

154

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26 January 2021
Paper-III, part-A

There are 15 sub-question in this question, each has to be answered in maximum 30 words. All questions are mandatory. Each question carries 3 (three) marks.

3x15=45

Paper - III, Part - A

(A) Q1.
Ans:

Influenza - Viral caused flu
- contagious through water-droplets
- Has variants Bird flu, Swine flu etc

(B) Q2.
Ans:

Double Salt -

(C) Q3.
Ans:

Angiography - To tackle Blockage issues in heart
- Stents (a medical device) is used to unblock cholesterol.

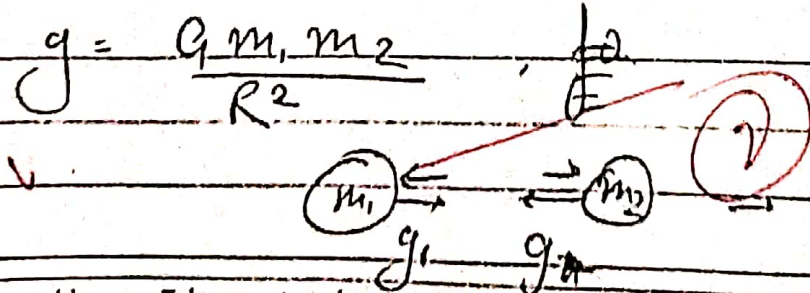
(D) Q4.
Ans:

Copyright - Rights given to creator of content (eg. Music, Video, Printings, photos etc), to prevent its replication or misuse.

(E) Q5.
Ans:

Gravity - Universal force through which every Body with mass attract each other.

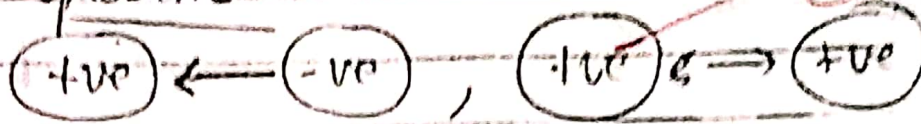
$$g = \frac{G m_1 m_2}{R^2}$$



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12/12/21

F) Q6. Electric field - Force of attraction or repulsion created around charged particles.



G) Q7. Probability - Chances or propensity calculation for a particular event to occur.

H) Q8. Insat 3dR - is geosynchronous satellite for communication purposes.

I) Q9. Gene Mapping - Is international effort to collect data about human genome. As per research around 2 Billion genes are present in our genetic transfer.

Q10. Protein Synthesis - Is done by cell organelles to keep the life from going.

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3x15=45

Short

Q 11.

Ans:

Bandwidth - Is frequency range in which particular operation takes place

(L)

Q 12.

Ans:

Magnetic Flux - Is force of attraction surrounding a Magnet or moving charge

(M)

Q 13.

Ans:

Cartosat - Is Mapping satellite launched by India
- PSLV orbit
- High resolution Cartography

(N)

Q 14.

Ans:

Radio Active Isotopes of Uranium with differing mass no. or which show instability and radio-activity

(O)

Q 15.

Ans:

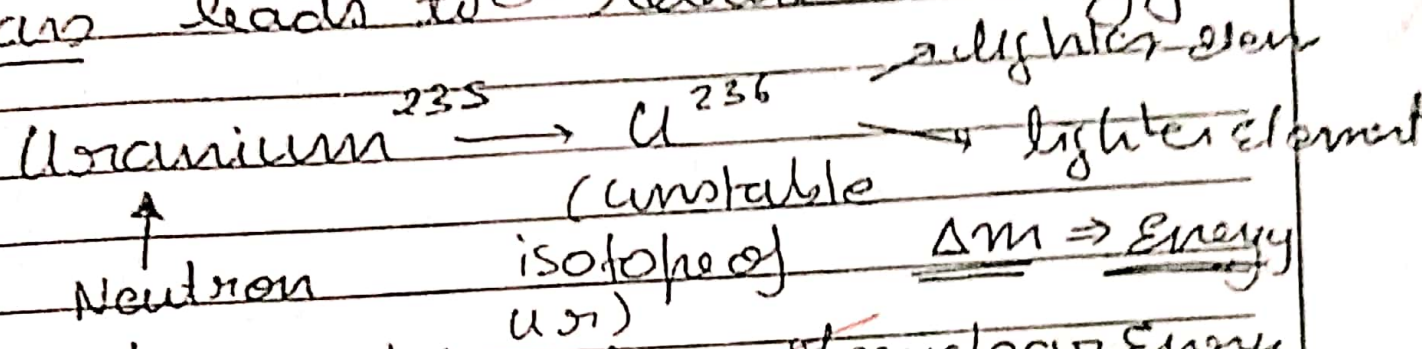
GM crop - Genetical Modified Crop where gene editing was done to recess or enhance particular trait in crop.

