

Q No: 2

(a)

Potential Benefits Of AI In Healthcare:

Following are the potential benefits of AI in health care sector:

1. Improved Diagnosis:

AI can detect diseases like cancer or heart problems earlier and more accurately.

2. Personalized Treatment:

AI analyzes patient data to recommend tailored treatment plans.

3. Faster Services:-

Automates routine tasks like medical records, prescriptions, and appointments.

4. Predictive Care:

AI forecasts health risks, helping in early intervention.

→ Challenges Of AI In Healthcare:-

1. Data Privacy Issues:

Patient records are sensitive and need strict protection.

2. Algorithm Bias:

If trained on biased data, AI may give incorrect or unfair results.

3. High Costs:

AI systems are expensive to install and maintain.

4. Lack of Human Touch:

AI cannot replace empathy and judgment of human doctors.

→ Impact On Patient Care of Medical Diagnosis:-

1. Enhances accuracy and speed of diagnosis.
2. Reduces human error.
3. Enables remote monitoring and telemedicine.
4. Raises concerns about trust and over-reliance on machines.

Q No: 2

(b)

Big Bang Theory:-

The Big Bang Theory suggests that the universe began about 13.8 billion years ago from an extremely hot and dense point (a singularity), and has been expanding ever since.

Significance:-

- Explains the origin of space, time, matter, and energy.
- Provides a scientific foundation for the evolution of galaxies, stars, and planets.
- Helps understand the structure and age of the universe.

Key Evidence Supporting The Theory:-

1. Cosmic Microwave Background Radiation (CMB):

- Faint heat detected in space; leftover radiation from the early universe.

2. Redshift Of Galaxies (Hubble's Law):

- Galaxies are moving away from us, indicating an expanding universe.

3. Abundance Of Light Elements:

- Predicted levels of hydrogen, helium, and lithium match observed amounts.

4. Large-Scale Structure Of The Universe:

- Distribution of galaxies fits the pattern expected from an initial explosion.

Q No. 2

(c)

Primary Causes Of Global Warming:-

1. Burning of Fossil Fuels:
Releases carbon dioxide (CO_2) from vehicles, power plants, and industries.
2. Deforestation:
Reduces the number of trees that absorb CO_2 .
3. Industries Emissions:
Factories emit greenhouse gases (CH_4).
4. Agriculture:
Produces methane and nitrous oxide through livestock and fertilizers.

-> Major Effects Of Global Warming:-

- Rising global temperatures.
- Melting glaciers and rising sea levels.
- Extreme weather events (heatwaves, floods, hurricanes).
- Loss of biodiversity and ecosystem disruption.

-> Role Of Human Activities:-

Human actions like urbanization, overconsumption, and pollution directly increase greenhouse gas emissions, driving climate change faster than natural processes.

-> Strategies To Mitigate Global Warming:

1. Shift to renewable energy such as solar, wind, and hydropower instead of coal and oil.

2. Reforestation and afforestation.
3. Promote public transport and energy efficiency.
4. Implement carbon taxes and green policies.

Q No: 2

(d)

Key Components Of A Disaster Management Plan :-

1. Risk Assessment:
Identify hazards and vulnerable areas.
2. Preparedness:
Training, emergency drills, early warning systems.
3. Response:
Immediate actions like rescue, relief, and medical aid.

4. Recovery: Rebuilding infrastructure, restoring services, and rehabilitation.

5. Mitigation: Long-term efforts to reduce future disaster risks e.g., flood barriers.

→ Importance Of Preparedness, Response, And Recovery:

- Preparedness: It ensures quick action, reducing loss of life and property.

- Response: It minimizes immediate harm through timely rescue and relief.

- Recovery: It helps in restore normalcy and rebuild communities, preventing long-term damage.

→ Examples Of Successful Disaster Management:

→ Japan:-

Earthquake drills, strict building codes, and tsunami warning systems.

→ Bangladesh:-

Cyclone shelters and community-based early warning systems.

→ NDMA Pakistan:-

Coordinates flood relief, earthquake response, and public awareness campaigns.

Q No 14

(a)

Characteristics Of a Tropical Cyclone:-

1. Low-pressure system with spiraling winds.
2. Strong winds, heavy rainfall, and storm surges.
3. Forms over warm ocean waters near the equator.
4. Eye at the center is calm, surrounded by a violent eyewall.

Formation Process:

1. Warm ocean water ($\geq 26.5^{\circ}\text{C}$) heats the air above it.
2. Warm air rises, creating low pressure.
3. Air cools and condenses, releasing heat that fuels the cyclone.
4. Coriolis effect causes the storm to rotate.

