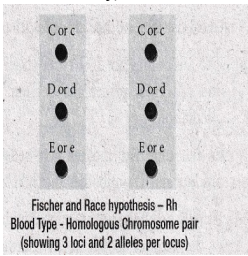
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Answers Key:

IV. Answer the following. Draw diagrams where ever necessary:

1. (i) **Fisher and Race hypothesis:**
Rh factor involves three different pairs of alleles located on three different closely linked loci on the chromosome pair. This system is more commonly in use today, and uses the 'Cde' nomenclature.



Fischer and Race hypothesis – Rh Blood Type - Homologous Chromosome pair (showing 3 loci and 2 alleles per locus)

2. In the above Figure, three pairs of Rh alleles (Cc, Dd and Ee) occur at 3 different loci on homologous chromosome pair- 1.
3. The possible genotypes will be one C or c, one D or d, one E or e from each chromosome
For e.g. CDE/cde; CdE/cDe; cde/cde; CDe/CdE etc.
4. All genotypes carrying a dominant 'D' allele will produce Rh positive phenotype and double recessive genotype 'dd' will give rise to Rh negative phenotype.
(ii) **Wiener Hypothesis**
1. Wiener proposed the existence of eight alleles (R^1, R^2, R^O, R^Z, r, r^1, r^{11}, r^y) at a single Rh locus.
2. All genotypes carrying a dominant 'R allele' (R^1, R^2, R^O, R^Z) will produce 'Rh- positive' phenotype and double recessive genotypes (rr, rr^1, rr^{11}, rr^y) will give rise to Rh^- negative phenotype.

2. (i) In eukaryotes, chromatin is formed by a series of repeating units called nucleosomes.
(ii) Korenberg proposed a model for the nucleosome, in which 2 molecules of the four histone proteins H_2A, H_2B, H3 AND H4 are organized to form a unit of eight molecules called histone octamere.
(iii) The negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called nucleosome. A typical nucleosome contains 200 bp of DNA helix.
(iv) The histone octameres are in close contact and DNA is coiled on the outside of nucleosome.
(v) Neighbouring nucleosomes are connected by linker DNA (Hl) that is exposed to enzymes. The DNA makes two complete turns around the histone octameres and the two turns are sealed off by an HI molecule
(vi) Chromatin lacking HI has beads on a string appearance in which DNA enters and leaves the nucleosomes at random places.
(vii) HI of one nucleosome can interact with HI of the neighbouring nucleosomes resulting in the further folding of the fibre.

3. The major sexually transmitted diseases are
(i) Gonorrhoea
1. Causative agent: Neisseria gonorrhoeae
2. Symptoms: Affects the urethra, rectum and throat and in females the cervix also get affected
3. Pain and pus discharge in the genital tract and burning sensation during urination.
4. Incubation period: 2 to 5 days
(ii) Syphilis
Causative agent : Treponema pallidum
Symptoms:
1. Primary stage: Formation of painless ulcer on the external genitalia.
2. Secondary stage : Skin lesions, rashes, swollen joints and fever and hair loss.
3. Tertiary stage : Appearance of chronic ulcers on nose. Lower legs and palate, loss of movement mental disorder visual impairment, heart problems, gummas (soft non-cancerous growths) etc.
(iii) Hepatitis B
1. Causative agent: Hepatitis B virus (HBV) with DNA.
2. Symptoms: Fatigue, jaundice, fever, rash and stomach pain.
3. Liver cirrhosis and liver failure occur in the later stage.
4. Incubation period: 30-80 days
(iv) AIDS:
1. Causative agent: Human immuno deficiency Virus (HIV) .
2. Symptoms: Enlarged lymph nodes, prolonged fever, prolonged diarrhoea, weight reduction, night sweating.
3. Incubation periods: 2 to 6 weeks even more than 10 years

4. Adaptive radiation is the process of evolution of different species in a given geographical area starting from a point and literally radiating to other geographical area habitats.
1. Darwins finches were the small black birds which Darwin observed in Galapagos islands.
2. There were many varities of these birds in the same island.

3. Darwin reasoned that after originating from a common ancestral seed eating stock the finches must have radiated to different geographical areas and undergone adaptive changes especially in their breaks enabling some of them to become insectivorous.
4. Living isolation for long new kinds of finches must have evolved which could survive in the new habitats.
5. Australian marsupials (Kangaroos) also show adaptive radiation
6. Marsupials in Australia and placental mammals in north America are two subclasses of mammals they adapted in similar way to a particular food resources, locomotary skill or climate.
7 They were separated from the ori-on ancestor more than 100 million year ago and each lineage continued to evolve independently despite temporal and geographical separation marsupials in Australia and placenta mammals in North America have reduced varieties of species living in similar habitats with similar way of life their overall resemblance in shape, locomotary mode, feeding and foraging are superimposed upon different modes of reproduction.

III. Answer any six from the following: Ques.No: 23 is compulsory.

5. 1. In Greek Parthenos means Virgin, Genesis means Produce.
2. Development of a haploid (n) egg into a complete individual without fertilization is known as parthenogenesis.
3. It was first discovered by Charles Bonnet in 1745.
4. Parthenogenesis occurs naturally in some invertebrates (e,g:) Nematodes, Water fleas, Scorpians, Parasitic (wasps).