India - Bt Cotton in Use
Bt Brinjal under trial

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

Q1. Nuclear Fission is when two lighter particles combine to form heavy material

When a heavy unstable element breaks into two lighter ones, and a ~~release in~~ differential energy mass leads to a release in energy



One of the most used form of nuclear energy

Q2. (B)

Discovered by Rutherford

2

(c) Q3. Housing is one of the amongst essentials to human development. SDG-11 focuses on its importance. A few new innovations are -

• Fly Ash Bricks - light weight, fire Resistant Chimney, contains atmospheric pollution.

Made up of Ash and PM from thermal power plants

• Roof top solar power - in form of water heaters and generators, decrease energy load, Increase sustainability affordable in long term.

(1)

Ans: Endocrine Gland is master gland of all as it controls secretion from other glands.

Releases hormones like Adrenaline in case of emergency and Rush

define
type
over
hormonal

Situated in hind side of Brain

Is essential for proper functioning of body.

(2)

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10x6=

Q1.

Ans:

Q6. Cloning is creating an exact genetic replica of a living being. First ever clone was that of a sheep named 'Dolly'

It is done through extracting somatic cells from one being and cultivating them to grow into another individual.

(6) Q7. Nanotechnology is manipulation of material to dimensions in 10^9 m in which material undergoes physiochemical change. It help in disease diagnosis

- Precision diagnosis in localised area
- Cellular level diagnosis using nano robots
- Endoscopy using ~~Nano~~ Nanoparticles and ~~Nano~~ Nano Cameras
- Easy and targeted penetration inside human Body.

Q8. But there accumulation in human body should also be taken care of.

(14) Ans: Petroleum is remains of living organisms plants and animals, sedimented and accumulated over millions of years.

It has various components which include -

- Oil - which is used as a source of energy and has high calorific value.
- Gas - Also used as energy source, Primarily for cooking in India (LPG)
- Plastics Originating from waste material of petroleum
- Oil is further divided into petrol and diesel

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

Q9. ASLV mk 3 is heaviest and fastest satellite launch vehicle in India

It can be a game changer as it uses Cryogenic engine i.e. indigenously developed implies it uses solid form of gas at ultra low temperature for fuel combustion, and decreases overall fuel load.

It will help India master GSV technique, will aid Interplanetary mission, Geosynchronous satellite etc.

Q10. Biopesticides are derived from organic material with low or no chemical percentage.

- Example - Neem oil
- Unlike chemical pesticides they are least harmful to human health
- Instead of completely wiping off all pest, they are selective towards various useful pest insects
- Help conserve Biotaxonomy Biodiversity
- May be a costly synthesical.

There use in Organic farming

has shown immense result

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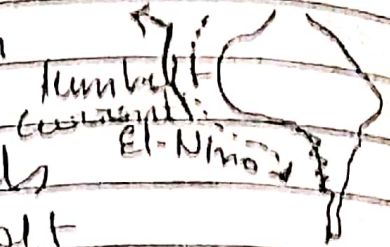
(K)

Q 11.

Ans:

El-Nino is warm current flow in East Pacific ocean near the coast of Peru.

It is caused when oceans are not adequate-ly heated up, which leads to reversal of Humboldt current (cold).



It changes the weather of Peru by creating low pressure, and causes drought. Similarly is reason for Drought conditions in Indonesia and India.

