

Mock Test

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GENERAL SCIENCE AND ABILITY

PART - II

SECTION - I

Q: NO. 2

(a) What are the potential benefits and challenges of implementing Artificial Intelligence (AI) in healthcare? Discuss the impact of AI on patient care and medical diagnosis.

Ans: Artificial Intelligence have both potential benefits as well as challenges. Some of them are:

Benefits

1 Improved diagnosis through machine learning-based imaging tools (e.g. early cancer detection)

- 2 Predictive analytics for disease outbreaks and patient deterioration.
- 3 Automation of administrative tasks, reducing workload.
- 4 Personalized medicine through data-driven treatment plans.

Challenges:-

- 1 Data privacy and security concerns.
- 2 High cost and lack of infrastructure in developing nations.
- 3 Ethical dilemmas regarding autonomy and bias.
- 4 Risk of job displacement in health-care.

Impact:-

AI enables faster, more accurate diagnoses and treatment plans, leading to better patient outcomes.

(b) Describe the Big Bang theory and its significance in understanding the origin and evolution of the universe. What are some of the

Key evidence supporting this theory?

Ans Big Bang theory:

The Big Bang theory suggests the universe originated about 13.8 billion years ago from a singularity - an infinity dense point - which expanded rapidly.

Significance:

Big Bang theory explains the origin and evolution of galaxies, stars and planets.

Evidence:

- 1) Cosmic Microwave Background Radiation (CMBR) - remnant heat from the explosion.
- 2) Redshift of galaxies (Hubble's law)
Galaxies moving away indicate expansion.
- 3) Abundance of light elements (H, He)
Matches predictions.

(C) What are the primary causes and effects of global warming? Discuss the role of human activities in contributing to global warming and suggest some potential strategies for mitigating its impacts?

Ans: Global Warming:-

Global warming refers to the long-term rise in the average temperature of the Earth's atmosphere and oceans.

Causes:-

Following are some of the causes of global warming:-

(1) Emission of Greenhouse gases e.g. Carbon dioxide (CO_2), methane (CH_4), and Nitrous Oxide (N_2O).

(2) Deforestation

(3) Industrialization and energy consumption.

Effects:-

As a result, these effects are caused:-

1 Rising temperature of atmosphere

and oceans.

2. Melting of glaciers, rising sea levels
3. Extreme weather events are one of the major effect
4. Another major effect is biodiversity loss.

For Mitigating the effects:

Following steps should be taken to mitigate the effects.

1. Transition to renewable energy.
2. Afforestation
3. International agreements such as the Paris Accord.
4. Sustainable agriculture.

(d) What are the key components of a disaster management plan?

Discuss the importance of preparedness, response and recovery in mitigating the impacts of natural disasters.

Provide examples of successful disaster management strategies.

Ans: Disaster management is the systematic process of preparing for, responding to and recovering from natural or man-made disasters to minimize the loss of life, property and environment. It involves planning, coordination, and efficient use of resources to handle emergencies effectively.

Key components:

1) Mitigation:-

Activities to reduce or eliminate risks for example constructing flood barriers, enforcing building codes, afforestation.

2) Preparedness:

Planning and training for effective response such as early warning systems, mock drills, community awareness programs.

3) Response:

Immediate actions during and after a disaster to save lives and provide relief. For example rescue operations, providing food, water,

and medical aid.

(4) Recovery:

Restoring normalcy and rebuilding affected areas. For examples in infrastructure repair, psychological support, economic rehabilitation.

Importance:

- Reduce loss of lives and property.
- Ensures quick and organized emergency response.
- Strengthens communities' resilience of future disasters.

Example:

Japan's earthquake disaster management involves strict building codes, rapid response teams, and advanced warning systems, significantly reducing casualties during seismic events.

Q: NO: (4)

(a) What are the characteristics of a tropical cyclone? Describe the formation process and the factors that influence its intensity. How do cyclones impact coastal communities?

Ans: Tropical cyclones:-

Tropical cyclones are intense low-pressure weather systems that form over warm ocean waters in tropical and subtropical regions. They are characterized by strong winds, heavy rainfall, and storm surges.

Characteristics:

1 Low-pressure center (Eye):

Calm area at the center with clear skies.

2 High-speed rotating winds:

Spiral inward toward the eye (up to 250 km/h).

3 Heavy rainfall:

Causes floods and landslides

4. Storm surge:

Abnormal rise of sea level, flooding coastal areas.

Formation Process:

1. Warm ocean water ($>26^{\circ}\text{C}$) heats the air above, causing it to rise.
2. Rising moist air cools, condenses and releases latent heat, fueling the cyclone.
- 3 Coriolis effect (Earth's rotation) causes air to spin and form a circular system.
- 4 As it intensifies, it develops a clear eye, spiral rainbands, and strong winds.

Impact on Coastal Communities:

- Destruction of homes and infrastructure
- Flooding from heavy rains and storm surges
- Loss of crops and livestock.
- Displacement and loss of lives.

Example:

Cyclone Bhola (1970) and Cyclone Idai (2019) caused massive destruction

due to strong winds and flooding
(b) What is remote sensing and how is it used in environmental monitoring? Discuss the advantages and limitations of remote sensing technology in tracking changes in land use, vegetation and climate?

Ans: Remote Sensing:

Remote sensing is the technique of collecting information about the Earth's surface without making physical contact. It uses sensors mounted on satellites, aircraft, or drones to capture data through reflected or emitted radiation (e.g., visible light, infrared, microwaves).

Use in environmental monitoring:

- Weather forecasting and climate monitoring
- Mapping land use and vegetation health
- Disaster management (floods, earthquakes, cyclones)
- Agriculture (crop health, soil moisture)
- Environmental monitoring (deforestation,

pollution)

Advantages:

- Covers large areas quickly
- Provides data for inaccessible regions
- Repeat observations over time.

