed in the examination hall. If any of above is seized from the candidates during examination time; he/ she will be immediately debarred from the examination and corresponding disciplinary action will be initiated by the Center Supervisor as deemed fit.
10. DO NOT FOLD or TEAR OMR Answer sheet as machine will not be able to recognize torn or folded OMR Answer sheet.
11. **You have to return the OMR Answer Sheet to the invigilator at the end of the examination compulsorily** and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet on conclusion of examination.

Paper - II
Earth Science

Note: This paper contains **FIFTY (50)** multiple-choice questions. Each Question carries **ONE (1)** mark.

01) Which one of the following has maximum width of the continental shelf?
   A) Arctic coast of Canada
   B) Greenland coast
   C) Antarctica coast
   D) Arctic coast of Siberia

02) Which of the following statements is not correct?
   A) Archaean rocks are found in Chotanagpur
   B) The central Himalaya base is of Archaean formation.
   C) The Peninsular gneiss is known as Bengal gneiss.
   D) The entire peninsular India is made up of Archaean rocks.

03) If a planet moves around the Sun in an elliptical orbit, when does it have maximum kinetic energy?
   A) At the farthest point from the Sun (aphelion)
   B) At the closest point to the Sun (perihelion)
   C) At the center of the ellipse
   D) Kinetic energy remains constant

04) What term describes the resistance of a rock to deformation under stress?
   A) Toughness
   B) Elasticity
   C) Strength
   D) Rigidity

05) What does a METAR report provide?
   A) Weather forecast for a 5-day period
   B) Real-time weather conditions at an airport
   C) Weather conditions for enroute flights
   D) Severe weather alerts

06) Which of the following geographical features are found in Indian Ocean?

   1. Lord Howe rise
   2. Mendocino seascarp
   3. Amsterdam-St. Paul plateau
   4. Prince Edward Crozet ridge

Select the correct answer from the codes given below:

   A) 2 and 4
   B) 1,3 and 4
   C) 3 and 4
   D) 1,2 and 4

07) Arrange the following marine features as one finds them in course of his movement from the coast to themed oceanic region,

   1. Shoal
   2. Seamount
   3. continental rise
   4. Continental slope
   5. Ocean deeps

Select the correct answer from the codes given below:

Codes
   A) 1,4,5,3,2
   B) 1,4,3,5,2
   C) 4,1,5,3,2
   D) 4,1,3,5,2,

08) Which of the following gases is most effective in absorbing terrestrial radiation?
   A) Oxygen
   B) Nitrogen
   C) Carbon Dioxide
   D) Helium

09) Which layer of the atmosphere absorbs most of the ultraviolet radiation from the sun?
   A) Troposphere
   B) Stratosphere
   C) Mesosphere
   D) Thermosphere

10) Which of the following is the most important factor in the fossilization of soft-bodied organisms?
   A) Rapid burial in anoxic conditions
   B) High oxygen levels
   C) Presence of scavengers
   D) Volcanic activity

11) Which dating method is most suitable for determining the age of a 1.5-billion-year-old igneous rock?
   A) Radiocarbon dating
   B) Thermoluminescence
   C) Potassium-Argon dating
   D) Dendrochronology

12) Which of the following regions is considered a biodiversity hotspot due to its high level of endemism and significant habitat loss?
   A) Siberian Taiga
   B) Canadian Shield
   C) Madagascar
   D) Greenland

13) Which process best explains the presence of similar species of flightless birds in South America, Africa, and Australia?
A) Convergent evolution
B) Adaptive radiation
C) Plate tectonics and continental drift
D) Parallel evolution

14) Which of the following biogeographic zones in India is known as the "transition zone" between the Palearctic and the Indo-Malayan realms?
A) Western Ghats
B) Indo-Gangetic Plain
C) Himalayas
D) Deccan Plateau

15) Which climate zone of India experiences a large temperature range between summer and winter, and moderate rainfall?
A) Tropical Wet
B) Humid Subtropical
C) Arid
D) Alpine