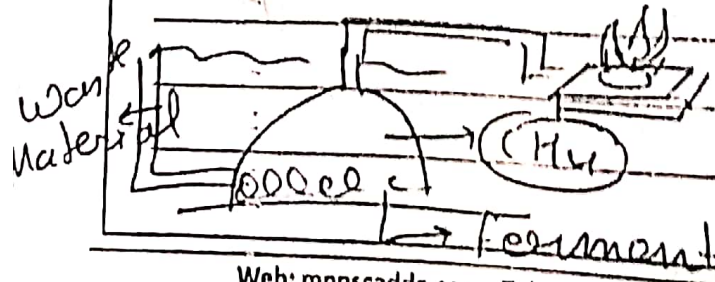
(A)

Q 12.

Ans:

Biomass energy is extracted from waste material from animals, humans and garbage.

The Biomass is kept in fermentation tank where anaerobic breakdown of Biomass leads to release of Methane gas. This gas can be directly supplied to household for as a clean cooking fuel option.



Q3.1

With population growth reaching 8 Billion, and increase in energy intensive lifestyle. Availability of energy resource is a major concern among countries. Specially in Developing nations like India.

Various sources of energy available are

Renewable	Non Renewable
May be renewed over the years or are inexhaustible	Exhaustible and is irreplaceable sources of energy.
Less conventionally used	More conventionally used
Example - Solar Energy, Wind Energy, Geo-thermal, Tidal Energy etc.	Example - Coal, petroleum and other fossil fuel generated energy.
Mostly cleaner source of energy with lower environmental impact	Nuclear source of energy with high Carbon emission.

Q 3.1 Continued ..

In India more than 70% of energy is sourced from non-renewable source of which coal generated thermal power has over 50% of share. Hence a shift towards solar energy is essential as

- India is tropical country with most regions receiving over 200 days of high intensity sunlight, which can be used efficiently.
- It will particularly aid remote areas where other sources of power generation are not available like Desert areas of Rajasthan and Gujarat, Leh, Ladakh, Island regions etc.
- Research has shown that over the years solar energy is more affordable and cheaper source of energy.

There are 03 sub-question in this question, each has to be answered in maximum 250 words. All questions are mandatory. There is also an internal option in every question. The answer to the internal option of the candidates is to be explicitly before the answer. Each question carries 15 (fifteen) marks.

3 x 15

Q 3.1 Continued ..

- It will lead to a cleaner cleaner and more sustainable development
- Will help India meet its INDC in Paris Summit.

Some efforts taken are

- Asia's largest solar project established in Rewari District H.P.
- International Solar Alliance with France.
- National Solar Energy development Programme etc.
- SDG - 7

Disseminate India's ^{total} solar energy requirement with solar ^{established} ^{plants}