5. Storm system intensifies as more warm, moist air is drawn in.

-> Factors Influencing Intensity:

- Sea surface temperature warmer = stronger cyclone.
- Atmospheric moisture more moisture = more energy.
- Low vertical wind shear less disturbance = stronger storm.
- Ocean heat content and duration over water.

-> Impact On Coastal Communities:

- Flooding and storm surges damage homes and infrastructure.
- High winds destroy buildings and crops.
- Displacement of people, water contamination, and health crises.

- Economic loss due to disruption in transport, fishing, and agriculture.

Q No: 4

(B)

→ Remote Sensing:-

Remote sensing is the process of collecting information about the earth's surface using satellites or aircraft without direct contact. It uses sensors to detect and measure reflected or emitted radiation.

Uses In Environmental Monitoring:-

• Land Use:-

Monitors urban expansion, deforestation, and agricultural practices.

• Vegetation:-

Tracks crop health, forest fires, and biodiversity loss.

• Climate:-

Observes temperature changes, glacier melting, and sea-level rise.

→ Advantages Of Remote Sensing:-

1. Covers large and remote areas quickly.
2. Provides frequent and real-time data.
3. Useful in inaccessible & dangerous regions.
4. Supports long-term monitoring and comparison.

→ Limitations Of Remote Sensing:-

1. High cost of equipment and satellite data.
2. Requires technical expertise to interpret data.
3. Affected by weather conditions e.g. cloud cover limits optical sensors.
4. Resolution limits may miss small-scale changes.

Q No. 4
(C)

Types Of Vitamins:-

1. Fat - Soluble Vitamins:
A, D, E, K - stored in body fat.
2. Water - Soluble Vitamins:
B - complex and C - not stored; need daily intake.

Contribution To Human Health:

- Vitamin A:
Supports vision, skin health and immune function.
- Vitamin B - Complex:
Helps in energy production, nerve function, and red blood cell formation.

- Vitamin C: Boosts immunity, adds in collagen production for skin and hair.

- Vitamin D: Strengthens bones and supports immune health.

- Vitamin E: Acts as an antioxidant, protects skin cells.

- Vitamin K: Helps in blood clotting and wound healing.

Importance For Skin, Hair, & Eyes:

- Healthy Skin: Vitamin A, C, and E maintain skin elasticity and repair.

- Hair Health: Biotin (B7) and Vitamin E strengthen hair and reduce hair loss.

- Eye Health:

Vitamin A prevents night blindness and keeps eyes moist.

→ Consequences Of Vitamin Deficiencies:-

- Vitamin A Deficiency: Night blindness and dry skin.

- Vitamin B Deficiency: Fatigue, anemia and nerve damage.

- Vitamin C Deficiency: Scurvy (bleeding gums, weak immunity).

- Vitamin D Deficiency: Rickets in children, bone pain in adults.

- Vitamin K Deficiency: Excessive bleeding and poor wound healing.

Q No: 4

(d)

→ Poliomyelitis (Polio):-

Polio is a highly infectious viral disease that affects the nervous system and can cause paralysis, especially in children under 5.

→ Transmission:

- Spread through the fecal-oral route, often via contaminated water or food.
- The virus multiplies in the intestines and can enter the nervous system.

→ Global Eradication Efforts:

- Led by the Global Polio Eradication Initiative (GPEI) with WHO, UNICEF, and other partners.
- Mass vaccination campaigns, door-to-door immunization, and surveillance systems.
- Over 99% reduction in global polio cases since 1988.

→ Challenges In Eradication:-

- Conflict zones and inaccessible areas.
- Misinformation and vaccine hesitancy.
- Political instability and lack of health infrastructure.
- Ongoing cases of in Pakistan and Afghanistan.

→ Importance Of Vaccination:-

- Only way to prevent polio infection.

- Builds herd immunity to stop the virus spread.
- Oral polio vaccine (OPV) is safe, effective, and affordable.

Q No: 5

(a)

Solution:-

Let:

- Number of students of 8 years of age = 48
- Let x = number of students above 8 years.

