

SUBJECT: ANTHROPOLOGY TEST SERIES 2022

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Time Allowed: 3 HOURS

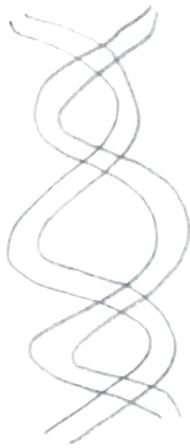
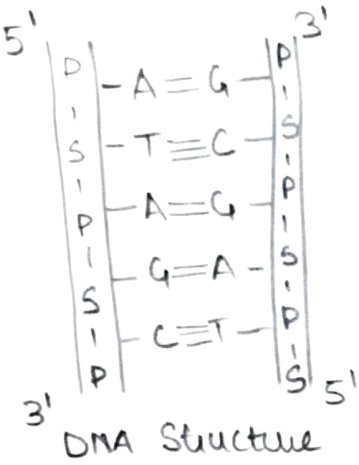
Maximum Marks: 250

INDEX TABLE			INSTRUCTION	
Q.No.	Max.Marks	Marks Obtained		
1	20	12	1. Do furnish the appropriate details in the answer sheet (viz. Name, Email, Roll No., Mobile).	
2	20	12		
3	11	11		
4	11	11		
5	11	11		
6	11	12		
7	20	12	2. All questions are compulsory.	
8	20	11		
1	15	9		
2	15	9		
3	11	9		
4	11	9		
5	15	9	3. The number of marks carried by a question/part is indicated against it.	
6	15	8		
			4. Answers must be written in the medium authorized in the Admission Certificate, which must be stated clearly on the cover of this Question-Cum-Answer (QCA) Booklet in the space provided.	
			5. Word limit in questions, if specified, should be adhered to.	
			6. Any page or portion of the page left blank in the Question-Cum Answer Booklet must be clearly Struck off.	
			<p align="center">“Develop success from failures. Discouragement and failure are two of the surest stepping stones to success.”</p>	
			<p align="center">H.NO. 1-1-664/B, 2nd floor opposite SBI & Canara Bank Rd, beside Gandhi Nagar Park, Hyderabad, Telangana 500080</p>	
			Start Time: 10:05	End Time: 1:03
			Mode of Examination:	Online: <input type="checkbox"/> Offline: <input checked="" type="checkbox"/>
			Evaluation Date:	
Total Marks:				

Part 1 (Attempt all questions $8 \times 20 = 160$ marks, 250 Words each)

1. Elaborate on the DNA Structure and protein synthesis with suitable diagrams and critically evaluate the role of DNA in the cell division and cell multiplication process?

- (A) DNA (Deoxyribonucleic Acid) is the genetic material present in the ~~the~~ cell.
- Crick and Watson explained about the double helix model of the DNA.
 - DNA is made of up of Basic unit called Nucleotides containing of a pentose sugar, a phosphate group and ~~the~~ nitrogen base.
 - A component containing only ~~the~~ nitrogen base and phosphate group is called a Nucleoside.
 - The Nucleoside differ from each other based on the Nitrogen base - 4 types.
 - ~~Double~~ ^{Single} ringed bases called Purines - Adenine & Guanine Cytosine Uranine.
 - ~~Single ring~~ Double ringed bases called as Pyrimidines - Thymine & Cytosine
 - Adenine pairs only with Thymine and Guanine pairs only with Cytosine (Chargaff's rules)



- Double Helix Model.

- The two strands in a DNA run in anti parallel direction (in 5'-3' direction and other in 3'-5' direction).

→ Protein Synthesis

- Proteins are macromolecules that form the base of all basic structures of human.
- They are made of chain of amino acids, ~~thus~~ thus they are also known as Polypeptides.
- Protein Synthesis consists of three parts -
 - ① Transcription of mRNA (messenger RNA)
 - ② Processing - Splicing and capping.
 - ③ Translation of mRNA.
- ① Transcription of mRNA - mRNA gets active when a gene is activated. mRNA

transcripts the pattern from DNA inside the nucleus. This happens with the help of ~~RNA~~ RNA polymerase.

② Processing - Once the above is done, the ~~RNA~~ mRNA enters cytoplasm.

The mRNA consists of codon which is to be decoded by tRNA.

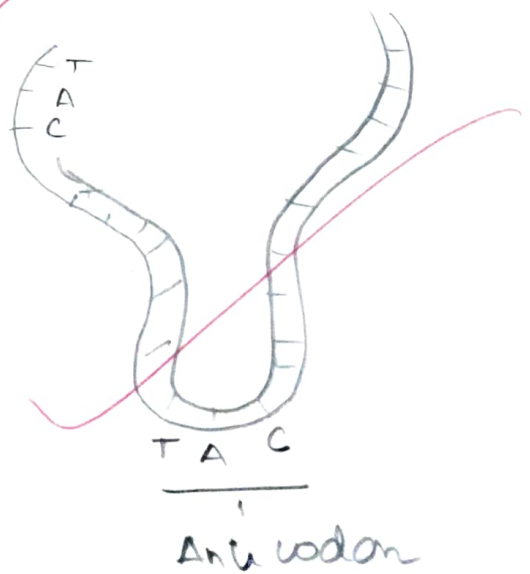
In the cytoplasm, certain parts of mRNA are spliced (junk DNA, VNTR e.t.c) and there is methylation of DNA.

③ Translation of mRNA - Here there is

another RNA called tRNA which encodes the codon ~~to~~ using the

anticodon present on the tRNA structure.

As the amino acid interacts between the codon and anticodon, the chain of macromolecules is generated.



④ tRNA.

→ Role of DNA in cell division and cell multiplication process -

- Organisms propagate their type in the world through the process of cell division and reproduction.
- Mitosis - cell division and multiplication in somatic cells. Results in 2 daughter cells. Ex - Skin, hair e.t.c.
- ~~Mitosis~~ Meiosis - In the sexually reproducing organisms in male Testis and female ovaries.
- Meiosis consists of spermatogenesis in males which leads to 4 sperm cells & oogenesis in females which results in one secondary oocyte (which will become an egg) and three primary oocytes.

Recent changes of modern lives have created large scale changes in which human body works (Ex - stress, nutrition etc) Early menopause, ~~the~~ Polycystic Ovarian Syndrome, deterioration of sperm quality are some of the examples.

Structure

✓

Introduction & Conclusion

✓

Content

✓

Total :

2. Give a brief note on the twin study, co-twin study, and foster child Methods?

(A) Twin Study, Co-twin Study, foster child, pedigree etc are different methods of genetic study of man.

→ Twin Study method -

- Variations in humans are due to three factors - Heredity, Environment and a combination of the two.
- Twin study method is a method to know whether a trait has a strong genetic or an environmental impact.
- Types of twine (Camille Deserte)
 - Monozygotic - One zygote splits into two. (same gender, same genes).
 - Dizygotic - Two eggs fertilized by two sperms.

◦ Method of Twin Study

① Determination of zygosity

- i) Placental method - by studying the placenta. (It has three layers -
 - Inner Amnion
 - Middle Chorion.
 - Outer Placenta).

Monozygotic - i) Monoamniotic, Monochorionic placenta.

ii) Diamniotic, monochorionic placenta.

Dizygotic - i) Diamniotic, Dichorionic placenta.

ii) DNA fingerprinting method.

iii) Similarity method.

② Checking of Concordance and Discordance

◦ Concordance - If both ~~gen~~ twins agree to a trait.

◦ Discordance - If both twins do not agree on a trait.

- Study pairs of 100 monozygotic (MZ) and Dizygotic (DZ) twins.

- Variance in MZ twins more - environmental factor.

- Variance in DZ twins more - genetic factor.

- Study was also conducted on twins reared apart and together.

Criticisms

- Considers genetic and environmental traits as one.

- Less importance to traits other than caused by the above two (Intelligence, Schizophrenia etc)

- Twins - Small sample group.

→ Co twin method -

- Co Twin method was developed keeping in mind the drawbacks of ~~the~~ Twin method.
- Twin method ~~did~~ not study cases in which one twin agreed to a trait and the other did not.
 - Thus, Co twin method focusses on pairwise analysis i.e. between MZ and DZ twins and between the two twins each.
 - ~~MZ~~ twins - If both ~~the~~ twins disagree to a trait, it is environmental influence and vice versa.

→ Foster Child Method

- A method to study the nature and nurture aspect of traits in humans.
- To study whether environment or genes impact people more. (Intelligence studied)
- Method (given by Osborne - 1951)
 - Children are selected at random and are placed in poor, average and good homes.
 - Since, they are selected at random,

it is assumed that the traits are equally distributed genetically and any difference would be purely environmental.

- After some time, the children are studied
- If all children ~~pass~~ perform well, then intelligence is genetically linked otherwise environmentally linked.

- Criticisms
 - what basis good, bad homes are selected?
 - Ethically unfair and wrong.
 - children's destiny should not be decided by people.

◦ caution (osborne).

- Foster children should be placed at a very young age.
- from same race.

Thus, the above methods have been used widely to study genetics, its influence etc on human beings.

Structure	✓	Introduction & Conclusion	✓
Content	✓	Total :	

4. Do Allen's rule and Bergmann's rule hold for human populations? Implications of mutation in evolution with suitable examples and highlight their critical role in evolution?

(A) Allen's and Bergmann's rule explain the impact of environment on humans and how humans adapt (culturally, genetically and Developmental) according to the environment.

→ Allen's Rule - Impact of Body Shape and environment.

◦ People living in colder areas have small extremities (hands, legs) in order to reduce the surface area to reduce heat dissipation. and viceversa.

(Ex) Inuit Eskimos of Greenland.

→ Bergmann's Rule - Body Size and environment.

◦ People living in hot or arid areas have smaller bodies to reduce heat loss. and viceversa.

◦ The fat composition or Adipose Tissue is also low to reduce ensure heat is not trapped. (Eg) Australian Pygmies.

- Aller's and Bergmann's rule do hold true for human populations since -
- They have enabled humans to adapt to extreme climates.
 - They have created genetic and developmental changes in human bodies.
 - Though certain exceptions ~~exist~~ exist, most of them can be seen to have these changes.

→ Implication of mutation in evolution with suitable examples and their role in evolution -

- Mutation have brought in changes based on the environment which have helped people adapt.
 - ⊗ Large chest in cold area (to increase lung surface - more oxygen).
 - ⊗ Short noses and nose pointed upwards in cold areas to reduce passage.
 - ⊗ cold areas - more RBCs in order to ensure faster transport of oxygen in cold areas. More number of capillaries to increase surface area.
- ~~Small large bodies and smaller~~

Smaller bodies and large extremities (Allen's and Bergman's rule).

- Epicantic fold and almond shaped eyes among mongoloids. oval
- (Ex) Mongoloids are known to have lived in Desert areas.
 mutation to protect eyes.
- Adaptation to hot and arid climates
 - concentrated ~~with~~ urine and more loss of water (to ensure less electrolyte loss)
 - low rectal temperatures.
 - low fat (Adipose tissue) - to ensure there is no trapping of heat.
- Mutations have created changes in order to beat ~~the~~ changes brought in around us.
- (Ex) Julian Steward had mentioned about environmental core and the environmental structure and how humans adapt to these changes.

◦ Mutations and successive biocultural adaptations helped man move away from Savanna (where man first evolved) and live in different climates.

Thus, a mix of mutations, genetic, biological, cultural, physiological changes have helped humans adapt to diverse environments around them.

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5. Write the meaning and wide scope of Recombinant DNA Technology? Highlight its challenges and limitations and various applications in different fields with suitable methodologies.

(A) Recombinant DNA / rDNA / molecular cloning / Gene cloning technology is a ~~techno~~ used to clone or create DNA favourable using plasmids or self replicating organisms.

→ Method

- Cut the plasmid DNA using restriction enzymes.
- Cut the DNA segment to be reproduced from humans.
- Combine the two DNA ~~with~~ using the enzyme lygase.
- Insert this into a bacterial plasmid.
- This plasmid will multiply creating the required protein / DNA on an industrial scale.

