TEST CODE	8	3	1	2	0	3

ATS 2025

Time Allowed : Three Hours
समय : तीन घंटे

ForumIAS

Maximum Marks : 250
अधिकतम अंक : 250

Anthropology / एथ्रोपोलॉजी (नृविज्ञान)

Name Of Candidate परीक्षार्थी का नाम	PUNIT KUMAR		
Roll No./अनुक्रमांक	19100 83588	Medium/माध्यम	English ✓ हिंदी
Center Code/परीक्षा केंद्र	1901 Karol Bagh	Date/दिनांक	28/1/2025

*Center Code : For Online – 1900 / Delhi : Karol bagh – 1901, ORN - 1902, Mukharji Nagar - 1903 / Patna : Boring Rd. – 2001 / Hyderabad : Jawahar Nagar - 2101

INDEX TABLE / अनुक्रमणिका

Q. No. प्र.सं.	Max. Marks अधिकतम अंक	Marks Obtained प्राप्तांक
1		
2		
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4		
5		
6		
7		
8		
9		
10		
Total/कुल अंक	250	

11:30
12:05

Examiner's Discretion/मूल्यांकन कर्त्ता का विवेक :

Total Marks/कुल अंक :

*Examiner's Discretion is the marks awarded at the discretion of the examiner based on your overall impression, on the basis of (but not limited to) your handwriting, presentation, use of diagrams, flowcharts, facts and figures or absolutely anything that he/she liked in your copy.

मूल्यांकन कर्ता का विवेक अंक, आपकी लिखावट, प्रस्तुति, आरेखों के उपयोग, फ्लोचार्ट, तथ्यों और आंकड़ों या समग्र रूप किसी अन्य विषय वस्तु, जो मूल्यांकन कर्ता को आपकी कॉपी में पसंद आयी के आधार पर (लेकिन इन्हीं तक सीमित नहीं) पर दिए गए अंक हैं।

INSTRUCTION / अनुदेश

1. Please do furnish Name, Email, Roll No and Mobile in the answer sheet.
कृपया उत्तर–पुस्तिका में नाम, ईमेल, रोल नंबर और मोबाइल नंबर भरें।

2. There are EIGHT questions divided in two Sections in the question paper. Question 1 and 5 are compulsory. You can attempt any THREE out of the remaining, Choosing at least ONE Question from each section.
प्रश्न पत्र में आठ प्रश्न दो खण्डों में विभाजित हैं। प्रश्न 1 और 5 अनिवार्य हैं। आप प्रत्येक खंड से कम से कम एक प्रश्न चुनकर, शेष में से किसी भी तीन का प्रयास कर सकते हैं।

3. The number of marks carried by a question/part is indicated against it.
प्रत्येक प्रश्न/भाग के लिए निर्धारित अंक उसके सामने अंकित किए गए हैं।

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.
उत्तर प्रवेश पत्र में अधिकृत माध्यम में लिखे जाने चाहिए, जो कि दिए गए स्थान में इस प्रश्न–सह–उत्तर (क्यूसीए) पुस्तिका के कवर पर स्पष्ट रूप से लिखा जाना चाहिए।

5. Word limit in questions, if specified, should be adhered to. Any page or portion of the page left blank in the Question-Cum Answer Booklet must be clearly Struck off.
प्रश्नों में शब्द सीमा, यदि निर्दिष्ट हो, का पालन किया जाए। प्रश्न–सह–उत्तर पुस्तिका में खाली छोड़े गये किसी भी पृष्ठ या पृष्ठ के भाग को स्पष्ट रूप से काट दें।

For Student Only / केवल परीक्षार्थी प्रयोग हेतु

Start Time/प्रारंभ करने का समय :	End Time/समाप्त करने का समय :
11:30 AM	3:00
Mode Of Examination/ परीक्षा की विधि :	Online/ऑनलाइन ☐ Offline/ऑफलाइन ☑

For Office Use Only / केवल कार्यालय प्रयोग हेतु

ECN CODE/ ईसीएन कोड :	EG/ईजी : ① ② ③ ④ ⑤	Evaluation Date/ मूल्यांकन तिथि :

Note: Students are expected to incorporate suggestions from the feedback provided in the answers. Discussion classes for the tests are also available online in your portal to aid in your preparation. Further, students are requested to see the good copies of the tests and learn from them. You can also discuss your copy with a Mentor and discover ways and means to improve your answers, or if you have any issues with this test / copy. Ask specific questions, to get specific answers.