We are told:

- Students above 8 years = $\frac{2}{3}$ of 48
- $x = \frac{2}{3} \times 48 = 32$

Now, we calculate:

- Students of 8 years = 48
 - Students above 8 years = 32
- So, students of 8 years and above = $48 + 32 = 80$

Now, this 80 is 80% of the total students because:

- 20% are below 8 years

So 80% are 8 years or above
Let total students = T
Then,

$$80\% \text{ of } T = 80 \rightarrow \frac{80}{100} \times T = 80$$

$$T = \frac{80 \times 100}{80} = 100$$

Answer: Total number of students = 100

Q No: 5

(b)

Solution:-

Let Rashid's present age = x

Then father's present age = $3x$ (since
three times more = $3x$)

After 8 years:

• Rashid's age = $x + 8$

• Father's age = $3x + 8$

Given:

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

Now solve:

$$3x + 8 = 2.5x + 20 \rightarrow 3x - 2.5x = 20 - 8$$

$$\rightarrow 0.5x = 12 \rightarrow x = 24$$

So, Rashid's present age = 24

Father's age = $3 \times 24 = 72$

After further 8 years (total 16 years ahead):

- Rashid = $24 + 16 = 40$
- Father = $72 + 16 = 88$

Now:

How many times older? $\frac{88}{40} = 2.2$

~~Ans~~ Answer: Father would be 2.2 times Rashid's age.

Q No: 5
(C)

Solution:-

- Possible outcomes = $6 \times 6 = 36$
- Prime numbers between 2 and 12: 2, 3, 5, 7, 11

Now count combinations giving each:

- 2 $\rightarrow (1, 1) \rightarrow 1$
- 3 $\rightarrow (1, 2), (2, 1) \rightarrow 2$
- 5 $\rightarrow (1, 4), (2, 3), (3, 2), (4, 1) \rightarrow 4$
- 7 $\rightarrow (1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1) \rightarrow 6$
- 11 $\rightarrow (5, 6), (6, 5) \rightarrow 2$

Total favorable outcomes = $1 + 2 + 4 + 6 + 2 = 15$

$$\text{Probability} = \frac{15}{36} = \frac{5}{12}$$

Answer $\frac{5}{12}$.

Q No: 5

(d)

Solution:-

Let. the average age of the whole team be $= x$

- Captain's age $= 26$
- Wicket-keeper's age $= 26 + 3 = 29$
- Total members $= 11$
- So, remaining members $= 9$

Given:

- Average age of remaining 9 players $= x - 1$
- Now use total sum method:

$$\text{Total age of team} = 11x$$

$$\text{Sum of remaining 9 players} = 9(x - 1) = 9x - 9$$

Now,

$$\text{Captain} + \text{Wicket-keeper} + \text{remaining 9} = 11x \rightarrow 26 + 29 + 9x - 9 = 11x - x$$

$$46 + 9x = 11x \rightarrow 46 = 2x \rightarrow x = 23$$

Answer: Average age of the team = 23 years.

Q No: 6

(a)

Solution:-

Let's assume: Cost price (CP) = Rs. 100

Let original profit = P, so selling price (SP) = CP + P = 100 + P

Now, if selling price is doubled, new SP = $2 \times (100 + P)$

New profit = New SP - CP

$$\rightarrow \text{New profit} = 2(100 + P) - 100 = 200 + 2P - 100 = 100 + 2P$$

According to the question:

New profit = 3 x old profit

$$100 + 2P = 3P \Rightarrow 100 = P$$

So, profit = Rs. 100, and since CP = 100:

$$\text{Profit \%} = \frac{100}{100} \times 100 = 100\%$$

Answer: Profit = 100%

Q No: 6
(b)

Solution:-

Let Y's salary = y

Then X's salary = 120% of $y = 1.2y$

Total salary:

$$1.2y + y = 550 \Rightarrow 2.2y = 550 \rightarrow y = \frac{550}{2.2} = 250$$

Answer: Y is paid Rs. 250 per week.

Q No: 6
(c)

Solve:-

Let:

- Breadth = b
- Perimeter = $5b$

Formula for perimeter:

$$P = 2(L + b) = 5b \rightarrow L + b = \frac{5b}{2} \rightarrow L = \frac{5b}{2} - b = \frac{3b}{2}$$

Now use Area = $L \times b$:

$$A = \frac{3b}{2} \times b = \frac{3b^2}{2} \rightarrow \frac{3b^2}{2} = 216 \rightarrow 3b^2 =$$

$$432 \rightarrow b^2 = 144 \rightarrow b = 12.$$

Now find length:

$$L = \frac{3b}{2} = \frac{3 \times 12}{2} = 18$$

length = 18 cm Ans.

Q No: 6

(d)

Solution:-

Numbers from 1 to 20: Total = 20

Multiples of 3:

3, 6, 9, 12, 15, 18 $\rightarrow$ 6 numbers

Multiples of 5:

5, 10, 15, 20 $\rightarrow$ 4 numbers

Note: 15 is common in both.

So total favorable numbers = $6 + 4 - 1 = 9$

We subtract 15 once to avoid double-counting.)

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

$$\text{Answer: } \frac{9}{20}.$$