

BATCH: 74

Date: 21/10/23

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MOCK EXAM

PART-II

SECTION-1

QUESTION NO:- 3 (a)

- a) Why cells form organelles? Discuss mitochondrion in human cell.

Cells form organelles to perform various life functions efficiently and in an organized manner. Each organelle carries out a specific task which helps the cell survive, grow, and reproduce.

FUNCTIONS OF ORGANELLES:

1. Division of labour:

Firstly organelles allow division of labour within the cell. For example:- Nucleus controls cell activities and stores genetic material, mitochondrion produce energy, and ribosomes synthesize protein. This specialization makes the cell work more efficiently.

2. Provide Compartmentalization:

Different chemical reactions occur in separate areas without interfering with one another. For instance, digestive enzymes in lysosomes don't harm the other parts of cell.

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Maintain proper conditions:

Thirdly, organelles help in maintaining proper cell conditions for cellular reactions such as pH and temperature ensuring smooth and controlled biochemical processes.

Supports cellular communication and coordination:

Finally, the presence of organelles supports cellular communication and coordination, which is essential in complex multicellular organisms.

MITOCHONRIA

Mitochondrion are also known as "powerhouse of the cell" because they produce energy in the form of Adenosine Triphosphate (ATP) through the process of Cellular Respiration. They are found in almost all human cells, especially those requiring high energy like: muscle, liver, and nerve cells.

Structurally mitochondrion is a double-membrane organelle. The outer membrane is smooth, while inner membrane is folded into structures called cristae which increase the surface area for energy production. Inside the matrix contains enzymes, mitochondrial DNA, and ribosomes needed for energy metabolism.

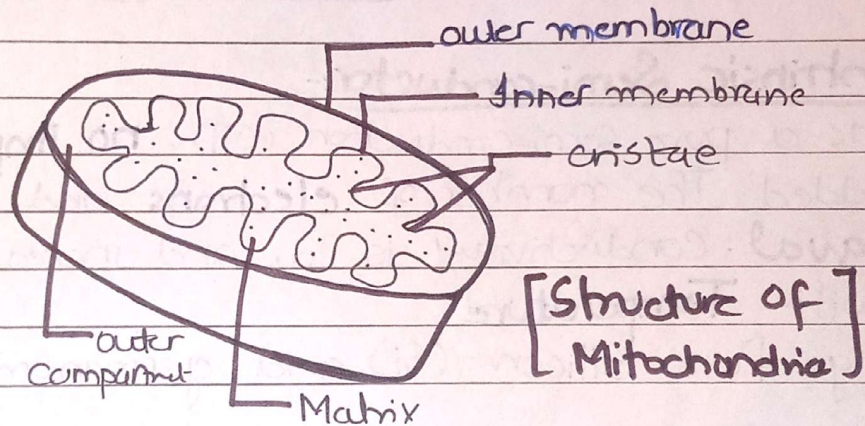
Functionally, mitochondria convert

nutrients like **Glucose** and **fatty acids** into **ATP** in a process called **oxidative phosphorylation**. They also play role in signalling, cell differentiation, **apoptosis** (programmed cell death), and the regulation of the cell cycle.

Interestingly, mitochondria have their own **DNA**, which is inherited maternally, suggesting their evolutionary origin from free living bacteria.

CONCLUSION:-

In a nutshell, mitochondria are vital organelles that supply **energy** and regulate essential cellular processes. without mitochondria, human cells couldn't sustain **biochemical activities** required for life.



(b)