16) The minimum support price (MSP) system in India is mainly designed to:
A) Control inflation
B) Encourage agricultural exports
C) Provide price assurance to farmers
D) Provide security to labourers

17) Which of the following Indian states is the leading producer of pulses?
A) Maharashtra
B) Madhya Pradesh
C) Uttar Pradesh
D) Andhra Pradesh

18) The Earth's solid outer layer which include the crust and the uppermost mantle is known as the_____.
A) Asthenosphere
B) Lithosphere
C) Mesosphere
D) Troposphere

19) What is the primary gas responsible for the greenhouse effect in the Earth's atmosphere?
A) Nitrogen
B) Oxygen
C) Argon
D) Carbon Dioxide

20) Which of the following is a result of the Coriolis effect on ocean currents?
A) The formation of tides
B) The sinking of cold, salty water
C) The deflection of currents to the right in the Northern Hemisphere and to the left in the Southern Hemisphere
D) The generation of tsunamis

21) The major component of the Earth's core consist of _____.
A) Silicates
B) Iron and Nickel
C) Silica and Aluminium
D) Carbon and Oxygen

22) The presence of a "shadow zone" for P-waves and S-waves provides critical evidence for which of the following?
A) The existence of a liquid outer core
B) The presence of plate tectonics
C) The theory of seafloor spreading
D) The composition of the Earth's mantle

23) In the context of the atmosphere, what does the term "lapse rate" refer to?
A) The rate at which the Earth's magnetic field changes with altitude.
B) The rate at which air pressure decreases with altitude.
C) The rate at which air temperature decreases with altitude.
D) The rate at which humidity decreases with altitude.

24) Which of the following is NOT a stage in the hydrological cycle?
A) Evaporation
B) Precipitation
C) Photosynthesis
D) Condensation

25) The variety of life in a particular habitat or ecosystem is known as_____.
A) Ecology
B) Biodiversity
C) Ecotone
D) Ecosystem

26) The global thermohaline circulation commonly called as the 'oceanic conveyor belt' is, primarily driven by_____.
A) differences in water density caused by temperature and salinity variations.
B) planetary wind patterns like the trade winds and polar winds.
C) the gravitational pull of the moon and the sun.
D) the rotation of the earth.

27) In the Koppen's climatic classification, a climate described as having very low precipitation where potential evaporation exceeds precipitation year-round falls into which major climate group?
A) D
B) A
C) B
D) E

28) The primary function of the 'biological pump', a critical process in the ocean's carbon cycle is
A) It increases the salinity of surface waters through evaporation
B) It dissolves calcium carbonate shells on the seafloor.
C) It generates oxygen through photosynthesis in shallow waters.
D) It transports organic carbon from the surface to the deep ocean.

29) A geologist observes that a mineral sample consistently breaks along smooth, flat surfaces. This physical property is known as_____.
A) Cleavage
B) Hardness
C) Fracture
D) Lustre

30) Which type of rainfall is associated with relief lifting?
A) Convectional rainfall
B) Frontal rainfall
C) Cyclonic rainfall
D) Orographic rainfall

31) Which of the following statements best describes the concept of albedo?
A) The rate at which a surface absorbs solar radiation.
B) The fraction of solar radiation reflected by a surface.
C) The amount of water vapor in the atmosphere.
D) The total amount of energy radiated by the Earth.

32) What is the primary characteristic of a continental polar air mass?
A) Cold and dry
B) Unstable and moist
C) Cold and moist
D) Warm and dry

33) The concept of "Wallace's Line" is related to:
A) The distribution of endemic species in Australia
B) The boundary between the Palearctic and Oriental faunal regions
C) The distribution of plant species in the Himalayas
D) The demarcation of different biomes in India

34) Which of the following is an example of convergent evolution?
A) The similar body shape of dolphins and sharks
B) The different beaks of finches on the Galapagos Islands
C) The different limb structures of mammals
D) The different primate groups such as lemurs, monkeys, apes, and humans

35) What is the primary impact of deforestation on the environment?
A) Increased biodiversity
B) Reduced soil erosion
C) Increased carbon sequestration
D) Loss of habitat and soil erosion

36) Which of the following best describes the concept of "carrying capacity" in relation to natural resources and human populations?
A) The maximum number of individuals an environment can support indefinitely.
B) The rate at which a resource can be used without depleting it.
C) The total amount of resources available on Earth.
D) The ability of an ecosystem to recover from disturbance.