→ Scope of rDNA technology

- To create GM (Genetically modified crops) - GM mustard, GM cotton etc.
- To produce vaccines on an industrial

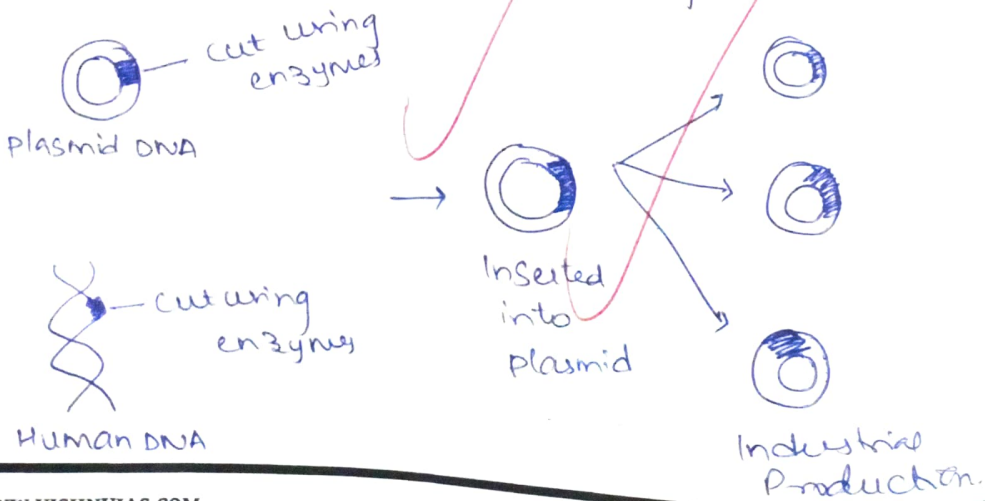
Scale.

- (Ex) Covaccine for covid.
- ~~Haemonal~~ Hormonal treatments.
- (Ex) To produce growth hormone, estrogen, e.t.c.
- Medical reasons.
- (Ex) large scale production of Insulin.
- Gene therapy - to replace a faulty gene with a functional gene.

→ Challenges of rDNA technology

- can be used for wrong purposes.
- (Ex) creation of virus to spread to large area - Bioweapon.
- Need for proper infrastructure.
- Ethical issues.

◦ Diagram of rDNA technology



→ Limitations of rDNA technology -

- cannot be used to prevent diseases.
- Awareness of the technology is low in underdeveloped and developing countries.

(Ex) During COVID, the African countries were at the mercy of developed countries for the COVID vaccines.

→ Applications in various fields

- Industrial production of vaccines and medicines.

(Ex) Vaccines - COVID and others.
 Insulin for diabetes e.t.c.

- CRISPR CAS - molecular scissors used in rDNA won the Nobel Prize recently.

- Gene Therapy - to treat chromosomal aberration, cancer e.t.c.

- Animal Experimentation.
 (Ex) 1st used on a pig to see the effects of cloning.
- Research and Development.

Thus, rDNA is a revolutionary technology that has opened up opportunities in diverse sectors especially in the areas of medicine and human health.

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Structure	↗	Introduction & Conclusion	↗
Content	↗	Total :	

6. What do you mean by Race and Racism? And give insight into the major classification of the races of the world. Give important biological criteria used frequently for such a classification.

(A) According to Dobzansky, Race can be defined as a group or unit of population who are reproductively isolated to an extent that the exchange of genes between them is absent or very low.

- Race is purely a biological aspect whereas Racism is a cultural aspect.
- When Race is used to create or bring in socio-cultural differences, it is called Racism.

(EX) Discrimination of Races based on skin colour.

- Racism is a threat to the society which can create bloodshed.

→ Major classification of races -

According to UNESCO (1951), all humans belong to one species i.e. Homo sapiens.

◦ However, the races around the world can be classified into primary and Secondary races.

◦ Primary Races -

A] Caucasoid Race

B] Mongoloid Race

C] Negrito Race.

Wiered

◦ Secondary Race - formed as a result of mixing of the above races.

(Ex) Australoid etc.

→ Biological criteria used for classification

Races

Morphological
criteria

Biological
criteria.

◦ Biological criteria -

A] Blood group - A, B, AB and O blood groups are most common.

O blood group - 63% of population.

A blood group - 23% of population.

B blood group - 16% of population.

B) Rh factor - Rhesus factor determines if ones blood group is positive or negative.

c) AM factor - studies the variations in immunity. IgG, IgA, IgM, IgE, IgD are the most common forms.

d) G6PD factor - Glucose 6 Phosphate Deficiency factor.
This varies across races.

(ex) Certain tribes in India from Rajasthan are known to have G6PD in high proportions.

Biological criteria are distributed on a random basis and it is difficult to categorize them based on races.

- No one race has exclusive ownership of one quality or feature.
- Moreover, globalisation has led to increased interaction among humans.

- Race crossing and inter race marriages are very common.
- Thus, the points of clear demarcation of races has been decreasing of late.

The above factors led to UNESCO declaring in 1951 that Race is purely a biological concept and that ~~Racism~~ Racism is a myth and should not be used to spread hatred.

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Structure	✓	Introduction & Conclusion	✓
Content	✓	Total :	

7. What do you mean by Aberrations and describe its types of numerical and sexual chromosomal aberrations?

(A) Aberrations are changes caused in chromosomes due to mutations or any other factor.

Chromosomal aberrations can be structural, numerical or sexual.

- Most of the Aberrations are caused due to Dysjunction when the sister chromatids fail to separate during Anaphase.
- It is more often than not associated with the age of the mother.

→ Numerical Aberrations -

(1) Down Syndrome (47, +21).

- Additional ~~21st~~ 47th chromosome on chromosome no 21.
- 1 in 20 eggs produced after 40 years in a woman.
- Features
 - Mongoloid features seen.
 - Epicanthic fold, small eyelids.
 - Simian crease on palm.
 - Mental Retardation.
 - Cardiovascular disease.

- loose tongue and appendages.
- learning disability.
- short life span.

② Patau Syndrome (47, +13).

- Additional chromosome No 13.

- Features
 - Microcephaly (small head)
 - Micrognathia (small jaw).
 - 1 in 700 cases.
 - Cardio vascular diseases.
 - Mental disability.
 - Cleft fingers e.t.c.
 - clenched hands.

③ Edward Syndrome (47, +18)

- Additional Chromosome No 18.

- Features
 - Microcephaly.
 - Micrognathia.
 - Spina Bifida (spinal cord outside).
 - Most of them aborted very soon.
 - Eyes set set apart. e.t.c.

④ Cri du Chat Syndrome (46, P-5)

- Absence of 5th chro chromosome on P arm.
- Features — ~~they~~ cry sounds like a cat.

- Eyes set wide apart.
- Slanting eyes.
- Mental retardation e.t.c.

→ Sexual Chromosomal Aberrations.

① Turner Syndrome (46, XO).

- Phenotypically female.
- Absence of ovaries and uterus.
- Sexual secondary characteristics not formed.
- Learning disabilities seen in some. e.t.c.

② Klinefelter Syndrome (47, XYY).

- Seen when there is more than one Y chromosome with X.
- Phenotypically males.
- Short trunk, long extremities.
- Gynecomastic (big breasts).
- Shoulder size equal to hip size.
- Some degree of feminine features seen.
- Extreme cases - XYYY, XXYYY, XYYYYY e.t.c.

③ Super Female (47, XXX).

- Phenotypically females.
- Can lead a normal life, bear children
- learning disabilities.
- Osteoporosis
- Low muscle tone. e.t.c.

④ Jacob syndrome (47, ~~XYY~~ XYY).

- Phenotypically males.
- Most of them do not know of their condition.
- Associated with violent behaviour, thus was referred to as Criminal Syndrome earlier.

Thus, modern life style, late child bearing, use of excessive androgens e.t.c has led to an increase in such cases of recent time. Genetic counselling can help in treating these cases before hand itself.

Structure

✓

Introduction & Conclusion

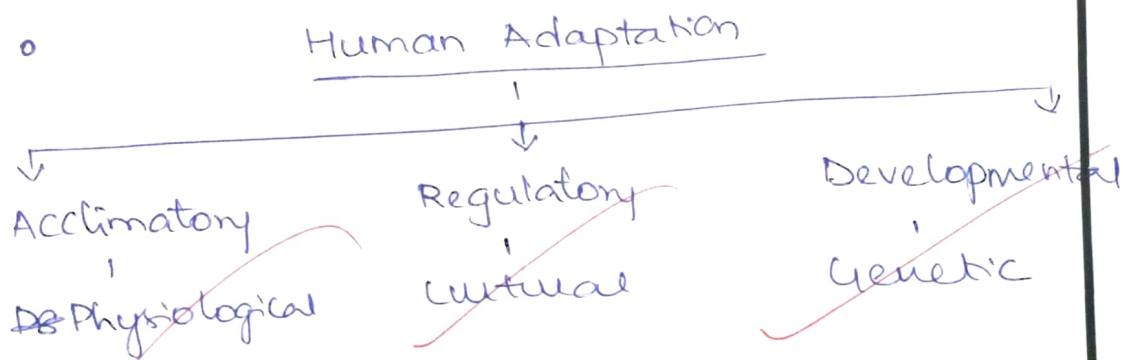
Content

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Total :

8. What do you mean by the Biocultural Adaptations and give insight into how genetic and nongenetic factors will affect the bio-cultural adaptations.