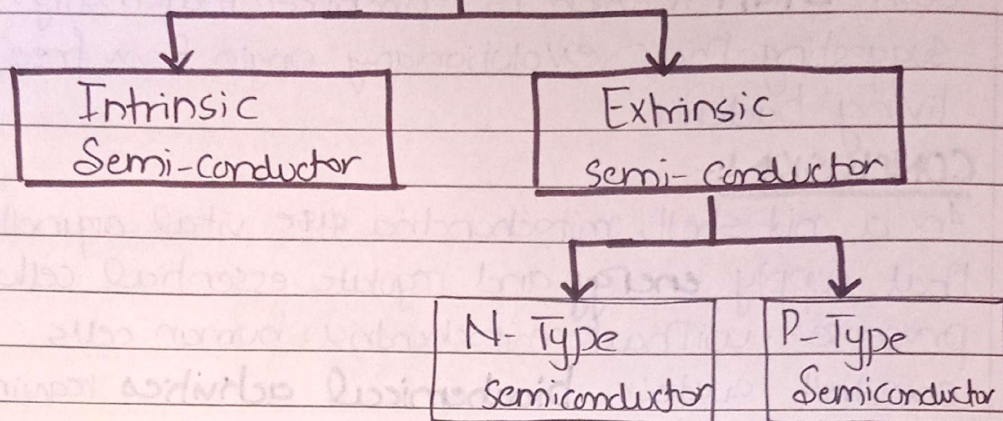
Q:- what's doping? Discuss different types of Semi-conductors.

DOPING:

Doping is the process of adding a small amount of **impurity** to a pure Semi-conductor to increase its **electrical conductivity**.

Pure semiconductors have limited free charge carriers, so doping introduces extra electrons or holes that improve their ability to conduct current.

TYPES OF SEMI-CONDUCTORS :-



1. Intrinsic Semi-conductor:-

This is a pure semi-conductor with no impurities added. The number of electrons and holes is equal. Conductivity is low and increases only with Temperature.

e.g:- Pure Silicon (Si) and germanium (Ge)

2. Extrinsic Semi-conductor:-

Formed when a small amount of impurity is added to a pure semi-conductor through doping. Conductivity is much higher due to increased charge carriers. There are two main types:-

a) N-type semi-conductor:

Doped with Pentavalent elements (having 5 valence electrons) such as phosphorus, Arsenic

2

Date: / /

or Antimony. Extra electrons become negative charge carriers. "N" stands for negative.

b) P-type Semi-conductor:

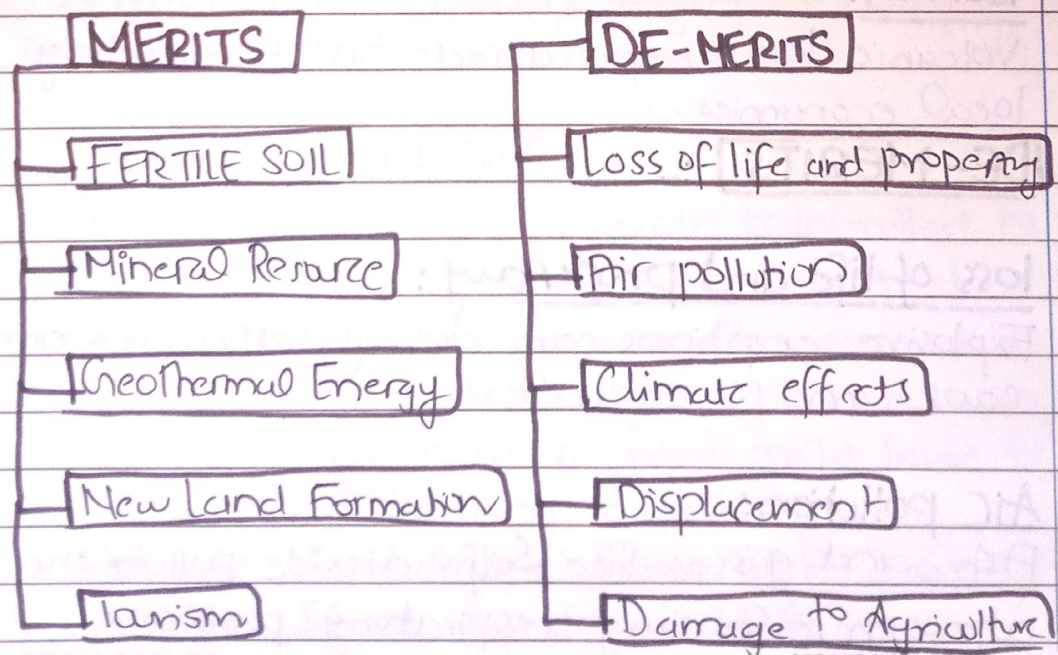
Doped with trivalent elements (having 3 valence electrons) such as Boron, Aluminium, and Gallium. This creates holes (positive charge carriers) due to missing electrons. "P" stands for positive.