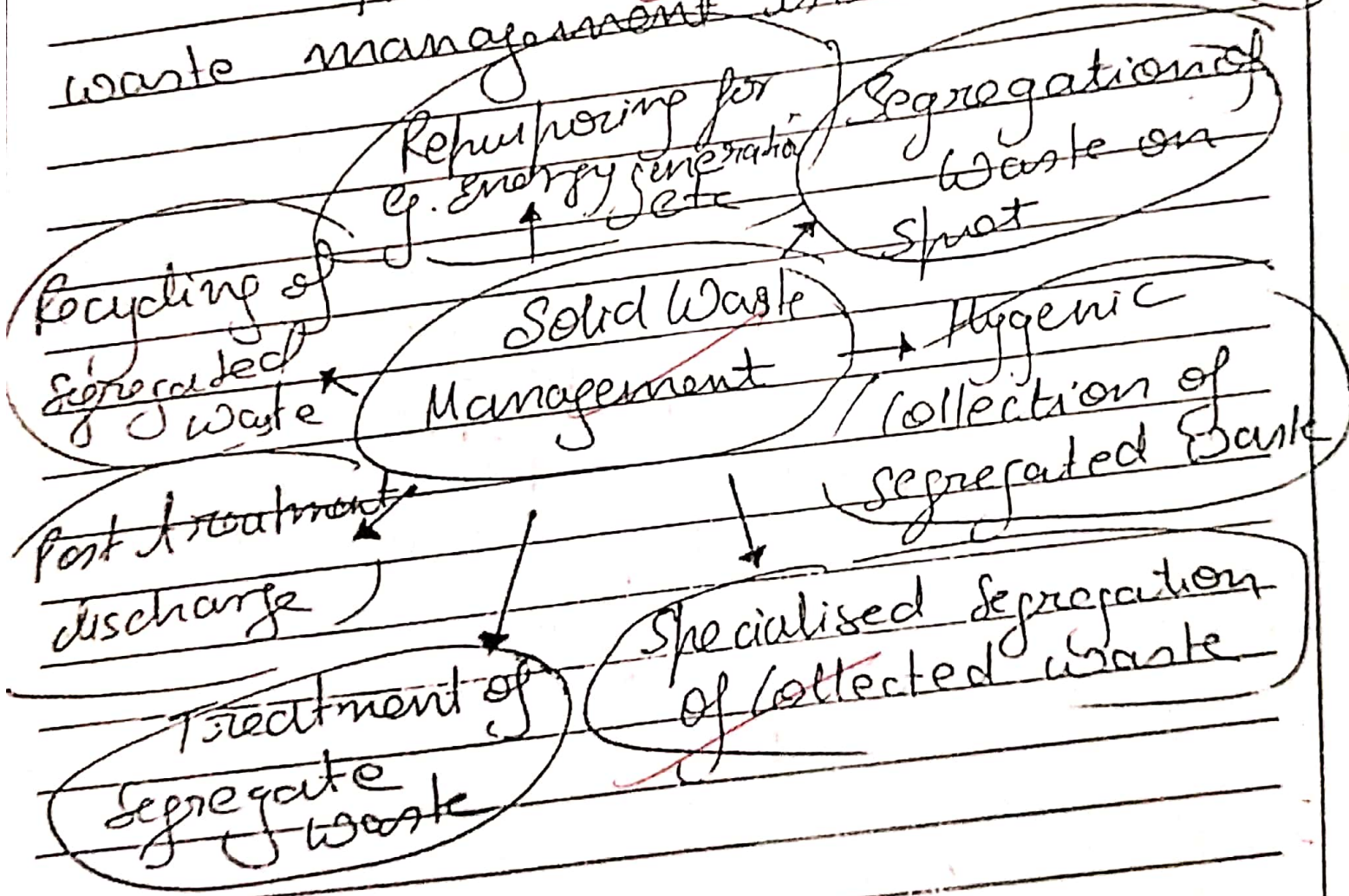
(17)

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Q 3.2.

Ans: in growing urbanisation, increased consumerism, and overpopulation and hazards caused thereby.

Hence the need of solid waste management is ever increasing



Q 3.2 Continued ..

Some of the technologies used for solid waste management are -

• Mechanical sedimentation and separation of solid waste specially in case of sewage.

As done in sewage treatment plants

• Incineration - That is burning of solid waste in high heat and less release of harmful gases.

• Recycling techniques include

↳ Magnetic segregation of waste material to separate metallic waste.

• Use of Electrostatic Scrubbers to prevent release of Particulate Matter etc.

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Q 3.2 Continued ..

Some efforts taken by govt
are

= Swachh Bharat Abhiyan

- Regulation of Landfills

- E-waste management guidelines
by govt.