6. 1. In this method of sex determination, the homogametic male possesses two 'X' chromosomes as in certain insects and certain vertebrates like fishes, reptiles and birds producing a single type of gamete.
2. The female sex consists of a single 'Y' chromosome. Thus the females are heterogametic and produce two types of eggs.
3. To avoid confusion with the XX-XO and XX-XY trues of sex determination, the alphabets 'Z' and 'W 'are used here instead of X and Y respectively.
4. Heterogametic females are of two types, ZO-ZZ type and ZW-ZZ type.

7. (i) It helps in gender identification.
(ii) It is used to detect the chromosomal aberrations like deletion, duplication, translocation, invasion and nondisjunction of chromosomes.
(iii) It helps to identify the abnormalities of chromosomes like aneuploidy.
(iv) It is also used in predicting the evolutionary relationships between species.
(v) Genetic diseases in human beings can be detected by this technique.

8. Colostrum is the yellowish fluid produced from the mother's mammary glands during initial few days of location, after parturition.
Significance:
1. It has less lactose than milk and almost no fat, but it contains more proteins, vitamin A and minerals.
2. Colostrum is also rich in IgA antibodies.
3. This helps to protect the infant's digestive tract against bacterial infection.
4. Breast milk is the ideal food for infants as it contains all the constituents in suitable concentration and is easily digestable.
5. It is fully sufficient till about 6 months of age and all infants must be breast fed by the mother to ensure the growth of a healthy baby.

9. Semen or seminal fluid is a milky white fluid which contains sperms and the seminal plasma, which is secreted from the seminal vesicles, prostate glands and bulbo urethal glands or Cowper's gland.
The semen comprises of Fructose, ascorbic acid, zinc, cholesterol, protein, calcium, chlorine, blood group antigens, citric acid, DNA, magnesium, Vitamin B12, phosphorous, sodium, potassium, uric acid,lactic acid, nitrogen, and other nutrients for the sperms.

10. (i) Identify all the genes (approximately 30000) in human DNA.
(ii) To store this information in databases.
(iii) Improve tools for data analysis.

11. Lamarcks 'theory of acquired character's was disproved by August Weismann who conducted experiments on mice for twenty generations by cutting their tails and Weismann proved that change in the somatoplasm will not be transferred to the next generation but changes in the germplasm will be inherited.

12. Salient features of Human Genome Project:
1. The human genome contains 3 billion nucleotide bases.
2. An average gene consists of 3000 bases, the largest known human gene being dystrophin with 2.4 million bases.
3. Genes are distributed over 24 chromosomes. Chromosome 19 has the highest gene density. Chromosome 13 and Y chromosome have lowest gene densities. The chromosomal organization of human genes shows diversity. there may be 35000-40000 genes in the genome and almost 99.9 nucleotide bases are exactly the same in all people. Functions for over 50percent of the discovered genes are unknown.
4. Less than 2 percent of the genome codes tor proteins.
5. Repeated sequences make up very large portion of the human genome. Repetitive sequences have no direct coding functions but they shed light on chromosome structure, dynamics and evolution (genetic diversity).
6. Chromosome 1 has 2968 genes whereas chromosome 'Y' has 231 genes.
7. Scientists have identified about 1.4 million locations where single base DNA differences (SNPs Single nucleotide polymorphism pronounce as snips) occur in humans. Identification of 'SNIPS' is helpful in finding chromosomal locations for disease associated sequences and tracing human history

II. Answer any six from the following:

13. Offsprings produced by asexual reproduction are called clones, because they are genetically as well as morphologically similar to the parent organism. They are not only similar to one another, but are also exact copies of their parent (e,g): Amoeba, Spirogyra, Hydra, Yeast, etc.

14. The inactivation of an X chromosome one of the two X chromosomes in every cell in some female mammal is randomly inactivated early in embryonic development and named after geneticist Mary Lyon.
The inactive X chromosome is silenced by it being packaged in such a way that it has a transcriptionally inactive structure called heterochromatin found in nucleoplasm of nucleus.

15. The genes present in the differential region of Y chromosome are called Y- linked or holandric genes. The Y linked genes have no corresponding allele on X chromosome. The Y linked genes inherit along with Y chromosome and they are phenotypically express only in the male sex.

16. Placenta during pregnancy secretes hormones such as human chorionic gonadotrophic (hcG) estrogen, progesterone and human placenta lactogen. So, placenta is regarded as an endocrine tissue.

17. In testes Sertoli cells secrete inhibin, a hormone which is involved in the negative feedback control of sperm production. (Spermatogenesis).

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18. tRNA on one hand binds to specific amino acids and on the other hand reads the codon of the amino acid bound to it through its anticodon, it is called as adapter molecule.
19. (a) ZIFT - Zygote Intra Fallopian Transfer
    (b) ICSI - Intra Cytoplasmic Sperm Injection
20. Methane, carbondioxide, ammonia and water vapour.

I. Answer the following:

21. (d) Recessive trait carried by X-chromosome
22. (c) Multiple alleles map at different loci of a chromosome
23. (a) Male heterogamety
24. (c) Sexual
25. (b) AB
26. (b) Leydig cell
27. (b) Ig A
28. (b) inhibiting release of FSH and LH
29. (b) August Weismann
30. (b) Interspecific competition

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