Conclusion:-

In short, doping enhances the conductivity of semi-conductors, making them useful for electronic devices like:- diodes, transistors, and integrated circuits. Thus, N-type and P-type semi-conductors are the backbone of modern electronic technology.

(c)

(c) State some of the merits and demerits of volcanic eruption.



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Merits :-

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① Fertile Soil :-

Volcanic ash contains minerals that make soil highly fertile promoting Agriculture (e.g. In Java and Italy)

② Mineral Resources:

Eruptions bring valuable minerals like:- copper, iron, and sulfur to the surface.

③ Geothermal Energy :

Heat from volcanic regions can be used to produce clean electricity.

④ New land formation :

Lava solidifies to create New Islands and landforms (e.g. Hawaii)

⑤ Tourism:

Volcanic landscapes attracts tourists boosting local economies.

DE-MERITS :-

① loss of life and property:

Explosive eruptions can destroy settlements and cause mass casualties.

② Air pollution:

Ash and gasses like Sulfur dioxide pollute the atmosphere, causing respiratory problems.

Date: / /

③ Climate Effects:

Volcanic dust can block sunlight, leading to temporary global cooling.

④ Displacement:

People living near volcanoes are often forced to migrate thereby causing displacement.

⑤ Damage to Agriculture:

Ash fly can bury crops and make land unusable for years.

Conclusion:

Volcanic eruptions are both destructive and beneficial - while they pose serious natural hazards, they also contribute to fertile land, mineral wealth, and energy resources.

(d)

Q:- What's dengue? Discuss Symptomology, causative agents and remedies.

DENGUE

Dengue is a viral disease transmitted to humans through the bite of infected *Aedes aegypti* mosquitoes. It is common in tropical and sub-tropical regions, including Pakistan. It can range from mild fever to severe life threatening conditions like Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS).

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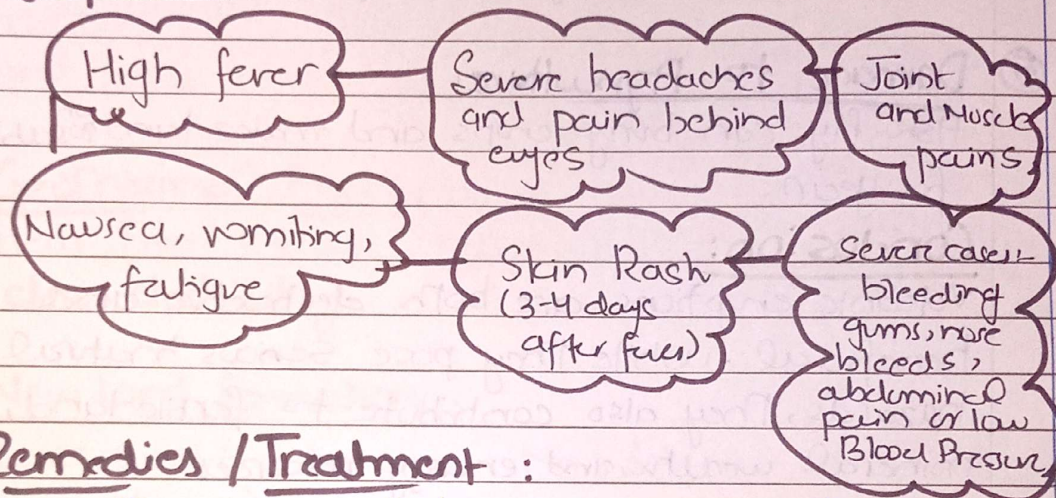
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Causative Agent:-

Dengue is caused by Dengue virus, belonging to Flavivirus genus. There are four strains of the virus: DENV-1, DENV-2, DENV-3, DENV-4.

Infection by one strain provides life long immunity to that strain but not to others.