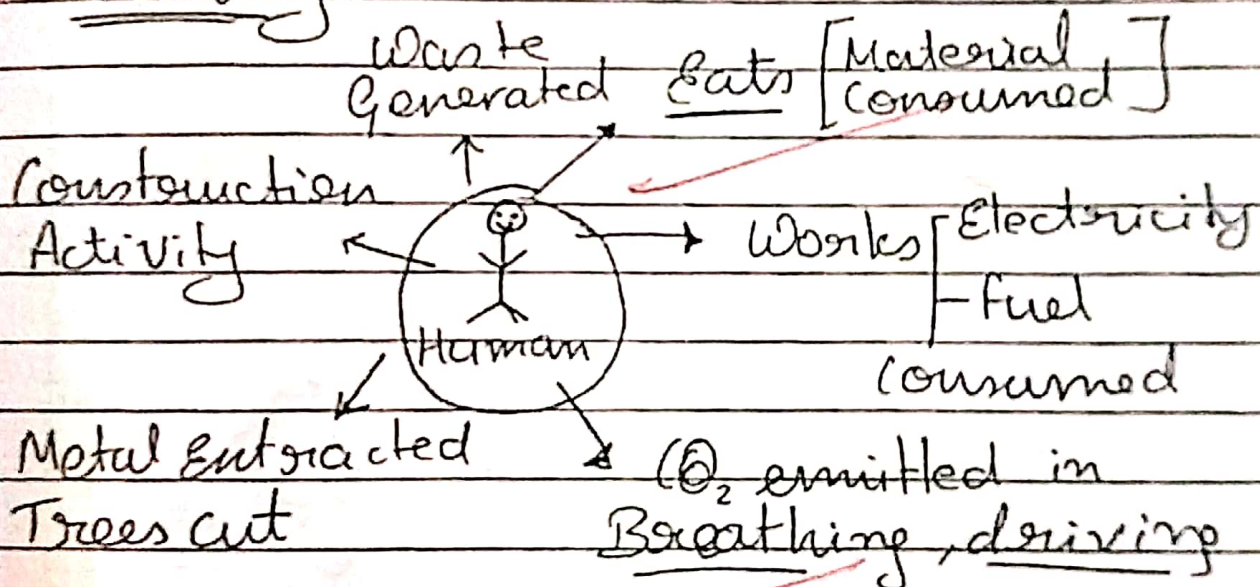
- Environment protection act etc

Q3

Q3.3.

Ans:

Ecological footprint is the impact caused on Environment and surroundings in terms of Carbon emission, Waste emission, energy consumed, Destruction caused and resources used like food, Plants, animals etc, By an Organism, human being, Civilisation or Activity



Ecological Footprint has various means of calculation as it is widely defined some of the measures are

- Carbon emitted
- Energy consumed etc.

Q 3.3 Continued..

The second HDI reported with
Planetary Pressure adjusted HDI or
PHDI is another means of
calculating ecological footprint.

Importance of Ecological
Footprint -

- Essential for Sustainable development
- To check inter-regional and inter-generational disparity. For eg. Ecological footprint of developed nations is often higher than developing.
- For environmental conservation
 - Biodiversity preservation
 - Pollution Control
 - check Emission etc
- Mitigation measure for climate change etc.

Q1.

Ans: Modem - Used to translate signals from digital to analog and vice-versa - important component of IT which integrates Telecom network

Marks =

Marks =

Q2.

Ans: Lithium is ~~not~~ a metal with atomic no. 3. Used in electronics, Batteries, Solar power generation etc

Marks =

Marks =

Q3.

Ans: Pituitary Gland - Is master gland of all and controls entire Endocrine system.
Regulates Hormonal secretion.

Marks =

Marks =

Q4.

Ans: Mitochondria - known as power house of cell. Generates ATP which is energy currency of living beings.
- Has DNA of its own.

Marks =

Marks =

Q5.

Ans: Alpha Diversity - Is diversity between different species within a Biome.
Eg: One ecosystem having eg. Forest having variety of trees and animals.

Marks =

Marks =

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3x15=

(F) Q6. Carbon Foot Print - To sum total
Ans: of carbon released and consumed by
living beings on society.
Final. Includes direct and indirect
emissions.

(G) Q7. Biometric Information - Is unique
Ans: identifications of human being including
Iris scan, Finger Prints, Voice etc

(H) Q8. PSLV XL - is polar satellite launch
Ans: vehicle which puts satellite in
polar orbit.

(I) Q9. Nano Particle - Particle in Nano Scale
Ans: i.e. 10^{-9} m are categorised
- Varied application like
space, Defence, Medicine etc

(J) Q10. Mensuration - Is ^{study} science of measuring
Ans: things and objects, time, speed etc.
It is based on standardised scale
and weight management system

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3x15=

K) Q 11. Active Remote Sensing - It implies on Real time tracking of geographical information location and relative position of an object with respect to time.

L) Q 12. Positive Work - Is work done in direction of force.

M) Q 13. QR Code - is Matrix of Information embedded in graphical form.

N) Q 14. SWAN

O) Q 15. Strong acid - With pH value ranging from 3 to 1, concentrated HCl , H_2SO_4 , HNO_3 are some of the strong acids.