EXAMINER'S REMARKS

CRITERIA FOR THE FEEDBACK SECTION AT THE END OF EACH QUESTION

1. **AWIS = Answered What is Asked.** This means whether you have addressed the core demand of the question or not. Addressing the core demand of the question gets you an objectively fair score. It is examiner's perception if you have understood the question and if you know the answer in the first place. Creative answer writing, sometimes missing the core demand, may fetch very high or very low scores, and exposes your answer to the subjectivity of the examiner.
2. **CD & VA = Content Density & Value Addition.** Examiner will evaluate the quality and quantity of your content in the answer. In the same word limit and space limit have you (a) written what is asked (b) gone beyond what is asked (c) enriched answers through combination of (but not all!) suggestions, ideas, quotes, flowcharts, diagrams, facts and figures, data etc. This affects objective components of assessment.
3. **S & F = Structure & Flow** = Whether you have structured your answer properly or not. Whether the answer has been broken into parts and sub-parts and each part has been addressed appropriately or not. Whether the flow of the answer is maintained. Affects both subjective and objective components of assessment.
4. **P & R** = How your answer performs on the criteria of **presentation, ease of read, clarity and apparent effort** in writing the answer. This affects the subjective components of assessment.

Section– A

Q.1) Write short notes on the following in about 150 words. (10 Marks)

a) Protein synthesis

Protein synthesis refers to process of protein development from genetic information for growth & other functions of body.

Process ⇒

Genes (Instruction for protein) → Cell creates Protein (If gene expressed) → Growth & development (Metabolism)

(eg → Insulin production in body)

Key factor affecting Protein synthesis

① Gene expression :→ unexpressed gene can led to protein deficiency which can affect health

(eg → Low height due to gene unexpressed)

② Mutation :→ Mutated genes restrict synthesis

(e.g. BRCA1/2 gene can led to cancer)

③ Immunogenetics → Role of genetic & immuno response can impact synthesis

(Eg. Unexpected Antibody response against self cells.)

Impact on body
- ① Create disease (eg. Diabetes)
- ② Restrict growth
- ③ Affect fertility.

Modern development → AI prediction of protein synthesis by sequences of amino acid (Nobel Prize for 2024)

Thus, protein synthesis is a complex phenomenon which require more research to completely understand the biological mechanisms.

b) Nature v/s Nurture debate in Anthropology (10 Marks)

Human phenotypes are ~~both~~ from both factors, learned as well as inherited from parents.

Base of debate → Role of Environment (Nurture) vs Role of Genetic (Nature)

Nurture	vs	Nature
① Everything can be learned and role of environment is more. [eg- Loneliness can led to depression]		① Role of genetic is superficial and can't be altered (eg- Height, Skin etc)
② More Psychosocial in nature		② More biological oriented
③ Takes Behavioural approach		③ Takes scientific approach -

Case studies & Results

① Minnesota ~~Case~~ Twin study (1990) →
↳ [100 twins]

→ Height inheritance rate = 50-80%

→ Intelligence (IQ) = 40-60%

→ Shows complex role of both the factors.

② Swedish Registry study →
↳ Similar result of contribution of both.

Way of Study →
① Twin study
② Heritability
③ Genetic study..

Nature vs Nurture debate highlight the role of complex interface of both the factor in study of Human phenotypes.

Feedback (For OFFICE use only)			
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Please put tick marks in the above table. Here G is Good, A is Average and P is Poor.			
TOTAL MARKS			

c) Thrifty genotype (10 Marks)

Thrifty genotype refers to genes which impact the body physique like fat accumulation which are generally considered related to Nutrition.

→ James Neel proposed hypothesis for explaining obesity among population.

Thrifty genotype
- → Accumulate fat quickly
- → Better survival chances in famine
- → Condition of obesity in condition of resource availability. (e.g. Present condition)
- → Specific to few communities (Prevalence)

→ Thrift genes accumulate more fat than normal people which causes obesity.

Evidence explanation → High prevalence of obesity in few societies despite same level of work & lifestyle

Criticism

→ ① No proper mechanism evolved for thrifty genes

→ ② Overgeneralize genetic effect as frequency could be very low

→ ③ Ignored activity & diet pattern to study contribution of genetics.

[E.g. → As per Report, Indians is one of the country with less physical exercise and obese diabetes > 16% as per NFHS-5)

↳ Shows role of environment than genetics

Thus, thrifty genes are genes which abnormaly manage the body physique with boosted effect of nutritional intake.