Limitations:

- Cloud cover can obstruct data collection (for optical sensors)
- Requires expert interpretation
- High initial cost

Example:

NASA's Landsat satellites use remote sensing to monitor deforestation in the Amazon rainforest.

(c) What are different types of vitamins and how do they contribute to human health?

Discuss the importance of vitamins in maintaining healthy skin, hair, and eyes and describe the consequences of vitamin deficiencies?

Vitamins:

Vitamins are organic compounds required by the body in small amounts for normal growth, metabolism, and overall health. They do not provide energy directly but help in regulating various biochemical processes.

Types of vitamins:

1 Fat soluble vitamins (A, D, E, K)

- Stored in the liver and fatty tissues
- Require fat for absorption
- Examples and functions:

(a) vitamin A: Vision, immune function, healthy skin.

(b) vitamin D: Calcium absorption, bone health.

(c) vitamin E: Antioxidant, protect cells

(d) vitamin K: Blood clotting.

2 Water soluble vitamins (B-complex and C)

- Not stored in the body, excess excreted in urine
- Need daily intake.

• Examples and functions:

(a) Vitamin B complex (B₁, B₂, B₃, B₆, B₁₂ etc) Energy metabolism, nerve function, red blood cell formation.

(b) Vitamin C: Collagen synthesis, boosts immunity, antioxidants.

Deficiency Diseases:

- Vitamin A Night Blindness
- Vitamin D Rickets (children), Osteomalacia (adults)
- Vitamin C Scurvy (bleeding gums)
- Vitamin K Delayed Blood Clotting
- Vitamin B₁₂ Pernicious anemia

(d) What is poliomyelitis (Polio) and how it is transmitted? Discuss the global efforts to eradicate polio and the challenges faced in achieving this goal. Describe the importance of vaccination in preventing polio.

(d) Poliomyelitis (Polio)

Viral disease affecting the nervous system, causing paralysis

Transmission:

- Through fecal-oral route
- Through contaminated water

Global eradication efforts:

- WHO's Global Polio Eradication Initiative
- Mass immunization campaigns

Challenges:

Some of the challenges are the war zones and vaccine availability.

Misinformation about vaccines

Poor sanitation.

Vaccination:

Oral polio vaccine (OPV) prevents spread.

Section II

Q No: 5

(a)

Students below 8 years = 20% = 48

Above 8 years = $\frac{2}{3}$ of 48 = $\frac{2}{3} \times 48$

$$= 96 = 32$$

Total students = $48 + 32 = 80$ students

(b) Let Rashid's age = R,

Father's age = 3R

After 8 years Father = $3R + 8$

Rashid = $R + 8$

$$3R + 8 = 2.5(R + 8)$$

$$3R + 8 = 2.5R + 20$$

$$3R - 2.5R = 20 - 8$$

$$0.5R = 12$$

$$R = \frac{12 \times 10^2}{0.5} = 24$$

$$R = 24$$

After further 8 years

$$\begin{aligned} \text{Father} &= 3R + 16 = 72 + 16 \\ &= 88 \end{aligned}$$

$$\text{Rashid} = R + 16 = 40$$

$$\text{Times} = \frac{88}{40} = 2.2 \text{ times}$$

(C) Total score prime number
possible sums 2-12

prime numbers = 2, 3, 5, 7, 11

$$\text{probability} = \frac{\text{Favourable}}{\text{Total}} = \frac{15}{36} = \frac{5}{12}$$

(d) Total age $26 \times 11 = 286$

Ages of captain and wicketkeeper

$$= 26 + 29 = 55$$

Remaining total age = 231

Average age of remaining players

$$= \text{average} - 1 = 25$$

~~231 = 25 \times 9 + 6~~

Let average age = x

Remaining 9 players average = $x - 1$

$$9(x - 1) + 26 + 29 = 11x$$

$$9x - 9 + 26 + 29 = 11x$$

$$9x - 9 + 55 = 11x$$

$$9x + 46 = 11x$$

$$46 = 2x$$

$$\boxed{x = 23 \text{ years}}$$

Q6.

(a)

Selling price doubled, profit triples

• let cost price = 100, initial profit = p

Selling price = cost price + profit of New Selling price

$$SP = CP + p \cdot \text{New SP} = 2SP = 2(CP + p) \\ = 2CP + 2p$$

$$\text{New profit} = 3p = \text{New SP} - CP = 2CP + 2p - CP \\ = CP + 2p$$

$$CP + 2p = 3p$$

$$CP = p$$

$$\text{Profit \%} = p/CP \times 100 = 100$$

(b)

X is paid 120% of Y

$$\text{Total} = 550$$

$$X = 1.2Y$$

$$1.2Y + Y = 550 \Rightarrow 2.2Y = 550$$

$$\boxed{Y = 250/\text{week}}$$

(c)

Perimeter : breadth = 5:1

let breadth = b perimeter = $5b$

$$\text{Perimeter} = 2(L+b) = 5b$$

$$L+b = 2.5b \Rightarrow L = 1.5b$$

$$\text{Area} = L \times b = 1.5b^2 = 216$$

$$\text{length} = 1.5b = 18 \text{ units.}$$

(d)

Multiples of 3 or 5 from 1 to 20

• multiples of 3 = 3, 6, 9, 12, 15, 18
= (6 numbers)

• multiples of 5 = (5, 10, 15, 20)
(4 numbers)

• 15 is counted twice so total

$$= 6 + 4 - 1 = 9$$

$$\text{Probability} = 9/20$$