37) The westward flow of some of the major Peninsular rivers like Narmada and Tapi is different. What is the primary reason for this unusual drainage pattern?
A) The rivers flow through structural troughs or rift valleys.
B) The Deccan Plateau has a westward tilt, forcing the rivers to flow in that direction.
C) They are a result of tectonic uplift in the eastern part of the subcontinent.
D) They originate in the Western Ghats, which have a westward slope.

38) The distribution of population in India is mainly characterised by
A) Population distribution is primarily determined by urban centers, with rural areas being sparsely populated.
B) The mountainous regions of the Himalayas have the highest population density due to their favorable climate.
C) Population is concentrated in areas with flat plains, fertile soils, and abundant water resources.
D) Population density is uniformly high across all of India due to its large population.

39) In remote sensing, which wavelength region is most suitable for penetrating cloud cover to capture surface features?
A) Thermal Infrared
B) Microwave
C) Visible Red
D) Near Infrared

40) According to the Clausius-Clapeyron equation, what is the effect of increasing temperature on the saturation vapor pressure?
A) Saturation vapor pressure increases exponentially.
B) Saturation vapor pressure decreases exponentially.
C) Saturation vapor pressure remains constant.
D) Saturation vapor pressure increases linearly.

41) In warm clouds, the dominant precipitation formation mechanism is
A) Riming process
B) Sublimation
C) Collision-coalescence process
D) Bergeron-Findeisen process

42) Which artificial precipitation technique primarily involves the introduction of ice-forming nuclei to supercooled clouds?
A) Silver iodide seeding
B) Salt powder seeding
C) Dry ice sublimation
D) Both A and C

43) In the Bergeron-Findeisen process, the difference in saturation vapor pressure over ice and water leads to
A) Condensation of vapor onto ice nuclei only at high temperatures
B) Evaporation of water droplets and sublimation of ice
C) Growth of ice crystals at the expense of supercooled droplets
D) Melting of snowflakes before reaching the surface

44) Which of the following is NOT a primary cloud classification according to the WMO system?
A) Cirrus
B) Altocirrostratus
C) Cumulonimbus
D) Stratocumulus

45) The Ferrel cell in the general circulation is considered thermally indirect because
A) it transfers energy from poles to equator.
B) it is driven solely by eddy fluxes rather than direct solar heating.
C) it operates only in the Southern Hemisphere.
D) rising motion occurs in cooler regions and sinking motion in warmer regions.

46) Which of the following statements about the Madden-Julian Oscillation (MJO) is correct?
A) It propagates eastward along the equator with a 30-60 day timescale.
B) It is confined to the Atlantic basin.
C) It is a stationary mode of tropical convection linked to sunspot maxima.
D) It has typical period of ~ 5-7 days and propagates poleward.

47) Ekman transport in the Northern Hemisphere results in net surface water movement
A) parallel to the wind direction.
B) 45^{o} to the right of wind direction.
C) 90^{o} to the left of wind direction.
D) 90^{o} to the right of wind direction.

48) On Mohr's Circle, the radius represents:
A) Average stress
B) Maximum shear stress
C) Hydrostatic stress
D) Yield strength

49) Which hypothesis argues that planets formed from gradual aggregation of small celestial bodies?
A) Nebular Hypothesis
B) Planetesimal Hypothesis
C) Supernova Hypothesis
D) Binary Star Hypothesis

50) The theory of island biogeography predicts that species richness on an island is primarily determined by:
A) The age and altitude of the island.
B) The evolutionary adaptability of colonizing species.
C) The distance of the island from the mainland and its size.
D) The avaiability of freshwater and volcanic activity.

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Rough Work: