Chapter: 16

Q.1 Fill in the blank and rewrite the completed statements 5

1 Organisms produced by ..... show minor variations.

Ans Organisms produced by **asexual reproduction** show minor variations.

2 Organisms produced through ..... show major variations.

Ans Organisms produced through **sexual reproduction** show major variations.

3 Hereditary characters are transferred from parents to offsprings by ....., hence they are said to be structural and functional units of heredity.

Ans Hereditary characters are transferred from parents to offsprings by **gene,** hence they are said to be structural and functional units of heredity.

4 The component which is in the nuclei of cells and carries the hereditary characteristics is called ..... .

Ans The component which is in the nuclei of cells and carries the hereditary characteristics is called **chromosomes.**

5 Chromosomes are mainly made up of ..... .

Ans Chromosomes are mainly made up of **DNA.**

Q.2 Find co-related terms 3

1 Women : Turner syndrome : : Men : ?

Ans **Klinefelter syndrome**

2 3:1 Monohybrid: : 9:3:3:1 : ?

Ans **Dihybrid**

3 44+X:Turner syndrome: :44+XXY:-.....

Ans 44+X:Turner syndrome: :44+XXY:- **Klinefelter syndrome**

Q.3 Match the pair 1

1

Column A	Column B	Column C
1. Turner syndrome	a. 44 + X	i. Women are sterile
2. Klinefelter syndrome	b. 45 + XXY	ii. Men are sterile
	c. 44 + XX	iii. Men are fertile
	d. 44 + XXY	iv. Women are fertile

Ans

Column A	Column B	Column C
1. Turner syndrome	44 + X	Women are sterile
2. Klinefelter syndrome	44 + XXY	Men are sterile

Q.4 Write Short Notes 6

1 Monogenic disorders.

Ans i. Disorders or diseases occurring due to mutation in any single gene into a defective one are called monogenic disorders.
ii. Approximately 4000 different disorders of this type are now known. Due to abnormal genes, their products are either produced in insufficient quantity or not at all.
iii. It causes abnormal metabolism that may lead to death at a tender age.
iv. Examples of such disorders are Hutchinson's disease, Tay-Sachs disease, galactosaemia, phenylketonuria, sickle cell anaemia, cystic fibrosis, albinism, haemophilia, night blindness, etc.

2 Down syndrome

Ans i. Down syndrome is a disorder arising due to chromosomal abnormality. This is the first discovered and described chromosomal disorder in human beings.
ii. This disorder is characterised by the presence of 47 chromosomes. It is described as trisomy of the 21st chromosome.
iii. Infants with this disorder have one extra chromosome with the 21st pair in every cell of their body. Therefore they have 47 chromosomes instead of 46.
iv. Children suffering from Down's syndrome are usually mentally retarded and have a short lifespan. Mental retardation is the most prominent characteristic.

3 Write note on use of DNA finger printing.

Ans 1. DNA finger printing is technique in which the sequence of the genes in the DNA of a person i.e. the genome of the person is identified.
2. It is useful to identify the lineage and to identify criminals because it is unique to every person.
3. It is very useful in forensic science to solve many cases.

Q.5 **Attempt the following.** **4**

1 Match the column.

Column A	Column B	Column C
1. Leber hereditary optic neuropathy	a. Turner syndrome	i. Effect on blood-glucose level
2. Diabetes	b. Mitochondrial disorder	ii. Men are sterile
	c. Monogenic disorder	ii. white hairs
	d. Polygenic disorder	iv. This disorder arises during development of zygote.

Ans

1. Leber hereditary optic neuropathy	Mitochondrial disorder	This disorder arises during development of zygote.
2. Diabetes	Polygenic disorder	Effect on blood-glucose level

2 Match the columns.

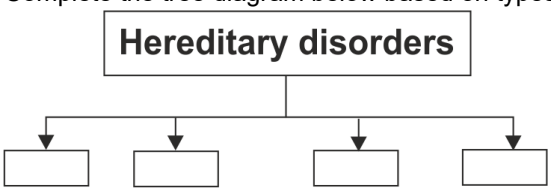
Column A	Column B	Column C
1. Albinism	a. Trisomy of 21st Chromosome	i. Pale skin, white hairs
2. Down syndrome	b. Monosomy of X chromosome	ii. Women are sterile
	c. Monogenic disorder	iii. 21st pair in every cell of their body.
	d. Polygenic disorder	iv. This disorder arises during development of zygote.

Ans

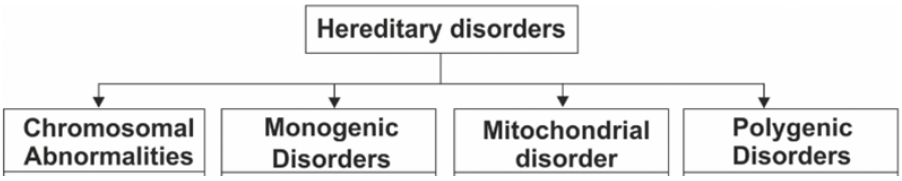
1. Albinism	Monogenic disorder	Pale skin, white hairs
2. Down syndrome	Trisomy of 21st Chromosome	21st pair in every cell of their body

Q.6 **Complete the given flow chart / table / diagram** **2**

1 Complete the tree diagram below based on types of hereditary disorders.



Ans



Q.7 **Give scientific reasons** **4**

1 We should not avoid living with a person suffering from a genetic disorder.

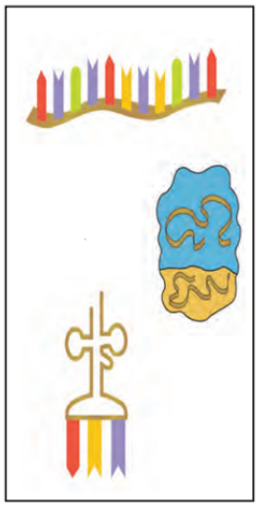
Ans 1. Genetic disorders gets carried further from parents to the next generation.
2. They are not contagious and do not spread through contact.
So, we should not avoid living with a person suffering from a genetic disorder.