Release more H^+ ion when dissolved in water.

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

Make the difference

Q1.

Ans:

Li-fi - Data is transferred to waves in visible light structure. Is considered to be faster than Wi-fi.
Relatively New Innovation.
Hindrance in opaque medium.

Wi-fi - Data is transferred over Radio Waves spectrum, No light necessary, Obstructed through solid medium (walls etc).
Relatively slower.

(B)

Q2.

Ans:

Energy Management is availability, affordability of energy along with its sustainable usage, maintaining of demand supply gap and transmission.
Issues related -

- 40% of energy is lost during transmission.
- More than 70% of energy is sourced from non-renewable sources of energy.
- Nearly 70% energy is coal and fossil fuel based which is major pollutant.
- Urban Bias in energy availability.
- Regional Bias in energy.
- Affordability issues for farmers and MSME and other sectors.

Q3.

Ans:

Quantum Computers are based on spin of protons rather than Binary system. Its Applications are -

- Faster and stores more information hence can be used for big data, weather sciences etc.
- IOT and other related application for integration of computer in daily life
- Space technology and light portals to computing.

China is ~~in~~ leading the Quantum computing.

Q4.

Ans:

Bioremediation is use of Biotechnology and Bio-organisms to clean up environment, waste management, control pollution etc. For example

- Clearing Oil Spills using either oil consuming Bacteria.
- Faster degradation of waste material using degrading agents.
- Carbon sequestration using Algae etc.

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

Q5.

Ans:

(This section is crossed out with a red diagonal line.)

Q6.

Ans:

Internet is a network of various systems (computers, phones) around the world. Applications -

- Service delivery through electronic media of Jan Dhan Portal, Village Resource Centre etc.
- E-governance - reduce corruption increase accountability.
- E-~~edu~~ E-Education decrease Inter-Regional ~~and~~ Disparity provides for affordable education to all.
- Leads to a more interconnected world.
- Educates on Social and Political Rights

Though many advantages like Bullying, trolling & frauds are some menace associated.

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x 6 = 60

Q7.

Net Metering -

Ans:

Marks = 06



Marks Obtained

9

Q8

Ans:

C-DAC - Centre for Development of Advanced Computing is top most Research and Development organisation on Computing in India.

Marks = 05



Marks Obtained

- It has developed the first Super Computer Param 800 of India
- Mihir which is fastest super computer is developed by C-DAC.
- Researches on Easy, Cheap and accessible ICT technology for all
- Has lead India in world's race of Advanced Computing.

3.5

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks. 10 x

(5) Q9. RNA - Ribonucleic acid is
Ans: Genetic storing material along
with DNA.

Add fact

- It is made up of Proteins
- It carries Information in the form of Genes
- It is present in Nucleus and Mitochondria.

(5) Q10. TRIPS - Trade Related Intellectual
Ans: Properties.

- The treaty comes under World Trade Organisation

- It aims at providing protection to creator of patent from misuse.

- But balances it with overall public interest and development

- It has clauses like for manufacture of generic products (eg Medicine) for developing Nations (counterailing measures)

But some issues like evergreening still prevail

Write the answers of any 10 of the following questions in maximum 80 words. Each question carries 6 (six) marks.

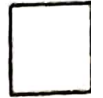
10 x 6 = 60

Q11.

Ans:

WIPO - World Intellectual Property Organisation. It is a specialised agency of United Nations. - Concerns International Patent, Copyright, Trademark and other Intellectual Property issues. - Issues Geographical Indicators tags internationally. - Publishes Global Innovation Index and Report. Aims to develop IP environment in the world.

Marks = 06



Marks Obtained

3

Q12.

Ans:

DRS technology is dispute resolution system in case of ambiguity and imperceptible details. For eg - If edge of Bat has touched the Ball can not. - It uses Infrared and sound frequency system which shows area of impact.