Feedback

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Please put tick marks in the above table.

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TOTAL MARKS	

d) Fertility & Fecundity (10 Marks)

Fecundity refers to the maximum potential of reproduction among the population

→ Theoritical concept highlighting the reproductive Health in population

Factor affecting Fecundity

① Genetic :→ free from inherited disease (eg: Turner, KF etc)

② Hormones & Growth factors →
↳ Low estrogen can reduce fecundity

③ Age → Reduced egg quality with later age
(eg: 86% conceiving chance at 22 than 45% at 32 [US university study]

④ Nutrition → Improper nutrition reduce fecundity

⑤ Lifestyle → Stress can reduce fecundity

Fertility refers to actual harnessing of reproductive potential i.e Birth given.

Fertility Rate: No. of Children per ~~1000~~ women in population.

(Eg: India Fertility Rate ≈ < 2.1]

Significance → Demographic status of country and Reproduction choices.

Determinants →
- ① Age & Health :→ less child at higher age
- ② Nutrition → Increased IMR (Eg: Tribals high IMR)
- ③ Culture → (Eg: Nigeria belief of many children → >6 Fertility Rate)
- ④ Modern Impact :→ "Double Income No Child"

So, Fertility & Fecundity are biological concepts which represents the potential and actual reproduction however affected by many other factors.

Feedback

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TOTAL MARKS	

e) Genes affecting human survival (10 Marks)

Genes are part of DNA sequence which have coded information related to human functioning.

Major cause of defected Gene
- ① Mutation of Genes (e.g. Sickle cell anaemia)
- ② Recombination

Genes Affecting human survival

① Lethal genes :→ Which can be fatal in most of the cases.

Types
- ① Dominant : fatal in both heterozygous & homozygous state (e.g. Huntington disease)
- ② Recessive :→ fatal in Homozygous state only. (e.g. Sickle cell anaemia)
- ③ Conditional Lethal → In specific environment only. (e.g. favism when eat fav beans)

② Sub Lethal genes :→ Higher survival rate due to less fatality.

Types
- ① Dominant :→ fatality ~~in~~ on in both Homozygous & Hetrozygous (e.g.→ Poly cystic kidney disease)
- ② Recessive → only in Hetrozygous
  ↳ High chance of survival (e.g.→ Haemophilia A)

Impact of Lethal genes
- ① Natural selection against disease genes to reduce frequency
- ② Increase diversity in population (e.g.→ Balanced polymorphism)
- ③ Adaptive potential for evolution

Thus, genetic mutation can led to serious concern for human survival however ~~gene~~ also provide for diversity & evolution potential.

Feedback (For OFFICE use only)			
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Q.2) a) Discuss in detail chromosomal aberrations with detailed explanation of 3 associated disorders. (20 marks)

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TOTAL MARKS	

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b) Highlight the terrestrial and arboreal adaptations in primates in detail.

(15 marks)

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TOTAL MARKS	

c) Describe "Restriction Fragment Length Polymorphism" in applied genetics and its applications in various fields. (15 marks)

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Q.3) a) Differentiate between the concept of "race" and "racism." Is race a biologically valid concept? Elaborate. (20 marks)

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b) Discuss the findings of the primate fossils of tertiary period. (15 marks)

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TOTAL MARKS	

c) What is "Action Anthropology"? Discuss with relevant case studies. (15 marks)

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TOTAL MARKS	

Q.4) a) Discuss the approaches in Applied Anthropology with relevant case studies. (20 marks)

Applied Anthropology is sub-branch of Anthropology related to real life application for problem solving aspect.

Scope of Applied Anthropology
- (1) Sports
- (2) Industrial design & ergonomics
- (3) Defense design
- (4) Forensic area

Approaches taken in Applied Anthropology

(1) Sports anthropology approach :→

(i) ↳ Best fit player for sports to be trained (Kinanthropometry)

(e.g. Tall + thin better for Basketball while Short & thick for weightlifting.

→ Somatotype advantage in sports.

China olympic Training case study :→

↳ Targeted training for better medal chances in competitive sports.

(ii) Ergonomic design of sports equipments

↳ (e.g→ cricket helmet light & strength for protection)

(2) Defense design approach :→

↳ Reduce weight

↳ Improved strength

↳ Easy to access the weapon

↳ flexible

[e.g→ Defense Tank design with ultimate strength yet fast moves with easy access to gun & controls]

(3) Problem solving related to Law by Forensic anthropology.

→ DNA profiling & sketch reconstruction

→ Identification of body & person

→ Key focus on legal evidence and logically solving the crime.

→ Paternity testing due to dispute

→ Disaster victim identification

(eg: Large scale victim identification in 2004 Tsunami in Bay of Bengal)

(4) Industrial product design →

↳ Improve comfort of the people

↳ Easy accessibility

(e.g.: Design of car seat to provide comfort to all type of people while maintaining the durability of product)

⑤ Disease detection & Treatment

↳ Genetic screening with cultural sensitive approach

↳ Better implementation of policy.

(e.g. Ebola versus vaccination approach in Africa region)

Key objective of Applied Anthropology

① Competetive advantage

② Ergonomical design

③ Scientific solution of crimes

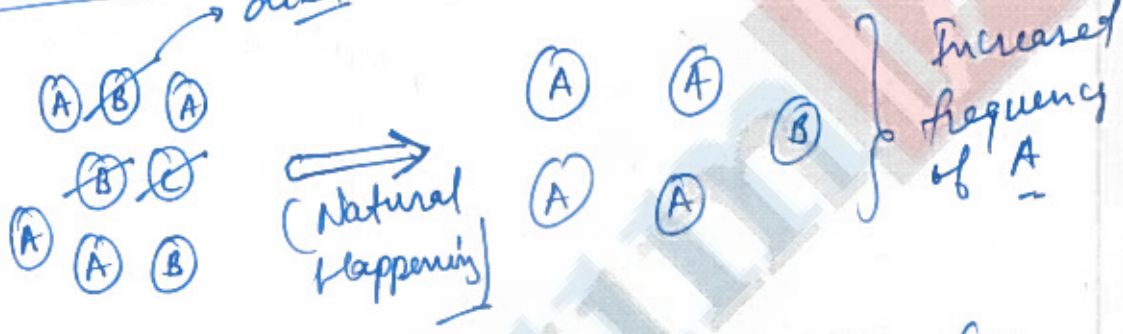
④ Culture sensitive approach for modern technology

Thus, applied anthropology approach provide humanistic application of science in societies with keeping the culture & belief in the mind.

b) What do you understand by the concept of "genetic drift"? Discuss with relevant examples. (15 Marks)

Genetic drift refers to increase/change in gene frequency due to isolation by natural disaster or phenomenon.

Process :→



→ Explained by Seawall Wright for explaining the organic evolution.

Example :→

Epicanthic fold eye of in Mongoloid population

↳ possible reason of genetic drift and later inbreeding led to increase accumulation of phenotype in them.

Relevance in evolution :⇒

⇒ Synthetic theory highlighted the evolutionary force of genetic drift in speciation.

→ Increases specific gene frequency

↓

Isolated breeding & ~~speciation~~ dominance

(e.g⇒ Death of ~~specific~~ coloured butterflies due to heat hot weather while other adapted to weather

↓

Changed gene frequency)

→ Fitness load due to sudden change in population genetics

↳ Reduced fitness to environment however further variation ~~not~~ adapted to environment. ⇒ Explain evolutionary process

Modern Relevance

① Preserving the species with reduced gene frequency or traits.
(e.g. ⇒ Critically endangered or unique species due to climate change)

② Study evolutionary impact on species due to Human activities.
(e.g. ⇒ Industrialization impact on species traits)

③ Study evolutionary biology of various species.

Thus, genetic drift provide the effect of environment on gene frequencies which directly affect the long term and continuous process of evolution as highlighted by Seawall Wright in synthetic theory.

Feedback

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Drawbacks ⇒

① Impossible in real life (Ideal population) → Mere a theoritical framework
↳ Various Migration, social rules etc)

② Too simplistic to apply → No space for Mutation
[e.g → Disease get Mutated very frequently to change gene frequency]

③ Static in nature → Not consider dynamic effect of natural selection & other factor.

④ Polygenic inheritance can't be expressed (e.g → Height variation etc)

Advantage
→ ① Helpful in Model generation (Statistical)
→ ② Study prevalence of disease
→ ③ Effective for carrier analysis.

Thus, However, it is an ideal & theoritical framework but still provides the impactful approach to study the gene flow in statical manner.

Feedback

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Please put tick marks in the above table.
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TOTAL MARKS	

Section- B

Q.5) Write short notes on the following in 150 words.

a) Applicability of Mendel's laws of inheritance in humans (10 Marks)

Mendel's law provide the mechanism for inheritance of phenotype from parents to offspring:-

Postulates
- ① Single factor for each phenotype
- ② Independent assortment.
- ③ Segregation of both parent
- ④ Single Dominance.

Applicability in Human inheritance

① Study spread of single factor disease:

Eg: Cystic Fibrosis:

25% chance of disease

② Analysis of carrier :-

↳ show probability of carrier of disease

→ Informed reproduction choice.

③ Role in genetic counselling :-
↳ effectively trace disease history & chances (e.g. PGD testing for IVF baby)

④ Policy decision for genetic screening :-
↳ High prevalence of genetic disease (e.g. High Sickle cell anaemia in Gassia tribe in RJ ⇒ Genetic screening)

Limitation of applicability →
① Unable to study polygenic inheritance (e.g. Diabetes, Height etc)
② Study co-dominance in inheritance pattern (e.g. ABO blood groups)
③ Unable to analyse epistasis i.e impact of one gene on another.

Thus, Mendel's law provide simple framework yet powerful tool to study genetic inheritance in human however significant limitation to complex inheritance patterns.

b) Ageing & Senescence (10 Marks)

Ageing refers to ^ chronological phenomenon of increase in age of the body.

→ Thus, technically starts from childhood itself but commonly used for after adulthood stage.

Senescence is the biological phenomenon of decreased metabolism of cells in post reproductive period and at later stage of life. (Bernard Strehler)

Characteristics of Aging & Senescence

1. Reduced activity & strength
2. Reduced endurance of body
3. Compromise immune response
4. More solitary & free time in culture
5. Generational gap occurs.

Explanation of Ageing & senescence

① Genetic theory :→ i) Gene on-off theory : (Stretchdry)

↳ Reduced gene functioning automatically with age.

ii) Cell division (Blueprint theory) → Reduced cell division & impact on functions

② Social & cultural → i) Disengagement lead to reduced activity & early aging

↳ Satisfied with their age & no motive to do more thing.

→ As per Erickson, Senescence represent the stage of Integrity vs Despair i.e satisfaction or regret.

Thus, senescence is last stage of life having vast experience of thing but with limited cognitive & motor ability to perform any task.

c) Genetic Counselling & Eugenics (10 Marks)

Eugenics refer to concept of "betterment of genes" by selective reproduction based on assumption.

→ 19th century concept, derived by Francis Galton eventually led to scientific racism.

Types of Eugenics
- +ve :→ Selection of fit individuals to improve their number
- -ve :→ Removal of unfit genes from population.

→ Based on pseudo-science assumption with support of racism.

Genetic counselling :→ refers to proper assessment & advice of genetic health of a person :-

Key feature
- ① Assessment of health → Pedigree analysis etc
- ② Genetic test for confirmation of disease
- ③ Advise for Reproduction, Treatment
- ④ Emotional support during navigation of disease.

Ex:→ Advising PGD test for IVF baby if Parents have genetic condition & support for assessment of newborn.

Interface of Eugenics & genetic Counselling

① Both as selection of fitter :→ Objective is same for both of reduce genetic disease

② Assumption based to genetic based :→
↳ More scientific approach in genetic counselling

③ Ethical rather than differential →
↳ More ethical approach.

However, both have similar objective yet Genetic counselling truly oriented towards betterment of individual choices than unsubstantiated Eugenics.

Feedback

(For OFFICE use only)

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Please put tick marks in the above table.
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TOTAL MARKS	

d) Polygenic Inheritance in man (10 Marks)

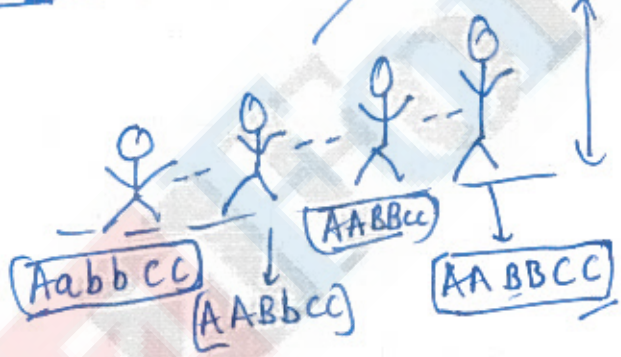
Polygenic inheritance refer to various genes affecting the inheritance pattern of a phenotype.

[For example :→ Height, Skin color, Hair texture etc.]

Mechanism of inheritance :→

Let A, B, C ⇒ Tall Height } (A, B, C) three gene impacting inheritance of Height factor
a, b, C ⇒ Short Height }

Phenotypes :→ Many phenotypes



Additive effect of gene expression

Features of Polygenic inheritance

① Additive effect → More gene expression
↓
Higher trait expression

② Continuous variation → Large no. of phenotype
(e.g. 3ft - 7ft people Height)

③ Not follow Mendel law of Unit factor & Independent assortment.
↳ Complex inheritance

④ Difficult statistical analysis due to Complex pattern
(e.g. Height - Gene co-relation study)

Impact on Human biology & Medicine

① Difficult to find cause (e.g. Diabetes study) → Vaccine & treatment inconclusive

② Pedigree analysis uncertain
↳ Reduce counselling effect

Modern development in genetics are continously developing to understand the Complex phenomenon of polygenic inheritance which will help immensely in polygenic diseases.

Feedback
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Please put tick marks in the above table.
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TOTAL MARKS	

e) **Geno**mic imprinting (10 Marks)

Genome imprinting refers to expression of genes in parent of origin specific manner without mutation.

i.e → No equal chance of expression from Mother & Father. ~~even if~~ even if both present.

Cause → Epigenetic Regulation of gene expression due to DNA Methylation

For example:→ 15th chromosome gene expression:

i) If Mother's expressed :→ Prader-Willi Syndrome

↳ No chance of father Gene

ii) If only Father expressed → Angelman Syndrome

↳ No chance of Mother's gene expression.

Impact → ① Functionality issue due to absence of expression of gene
(e.g. → Growth retardness, stature etc)

→ ② Cognitive growth retardness

→ ③ Physical disability or Condition (eg: Skin issue etc)

Diagnosis → Protein synthesis study needed as DNA sequence can't diagnose as there is no Mutation.

→ Unpredictable due to complex phenomenon of gene expression.

Ans Genetic imprinting is a genetic condition associated with gene expression due to DNA methylation can create genetic disorders in affected person however with proper diagnosis, situation can be treated temporarily.

Q.6) a) Highlight the broad postulates of the synthetic theory of evolution in detail with its significance. (20 marks)

Synthetic theory of evolution is group of evolutionary explanation developed in 1940s & later times with modern scientific explanations.

Broad postulate of Synthetic Theory

① Origin of Variation :→ Variation took place in genes & created variation in phenotypes :-

Cause of Variation

→ ① Mutation :→ Major cause of variation
↳ Mutation in DNA sequence created various variation

→ ② Recombination → Two different genes recombined to create seperate gene

② Role of evolutionary forces :→
↳ Darwin emphasized "Natural selection" as only means but synthetic theory

role of other forces also :-

i) Genetic Drift (Seawall Wright studied)
↳ changed gene frequency to dominance of variations.
[e.g→ Epicanthic fold eye in Mongloid]

ii) Mutation → Sustained Mutation maintains the diversity in population

iii) Isolation → Separation of popn to stop gene flow.

iv) Assortative Mating (Non Random mating)
[e.g→ Butterfly preferred colored mate]

v) Natural selection
(e.g→ Brown bettles selected against green after industrial revolution)

③ Gene flow in population :-
↳ explained mechanism of hereditary as question remained for Darwin
→ Dobzansky demonstrated the

gene flow concept and eventually explained how trait transferred.

(4) Speciation → Accumulation of genes with significant variation later lead to speciation.

→ Explained by "Earnest Mayr"

[E.g → New finches in Galapagos island due to their food niche.]

Significance of Synthetic theory of evolution :→

(1) Explained Darwin's theory questions :→

↳ Cause of variation

↳ Mechanism of variation

↳ Evolutionary effect

↳ Speciation

(2) Scientific approach to evolution →
↳ Provided genetic evidences to study of evolution [As Churches, questioning evidence of Darwin's theory]

(3) Study of genetic disease & gene flow
↳ Role in adaptation & evolution study

(4) Response to Scientific Racism →
↳ As Dobzansky explained different phenotype as reduced gene flow

Thus, Synthetic theory was a result of advancement in genetics which provided scientific approach to Darwinian theory of evolution and opened the door for more deep research in evolutionary biology.

b) Human evolution is bio-cultural. Substantiate. (15 marks)

As it is confirmed that Human have been evolved both biologically and culturally but interaction of both is also evident.

Bio-cultural evolution :→ Biology ↔ Culture } Two-sided interaction

Bio-cultural evolution of Human

① Brain expansion & Culture development :⇒

↳ Increased brain size 3X from ape to 1300 - 1450 cm^3.

② Hunting expedition
③ New tool use
④ Complex social interaction
⑤ Changing environment

} Pressure on brain ↓ Cognitive Growth ⇒ Increased Brain Size

Culture ⟹ Biology

More Cognitive Capacity
- ① Language development
- ② New tool development
- ③ Art development
- ④ Social relationship

Biology ⇒ Culture

→ Shows syncretic development of human in bio-cultural context.

① Pelvis Girdle & Social institution :→

Short & Broad Pelvis Girdle → Pre-mature Children → More Natal Care

Division of Labor / Political Institution ← Family Institution ← Support of Male member

→ shows the bio-cultural development of social landscape of human

(3) Erect posture & Bipedalism ⇒

↳ Free hand : Gesture & Symbols ⇒ Language development

↳ Art

↳ Increased resource access → More free time → Social Relationship ⇒

(4) Teeth evolution & dietary pattern

↳ from fruitivorus to cooked food

→ Jaw shaped changed from U shape to ∪-shape. ⇒ food choices

Anatomy & fossil shows the biological evolution of human however from evidence of tool use, arts and dietary pattern, it is quite clear that human evolution is bio-cultural in nature.

Feedback

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TOTAL MARKS	

c) How is human physique studied? Discuss in detail various somatotypes associated with this study. (15 marks)

Human physique refer to morphological appearance of human body.

(e.g. Slender body & thick body)

Aspect of physique
- (1) functionality :- Agile & flexible
- (2) Strength → power & strength
- (3) Asthetic → Balanced body

Methods of study :-

(1) Sheldon's Method :-

↳ Used photoscopic method with grids to rate on the basis of apperance (3 sided images)

Endo → More thick

Meso → Muscular

Ecto → More thin & slender (Tall)

(Grid image)

Somatotypes considered → ① Shape of body → (1–7 rating)
→ ② Height - weight

Limitation → Subjective in nature
→ Limited measurements of somatotype

② Heath & Carter Method :→
↳ Used anthroposcopic measurements

Physique types :→

(171)
Meso

① Endomorph :→ High fat & less flexibility
→ Thick body
Somatotype :→ Skinfold at bicep & tricep measurement

Endo (711)

Ecto (117)

② Ectomorph → Height & weight measurement
↳ Tall & thin :→ More flexible and agile person

③ Mesomorph → High strength & power
↳ Balanced, Muscular body

Measurement :→ Circumfernce (Arm, femur, stomach)

Importance of physique study →
① Sports selection of better candidate (→ Mesomorph for weight lifting)
② Health condition like obesity etc.
③ Military operations for better individual.

Thus, human physique study provide a statical measurement of somatotypes to give a fair picture however limited due to ignored focus of strength training & body composition impact on somatotypes.

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TOTAL MARKS	

Q.7) a) Elaborate on primate taxonomy. (20 marks)

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Feedback

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TOTAL MARKS	

b) What do you understand by the concept of "Ecological Anthropology"? Elaborate. (15 marks)

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Feedback

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TOTAL MARKS	

c) What are "genetic markers"? Discuss the prominent genetic markers in human beings. (15 marks)

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TOTAL MARKS	

Q.8) a) Discuss the concept of adaptation, adaptability & acclimatization with relevant examples.

(20 marks)

Adaptation, adaptability & acclimatization are related to human body responses to adverse condition in short term as well as long term.

(1) **Adaptation** refers to long-term adaptation to climate conditions like cold, hot and high altitude etc

Key feature →
- Long term
- Permanent
- Genetic
- Inherited to offsprings.

Example:→ (a) Slender body in Masai tribe of Africa while thick body of Inuit of Alaska. (Allen's Rule)

↳ Shows adaptation by Heat regulation to cold & hot climate

(ii) EPAS1 gene in Tibetan people to regulate Hb level as well as efficient breathing.
→ Adaptation to low oxygen level.

(iii) Adapted Basal Metabolism Rate in Hot & cold climate
→ Low in hot climate
→ High in cold climate.

(2) **Adaptability** refers to capability of an individual to adopt to different Climat condition like Temp. change, Altitude change etc.
→ Potential of adaptation &

Example :→ (i) Australian Aborigines have high adaptability to large temperature range than plains people.
→ Changing temperature in desert in day & night

(ii) Effective Breathing of high altitude people in sports ⇒ Better performance

(e.g. ~~Attitud~~ Norwegian skier effective breathing & low pulse rate)

Application → (1) Sports training & selection
→ (2) Military training

(3) Acclimatization refers to short term physiological changes to environment condition for better survival.

(e.g. Shivering in cold)

key feature → (1) Short-term (1 day - 2 weeks) to start
→ (2) No inheritance impact
→ (3) No genetic change
→ (4) Physiological change

Example :→ i) Response to sudden cold in winter more than normal :

→ Increased Metabolic Rate → keep body warm

→ Shivering to ~~reduce~~ keep warm

→ Vasoconstriction → Reduce heat loss

(ii) Response to Mountain visit :⇒

↳ Increased breathing rate & Pulse

↳ Efficient use of oxygen within cells.

Importance of Adaptive response

→ ① Better survival chances against weather

→ ② Resilience to sudden Changes in climate

→ ③ Effective functioning in adverse situation

Thus, adaptation, adaptability & acclimatization are adaptive response which shows the enduring & resilient mechanism inbuilt in our body.

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TOTAL MARKS	

b) Describe the immunological methods in human genetics with appropriate examples. (15 Marks)

Immunological methods are related to study of dynamic interface of immunological response & genetics in human body.

Key Components of study
- ① Immune cells (Antigen, Antibody etc.)
- ② Protein synthesis
- ③ Genes with immune instructions

Various method of Immunogenetics

① ELISA (enzyme linked Method) :→
↳ studies the role of DNA with proteins
→ Study response of immune system and related enzyme and DNA

② ~~Iste~~ (e.g → Study gene expression ~~ina~~ related to immune cells in infection)

② Western Blotting →

↳ Studies role of antibodies & antigens & their variation

→ Considers amount of antibodies to study genetic effect.

[eg→ Study trial of vaccines]

③ Immunoprecipitation (IP) :→

↳ Seperate specific antibody in the sample

→ Help to study quantity & quality.

⇒ Effective in virus study in human body]

④ Cytogenic Flowmetry :→

↳ focus on gene expression impact on immune cells and their variation

(eg→ detect compromised immune system)

Importance of Immuno-genetics Methods

→ ① Study of gene expression related to immune system (e.g., HLA system study)

→ ② Antibody response study

→ ③ Vaccine development

→ ④ Treatment/study of Auto-immune diseases.

Thus, immunogenetics method provides significant help in studying the complex phenomenon of epigenetic regulation of immune response and role of modern advancement in quite critical in these methods.

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c) Highlight the skeletal changes that have occurred in humans due to erect posture and its implications. (15 marks)

Human skeletal has significant changes from head to toe due to erect posture & to like skull, spine etc.

Various skeletal changes & their implication:⇒

① Shape of Spine :→ Became S- shaped

Implication

→ Better weight balance of erect posture

→ Support endurance to bipedalism

Thick at lower end ⇒ Weight Management

→ problem of back Pain

② Foramen Magnum attachment ⇒

↳ shifted to centre ⇒ Support erect posture

(Back side)

Ape

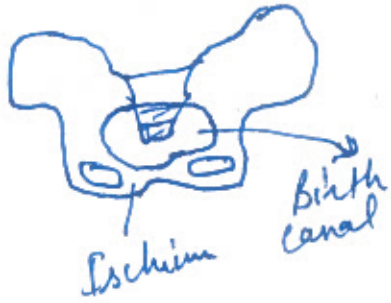
⇒

(Centre)

Human

⇒ Helpful for development of thorax for language

(3) Pelvis girdle :⇒ Shorter + Broader



→ Helpful in quick walking & running

→ Reduced birth canal increased pregnancy complications.

(4) Legs :⇒ Femur angle to support erect posture.

→ Angle provide better walking ability

→ create Joint pain problem significantly.

(5) Opposed thumb → Tool & Tech development
↳ More ability to do creative art & innovation

(6) Weight Managed feet → Effective balance of body weight at feet.

(7) ~~Shorter~~ Longer legs & shorter arms

↳ Increase flexiblity of limbs

↳ Increased rotation range of arms. due to shoulders skeleton change

→ Lost grasping power for climbing to trees.

Summary of implications

→ Increased biological & endurance strength

→ Weight concentrated on limbs

↳ Issues of joint pains.

↳ Birth complication

Thus, erect posture has been a trade off between body stress, birth canal and bipedalism however this has decisively impacted for development of Human where they are today.