2 It is necessary for people to have their blood examined before marriage.

Ans i. Genetic diseases spread in only one way i.e. reproduction.
ii. Examination of blood would show whether the person is normal or a carrier of sickle-cell anemia gene.
iii. If both are diagnosed with carrier the progeny have risk of having a child suffering with sickle cell anemia, which can be fatal.
iv. Hence, husband and wife should get their blood exmined either before marriage or after it.

Q.8 **Write answers based on given diagram** **3**

1 Identify the type of RNA and explain them:



Ans Ribosomal RNA (rRNA), Messenger RNA (mRNA) and Transfer RNA (tRNA) are are three types of RNA.

i. **Ribosomal RNA (rRNA):** The molecule of RNA which is a component of the ribosome organelle is called a ribosomal RNA. Ribosomes perform the function of protein synthesis.

ii. **Messenger RNA (mRNA):** The RNA molecule that carries the information of protein synthesis from genes i.e. DNA chain in the cell nucleus to ribosomes in the cytoplasm which produce the proteins, is called messenger RNA.

iii. **Transfer RNA (tRNA):** The RNA molecule which, according to the message of the mRNA carries the amino acid up to the ribosomes is called transfer RNA.

Q.9 **Answer the following** **6**

1 Write about the symptoms and treatment of Sickle cell anaemia.

Ans i. Sickle-cell anaemia is a hereditary disease. It occurs due to changes in genes during conception.
ii. Symptoms of this disease are: Swelling of hands and legs, pain in joints, severe general body aches, frequent colds and cough, constant low grade fever, exhaustion, pale face, low haemoglobin content.
iii. The remedies which can be done are only: A carrier or sufferer should avoid marriage with another carrier or sufferer.
iv. Also, a person suffering from sickle cell anaemia should take a tablet of folic acid daily.

2 Define chromosome and explain its types.

Ans i. The structure in the nucleus of cells that carries the hereditary characteristics is called the chromosome. It is made up mainly of nucleic acids and proteins.
ii. There are four types of chromosomes.
1. **Metacentric** : The centromere is exactly at the mid-point in this chromosome, and therefore the chromosome looks like the English letter 'V'. The arms of this chromosome are equal in length.
2. **Sub-metacentric** : The centromere is somewhere near the mid-point in this chromosome which therefore looks like English letter 'L'. One arm is slightly shorter than the other.
3. **Acrocentric** : The centromere is near one end of this chromosome which therefore looks like the English letter 'j'. One arm is much smaller than other.
4. **Telocentric** : The centromere is right at the end of this chromosome making the chromosome look like the English letter 'i'. This chromosome consists of only one arm.

Q.10 Extra data **5**

1 Explain the structure, function and types of RNA.

Ans Structure of RNA:
1. This nucleic acid is made up of ribose sugar, phosphate molecules and any four types of nitrogenous bases adenine, guanine, cytosine and uracil.
2. The nucleotide is smallest unit of the chain of the RNA molecule.
3. Large numbers of nucleotides are bonded together to form the macromolecule of RNA.
Function of RNA: It performs the function of protein synthesis.
Types of RNA:
1. Ribosomal RNA (rRNA) : The molecule of RNA which is a component of the ribosome organelle is called a ribosomal RNA. Ribosomes perform the function of protein synthesis.
2. Messenger RNA (mRNA) : It carries the information of protein synthesis from genes i.e. DNA chain in the cell nucleus to ribosomes in the cytoplasm.
3. Transfer RNA (tRNA) : It carries the amino acid up to the ribosomes.

Q.11 Answer the following in detail **5**

1 Explain Mendel's monohybrid progeny with the help of any one cross.

Ans i. Mendel's monohybrid cross involves cross between two pea plants with only one pair of contrasting characters.
ii. Single character i.e. height of pea plant can be considered for the cross. Here, the tallness of plant and dwarfiness of plant are the contrasting characteristics.
iii. The tall plant and dwarf plant are the parents of F_1 generation,hence, called P_1 or parental generation.
iv. All the plants produced in F_1 generation are tall, having genotype Tt. This indicates that gene 'T' responsible for tallness in pea plants is dominant over the gene 't' responsible for dwarfness in pea plants.
v. When F_1 hybrids are self fertilized they produced second filial generation (F_2).
vi. In F_2 generation, both tall and dwarf plants appeared in the ration of 3 : 1.
vii. Thus, the phenotypic ration of F_2 generation is 3(Tall) : 1 (Dwarf)
viii. The genotypic ration of F_2 generation is 1(TT):2 (Tt) : 1 (tt)