Marks = 01



Marks Obtained

2

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A) Q31

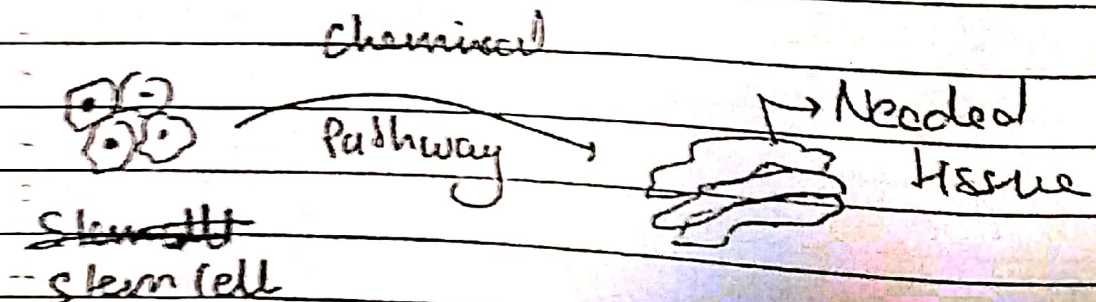
Stem Cells are Somatic Cells are initial or reproductive cells in human body that can take a particular shape in future.

They are present in umbilical Chord, Menstrual flow, Bone Marrow etc of a human being.

The types are

Pluri Potent and Toti Potent

- Can develop into some particular tissue of an organ
- E.g. Somatic cell in Bone Marrow
- Can develop into any particular tissue or Organ
- E.g. Somatic cell in Umbilical Chord.



There are 03 sub-questions in this question, each has to be answered in maximum 250 words. All questions are read explicitly before the answer. Each question carries 15 (fifteen) marks.

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Q 3.1 Continued ..

Application -

- They are used to develop clones
- Artificial tissue and organ culture
- Bone Marrow transplant in Cancer treatment
- Increase immunity, disease treatment at later stage of life.
- Blood transplant etc.

Stem cell therapy is blooming branch of Biotechnology, which ~~will~~ needs to be harnessed in ethical and effective manner.

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(B) Q.32.

Ans: Bio-Energy is energy derived from plants, animals and other sources and stored as Bio Mass.

It is also known as organically derived energy, different from fossil fuel. It is Renewable Source of Energy.

For Example -

• Energy from Bio Mass - Anaerobic fermentation of Biomass produces Methane (CH_4), used as cooking fuel. Gobar Gas Plant are one examples.

• Fuel Wood and timber have been used even the grass as Bio Energy.

But with change in technology Bio-Energy has taken a new leap in form of Bio-fuel.

Q.3.2 Continued ..

Bio Fuels -

1st Generation Bio Fuel - Algae extracted from fibrous plants eg Jatropha and Molasses.

2nd Generation Bio Fuel - Algae generated from food crop waste material like Rice Husk, Hay, Cane Husk etc

3rd Generation Bio Fuel - Not only Fuel is extracted but Carbon is sequestered, hence they are Carbon negative in Nature.
Eg - Algae Culture

Bio fuels are efficient form of clean energy with very low carbon emission

Govt has also mandated Bio-fuel Blending in petroleum to decrease import Bill and Environmental impact.

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Q 3.3.

Ans: With several New Nuclear energy projects coming up, India is aiming for near 2% of total energy to be made from Nuclear.

This dream was envisioned way before by Dr. Homi Jhabalji when he was designing India's three stage Nuclear Programme.

Stage 1 →

- Involves Uranium ²³⁸ as raw material when Neutron is bombarded it breaks off into lighter material.
- Pressurised Heavy Water Reactor where $U^{238} \rightarrow$ converted to U^{235} (fissile) material
- D_2O Deuterium oxide used as moderator
- Bi-product is Plutonium-239

Q.3 Continued..

Stage - II

- Plutonium-239 used as raw material
- Fast Breeder Reactors are used
- No coolant is required
- U^{235} is used to breed more fuel
- Pu^{239} - later undergoes fission reaction

Is under construction at Kalpakkam
Madras.

Stage III

- Raw material thorium and Uranium
- thorium is bred into $U-233$ which is fissile and undergoes reaction
- India's natural reserves of thorium being utilized

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3 x 15 =

Q.3.3 Continued..

Most of India's Nuclear Reactors are in Stage - I, with Kalpakkam in Stage II.

(B)

- Don't put unnecessary details.
- put authentic details.
- attempt all parts.