Symptoms:-



Remedies / Treatment :

- 1) No specific anti-viral treatment exists for Dengue; Symptomatic and supportive care is given.
- 2) Rest and adequate hydration are essential to prevent dehydration.
- 3) Paracetamol can be used for fever and pain
- 4) Hospitalization is required in severe cases to manage bleeding, dehydration, and low platelet count.

Prevention:-

- eliminate mosquito breeding sites (Stagnant water)
- use mosquito repellents and nets
- community fumigation and awareness campaigns

CONCLUSION:-

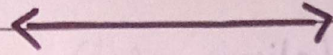
Dengue is a mosquito-borne viral infection

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with serious public health implications. Although it has no specific cure, early diagnosis, supportive care, and preventive measures can effectively reduce its impact and mortality.



QUESTION NO:- 4

(a)

Q. Write a note on plant kingdom "Chlorophyll".
Chlorophyll is the green pigment found in the plants, algae, and some bacteria that enables them to prepare their own food through photosynthesis. It is located mainly in the chloroplasts of plant cells. Chemically, it is a magnesium containing compound. It absorbs light energy from the sun, especially blue and red wavelengths, and reflects green light giving plants the characteristic green colour.

During photosynthesis, chlorophyll captures sunlight and uses its energy to convert: Carbon dioxide (CO_2) and water (H_2O) into glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) and oxygen (O_2) - a process essential for sustaining life on Earth.

Types of chlorophyll:-

There are different types of chlorophyll in plants:

- Chlorophyll a: Primary pigment in all photosynthesis organisms

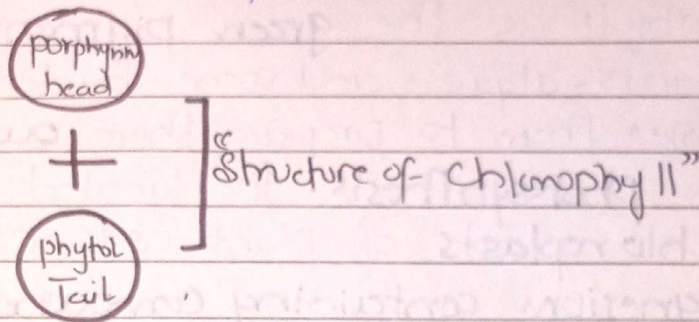
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Date: / /

- chlorophyll b: Accessory pigment found in higher plants, help absorb additional light wavelengths.

CONCLUSION:-

Chlorophyll is the lifeline of the plant kingdom, as it drives photosynthesis - the process that provides food and oxygen for all living organisms and maintains the balance of gases in the atmosphere.



(b)

Q:- Describe role of Ribosomes in protein Synthesis.

Ribosomes are small spherical organelles found both in prokaryotic and eukaryotic cells. They're often called the "protein factories" of the cell because they're the main site of protein Synthesis.

Structure of a Ribosome:-

Structurally ribosome is made up of two subunits - a large subunit and a small subunit. Each subunit contains ribosomal RNA (rRNA) and proteins. Ribosomes may be free in the cytoplasm or attached to rough

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endoplasmic reticulum (RER)

Role in protein Synthesis:-

Protein synthesis occurs in two main stages:

Transcription and translation. Ribosomes perform their role in translation stage.

1) mRNA binding:-

- The small ribosomal subunit binds to mRNA, which carries the genetic code copied from DNA.

2) tRNA Attachment:-

- Transfer RNA (tRNA) molecules bring specific amino acids to the ribosome.
- Each tRNA has anti-codon that pairs with the codon on mRNA.

3) peptide bond formation:-

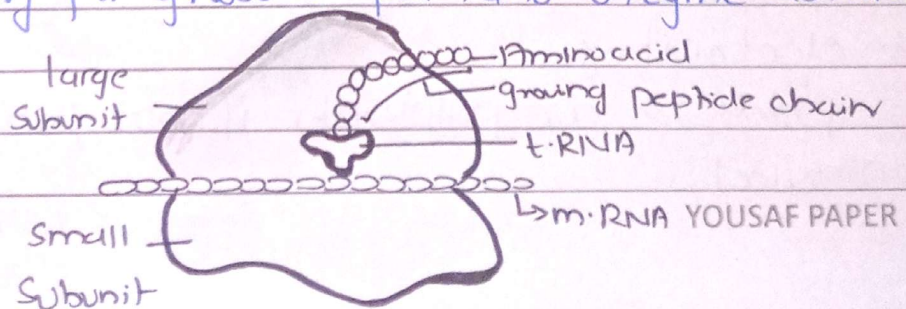
large ribosomal subunit helps form peptide bond between amino acids, creating a growing polypeptide chain.

4) Elongation and termination:-

- The ribosomes move along the mRNA adding amino acids one by one until a stop codon is reached.
- The completed protein chain is then released.

Conclusion:-

Ribosomes play a central role in translating genetic information into functional proteins. They ensure that each cell produces the proteins necessary for growth, repair, and enzyme activity.



(c)

Q:- Discuss different methods of Solid Waste Management.

Solid waste Management refers to the collection, treatment and disposal of solid materials produced by human and industrial activities in a way that is safe for the environment and public health.

→ Main Methods of Solid Waste Management:

1. Open Dumping (primitive Method)

- Waste is dumped in open areas or land pits
- It's cheap but unhygienic, leading to foul smell, insects, and groundwater contamination.
- It's not encouraged due to environmental hazards

2. Landfilling:

- Solid waste is buried in layers in low-lying areas
- Modern sanitary landfills are lined with clay or plastic to prevent leaching into soil
- Suitable for non-recyclable waste
- It's economical and simple but requires large land areas and it may produce methane gas.

3. Incineration (Burning):

- Waste is burned at high temperature in an incinerator
- Reduce waste volume upto 90%.
- Generates heat energy, which can be converted into electricity
- It produces air pollutants, if not properly controlled

4. Compositing :

- Biodegradable waste is decomposed by micro-organisms to form compost, a natural fertilizer
- Its eco-friendly and improves soil fertility
- Its a slow process and not suitable for all waste types

5. Recycling :

- Reusing materials like: paper, plastic, metal, and glass after processing.
- Conserves resources, saves energy and reduces landfill use
- It requires segregation and public cooperation.

6. Waste to Energy (WTE) :

- Converts non-recyclable waste into electricity or heat using combustion or biological processes
- helps in reducing landfill use and energy crisis.

CONCLUSION :-

Effective solid waste management combines reduction, reuse, recycling, compositing and energy recovery to minimize environmental impact. Public awareness, and government policies are essential for a clean and sustainable environment.

(d)

Define the terms:-

i) Biofuel :

Biofuel is a type of renewable energy source made from biological materials such as plants, animal waste, and algae. It is produced through biological processes like fermentation and anaerobic digestion rather than geological processes that form fossil fuels.

ii) Adulteration:-

Adulteration means mixing inferior, harmful, or impure substances with food, drink or other products to increase quantity or profit. It reduces quality and may cause serious health hazards.

Eg:- Mixing water in milk or artificial colors in spices

iii) Hydrosphere:-

The Hydrosphere refers to all the water present on, under, or above the Earth's surface. It includes oceans, rivers, lakes, glaciers, groundwater, and water vapor in the atmosphere. It covers about 71% of the Earth's surface.

iv) Troposphere:-

This is the lowest layer of Earth's Atmosphere extending upto about 12 km from the Earth's surface. It contains most of the air, clouds, and weather phenomenon like rain, storms and winds.