- (A) Julian Steward had first emphasized the effect of environment on culture.
- Biocultural Adaptation are a mix of biological, cultural and genetic or developmental factors which humans develop to adapt to the respective environments.



→ How genetic and non genetic factors affect bio cultural adaptation

• Genetic factors

- by bringing in permanent changes in human beings.
- Developmental changes.
- Examples -

In cold areas

- Increase in blood capillaries to carry oxygen.
- Increase in lung size and broad chest.
- Increase in size of right side of heart.
- Increase in RBC count.
- Ability of RBC to bind with oxygen.
- Allen's and Bergmann's rule.

In hot areas

- Smaller bodies, larger extremities.
- low rectal temperatures.
- concentrated urine etc.

- Non Genetic factors

can be divided into cultural factors and certain ~~social~~ ^{psy} Physiological changes.

Examples of cultural changesIn cold areas

- Eating of tobacco leaves by Brazil highlanders.
- Animal fur as clothes (Eskimos).
- living in igloos (air pockets capture heat).
- clothing.

- Carbohydrate rich food.
- work during day time.

e.t.c

In hot/arid areas

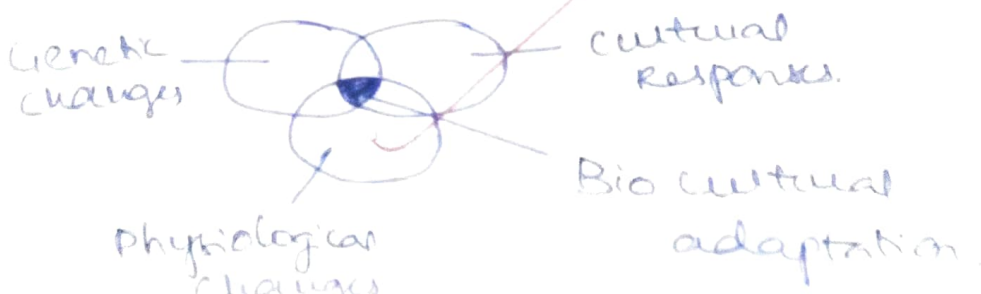
- Arid areas full of clothing.
- Hot areas (Wastar) - less clothing
- Housing.
- Work hours are late e.t.c.

Examples of Physiological changes

- Heavy breathing in cold high altitude areas to get more oxygen.
- Shivering to generate heat.
- Sweating to reduce temperature due to evaporation.

e.t.c.

Thus, Several genetic and non genetic factors have a role to play in biocultural adaptation.



Please refer to our notes on model answers. You will get more points to add.

Humans are probably one of the very few species of the world who have been able to use/culture to modify environment in order to adapt. This quality has ensured that human race is spread across several climatic zones from deserts to cold Siberian regions e.t.c.

Structure	✓	Introduction & Conc usion	✓
Content	✓	Total :	

Part 2 (Attempt all questions 6*15=90marks, 200Words each)

1. Write the meaning of Epidemiological Anthropology and Describe the scope of Epidemiological Anthropology during the covid 19 and its critical role played.

(A) Epidemiological Anthropology Studies the determinants and distribution of diseases.

- Initially, there was a push to study and control the spread of diseases.
- But later, it was realized that along with biological factors, cultural factors also play an important role in disease and health, thus the emergence of the field of Epidemiological Anthropology.

(Ex) In Orissa, Albinism is considered holy.

→ Scope of Epidemiological Anthropology during COVID 19 -

- COVID was a mix of biological and social factors.
- Biological - virus.

- Social - Social distancing, hand wash, behavioural changes.
- o COVID could not be ~~head~~ treated only using vaccines unless social changes were accepted.
- (Ex) wearing of masks, lockdowns e.t.c.
- o Educating tribals and convincing for vaccination.
- o Promoting covid appropriate behaviour in people.
- o Sharing of information on covid on international ~~plat~~ platforms.
- o Removing fear of vaccination from people.
- o There was a need to cooperate with Medicine man, religious leaders, village elders, panchayats e.t.c to educate people and promote covid appropriate behaviour and thus vaccination.

→ Role played by Epidemiological Anthropology -

- a combination of social and biological measures to tackle covid.
- Future ready for such pandemics.
- Training of officials and personnel.

Thus, Epidemiological Anthropology was one of the vital aspects of handling of covid in India and across the world.

Structure	3	Introduction & Conclusion	3
Content	3	Total :	

2. Critically elaborate on the Mendelian principles and their application to human populations in the present context.

(A) Gregor Mendel gave the principles of genetics and inheritance which opened the door for further research and development on genetics and heredity.

→ Mendelian Principles - He conducted his study on pea plants (Height of trees) and later on other traits like colour and texture of the peas.

◦ Law 1 - The Law of Dominance

The trait which appears in the first generation is called a dominant trait and the one which disappears and again appears successively is called a Recessive trait.

Exceptions - Co dominant trait

Haemoglobin in RBCs.

H_Se Co dominance of H_S (sickle cell) and H_A (Anaemia) in humans.

o Law 2 - The law of Unit factors

The traits express themselves individually one trait is acquired from mother and one from father.

Exception - Incomplete dominance.

o Law-3 - The law of Segregation

The traits do not mix and interfere in each other during the expression.

Exception - Polymorphism.

Height, Intelligence, Schizophrenia are exceptions to this law.

o Law 4 - The law of equivalence

The traits express in a similar fashion irrespective of ~~where~~ from which parent, the trait is generated.

Exception - Huntington Chorea.

If it comes from mother, the disease is - Angel Man's Syndrome.

If it comes from father, the disease is Prader Willi Syndrome.

Genetic Imprinting is an exception to this law.

Thus, Genetic Polymorphism, Polygenetic Inheritance are few of the exceptions to Mendelian principles. Mendel's principles, irrespective of the exceptions, to a very large extent contributed to the study of genetics and heredity.

a

3. Critically substantiate the significance of screening and counseling for genetic disorders.

(A) Genetic Screening refers to the process of testing ones chromosomes or karyotyping in order to look for any aberrations or a possibility of passing harmful traits to children.

Genetic Counselling is the use of the above data to educate parents about the possibility of passing of harmful traits and the ways to avoid them.

→ Genetic Screening

- Pre Natal screening.
- Pre Implantation Screening.
- Intra uterine Screening. e.t.c.

→ Significance of Screening and Counselling for genetic disorders -

- o To look for homozygosity and possibility of expression of recessive traits.

(Ex) Albinism, Colour blindness.

- VISHN
I A S
- Incompatibility testing.
 - (Ex) Blood group incompatibility can lead to Erythroblast's Foetalis
 - Awareness and educating the to be parents to make an informed decision.
 - In case of consanguinous marriages, the risk is higher.
 - To ensure healthy gene pool and reduction in unhealthy genes - Eugenics.
 - To prevent miscarriages and Neo natal mortality.
 - (Ex) Various Sex chromosomal aberrations
 - With increasing age of mothers, working mothers, the need has increased even more.
 - (Ex) ~~is~~ Non Disjunction is high in old mothers.

→ Critical evaluation -

- The number of trained Genetics specialists is very low especially in India.

- o lack of awareness among people.
 - o low disregard for karyotyping, Genetic counselling etc.
- Marriages are more approved in case of Social compatibility (caste, race etc) rather than genetic compatibility.
- Governments have to spend hugely on setting up infrastructure, training etc.

Thus, not just India but the world has a long way to go in inculcating awareness on counselling and screening. The absence of specialists and low awareness among people makes the job even more difficult.

Structure	3	Introduction & Conclusion	3
Content	3	Total :	

4. Write a brief note on the role of heredity and environment in the formation of races?

(A) According to Dobzansky, a Race is a group or unit of population that is reproductively isolated to an extent such that the exchange of genes between them is absent or less.

→ Role of heredity and environment -

- Role of heredity

- ~~Int~~ Intra racial marriages have led to confinement of traits within a population and thus clear demarcation of differences.
- (Ex) - Negritos, Caucasoids, Mongoloids.
- Mutations have led to certain changes contributing to race formation.
- (Ex) Mongoloid - epicanthic fold e.t.c.
- Nasal Index, Cephalic Index, Stature e.t.c have been influenced by heredity to a large extent.
- Nutrition status also influenced by

heredity.

o Malnutrition.

→ Role of environment

o skin colour - based on environment
(Glogger's rule)

Hot climate - dark colour.

(EX) - Negritos - Andamanese.

cold climate - light colour.

(EX) Siberian people.

o Body built - Bergmann's and Allen's rule.

Cold - ~~smaller~~ larger bodies and smaller extremities.

Hot - smaller bodies and larger extremities.

o Hair colour, texture and pattern
depends on environmental conditions.

Thus, a mix of environmental and heredity leads to varied results and changes and formation of races.

However, Race crossing and inter racial marriages due to globalization have reduced the importance of Race and now Racism is proved to be just a myth.

Structure

3

Introduction & Conclusion

3

Content

3

Total :

5. What do you mean by ecological anthropology and critically examine the physiological responses and Acclimatization to the cold climate in a man?

(A) Ecological Anthropology studies the various ways in which ecology and environmental ~~and~~ affect humans and viceversa.

Julian Steward can be credited for the beginning made in the field of Ecological Anthropology.

→ Physiological responses of Acclimatization to cold climate -

Human beings evolved in Savanna but they evolved and adapted to adjust to cold climates.

• Developmental Responses

- ~~Smaller body to reduce heat loss~~

- Larger body in order to conserve heat (Beigmann's rule).

- Smaller extremities in order to increase surface area to conserve heat and

- reduce heat loss (Allen's rule).
- ~~traits~~ Decreased Melanin production and light skin to let sunlight penetration into skin (Gloger's rule)
- Increased blood capillaries to help transport of blood and oxygen.
- Increase in the size of chest and increased lung surface area to produce more oxygen.

Exception - Sheeps of Nepal.

- Ability of haemoglobin to extract oxygen from low levels.
- High content of haemoglobin for faster transport of oxygen.
- Right side of heart is big in size to ensure faster pumping of blood.

o Cultural changes

- Clothing (Fur clothing among Eskimos).
- Housing (Igloos among Inuits).
- High carbohydrate diet to increase heat.
- Work in day hours.

o Physiological changes

- Hypothalamus activates the brain and thus shivering starts to produce heat
- High amount of fat (Adipose tissue) to conserve heat.

Thus, a mix of ~~acclimatory~~ acclimatory, cultural and developmental changes help humans to adapt to different types of climate.

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Structure	3	Introduction & Conclusion	3
Content	3	Total :	

6. What is a Genetic Load and what are various types of Genetic Load with the suitable examples?

(A) According to Crow, Genetic load is the proportion by which the fitness of a gene pool is reduced due to the presence of unfit genes or mutations.

→ Types of Genetic load

(1) Mutational Load

Mutations lead to increase in unfit genes and reduction in fit genes in a population.

(EX) If a negative allele 'a' enters a gene pool and due to certain factors this gene increases in the population due to mutations.

Down Syndrome, Achondroplastic Dwarfism, Albinism e.t.c.

(2) Segregational load -

This is a situation where there is continuous segregation of homozygous

and heterozygous genes due to various different reasons.

(Ex) & Inbreeding or Consanguinous marriages.

Here, there is an increase in homozygosity over heterozygosity over a period of time.

Heterozygosity is always favourable over homozygosity since it is capable to bring recessive traits back.

(3) Incompatibility load -

This happens when genes or alleles are incapable to exist together and grow.

- Commonly seen in marriages.
- Blood group incompatibility.
- Rh factor incompatibility.
- Organ transplant reaction

e.t.c.

(Ex) Erythroblastosis Foetalis.

Here, if a woman has a Rh positive blood group and she carries the child of a Rh negative man and the child is Rh negative, then the cells of the zygote will attack the mother's immunity leading to death in few cases.

Thus, Genetic Screening and Genetic Counselling can help in understanding and getting the right treatment at the right possible-time.

Go through ~~cells~~
genus

8
10

Structure	3	Introduction & Conclusion	2
Content	7	Total :	