Date: / /

v) Isotopes :-

Isotopes are atoms of the same element that have the same number of protons but different no. of neutrons. Hence they've same atomic number but different mass numbers.

e.g. :- Hydrogen has three isotopes :-

Protium (^1H), Deuterium (^2H), Tritium (^3H)

↔

SECTION-II

QUESTION NO:- 7

(a)

Calculate volume of a sphere with diameter 14cm (use $\pi = 22/7$)

Sol:-

$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

$$r = \frac{d}{2} = \frac{14}{2} = 7$$

Substituting value of "r"

$$V \text{ of sphere} = \frac{4}{3} \times \frac{22}{7} \times (7)^3$$

$$V \text{ of sphere} = \frac{4}{3} \times \frac{22}{7} \times 343$$

$$V \text{ of sphere} = \frac{4 \times 343 \times 22}{3 \times 7}$$

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Date: / /

196

$$V \text{ of Sphere} = \frac{1372}{3} \times \frac{22}{7}$$

$$V \text{ of Sphere} = \frac{4312}{3} = 1437.3$$

$$\text{Volume of Sphere} = 1437.3 \text{ cm}^3$$

(b)

b) Five friends total saving = 25,000 Rs,
ratio 1:2:3:4:5. Find the smallest share.

Sol:-

$$\text{Total Saving} = 25,000$$

$$\text{Sum of Ratios} = 1+2+3+4+5 = 15$$

$$\text{Find Smallest Share} = ?$$

$$\begin{aligned} \text{Smallest Share} &= \frac{\text{Total}}{\text{Sum of Ratios}} \times (\text{Ratio of A}) \\ &= \frac{25,000}{15} \times 1 \\ &= 1666.6 \end{aligned}$$

$$\text{Share of A} = 1666.6$$

$$\text{Share of B} = \frac{25,000}{15} \times 2 = 3,333.3$$

$$\text{Share of C} = \frac{25,000}{15} \times 3 = 5,000$$

$$\text{Share of D} = \frac{25,000}{15} \times 4 = 6,666.6$$

$$\text{Share of E} = \frac{25,000}{15} \times 5 = 8,333.3$$

$$\text{So, Smallest Share} = \boxed{\text{Rs } 1,666.67}$$

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5

Date: / /

(c)

Spot the error / complete the series:-

i) 2, 6, 18, 54, 162, 486 (which number doesn't fit?)

2 $\xrightarrow{\times 3}$ 6 $\xrightarrow{\times 3}$ 18 $\xrightarrow{\times 3}$ 54 $\xrightarrow{\times 3}$ 162 $\xrightarrow{\times 3}$ 486 $\xrightarrow{\times 3}$ 1458

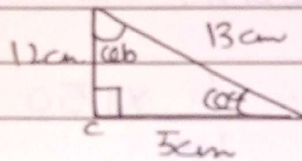
$\rightarrow 2, 6, 18, 54, 162, 486, 1458$

ii) 3, 5, 7, 11, 13, _____

$\rightarrow 3, 5, 7, 11, 13, 17$ } (continuation of prime numbers)

(d)

A triangle with sides 5cm, 12cm, 13cm.
Find all three angles



H₀ Angle c = 90°

Angle b = 67.4°

Angle A = 22.6°

QUESTION NO: - 6

(a)

Apple, Berry, Cherry, Date

3 : 6 : 2 : 5

Apple = $3n$

Berry = $6n$

Cherry = $2n$

Date = $5n$

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Date: / /

$$\text{Apple - dates } 5n - 3n = 2n = 35 \\ n = 17.5$$

Find berry candies:-

$$\text{Berry} = 6n = 6 \times 17.5 = \boxed{105}$$

- b) Camera priced = 200\$, gets 25% off plus 6% Tax. Calculate total amount paid.

Sol:-

$$\text{Discount} = 25\% \text{ of } 200$$

$$= \frac{25 \times 200}{100}$$

$$= 50$$

$$\text{price after discount: } 200 - 50 = \boxed{150}$$

Tax:-

$$6\% \text{ of } 150 = \frac{6 \times 150}{100}$$

$$6\% \text{ of } 150 = \boxed{9}$$

$$\text{Total amount paid} = 150 + 9 = \boxed{159\$}$$

(c)

$$v = \frac{d}{t}$$

$$t = \frac{d}{v}$$

$$t = \frac{36}{18} = 2 \text{ hrs}$$

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Start time = 1:00pm

Time taken = 2 hrs

Arrival time = 1:00pm + 2hrs (added)

= 3:00pm

(d)

i) STSTAICITS = Statistics

ii) LGEBMAR = ALGEBRA

