

CBSE Board  
Class XII Biology  
Board Paper  
Term 1 - 2021

Time: 90 minutes

Total Marks: 35

**General Instructions:**

**Read the following instructions very carefully and strictly follow them:**

- (i) This question paper contains **60** questions out of which **50** questions are to be attempted. **All** questions carry equal marks.
- (ii) The questions paper consists **three** Sections - Section **A, B** and **C**.
- (iii) **Section - A** contains **24** questions. Attempt any **20** questions from Ques. No. **1** to **24**.
- (iv) **Section - B** contains **24** questions. Attempt any **20** questions from Ques. No. **25** to **48**.
- (v) **Section - C** contains **12** questions. Attempt any **10** questions from Ques. No, **49** to **60**
- (vi) There is only one correct option for every Multiple Choice Questions (MCQs). Marks will not be awarded for answering more than one option.
- (vii) There is not any negative marking.

**SECTION-A**

Section – A consists of **24** questions. Attempt any **20** questions from this section.

The first attempted 20 questions would be evaluated.

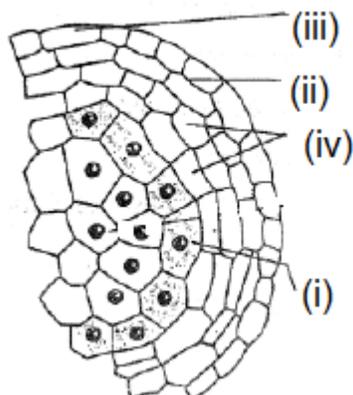
**Question 1.**

The hilum in a typical angiospermic ovule represents the junction between -

- (a) Integuments and the embryo sac
- (b) Embryo sac and the nucellus
- (c) Body of the ovule and the funicle
- (d) Nucellus and the funicle

**Question 2.**

In the given diagram of a transverse section of a young anther. Choose the labellings showing correct placement of the wall layers from the table given below:



	(i)	(ii)	(iii)	(iv)
(a)	Epidermis	Middle layers	Tapetum	Endothecium
(b)	Tapetum	Endothecium	Epidermis	Middle layers
(c)	Endothecium	Tapetum	Middle layers	Epidermis
(d)	Middle layers	Epidermis	Endothecium	Tapetum

**Question 3.**

The term used for the embryo entering into the state of inactivity as the seed mature is -

- (a) Quiescent
- (b) Parthenogenesis
- (c) Parthenocarpy
- (d) Dormancy

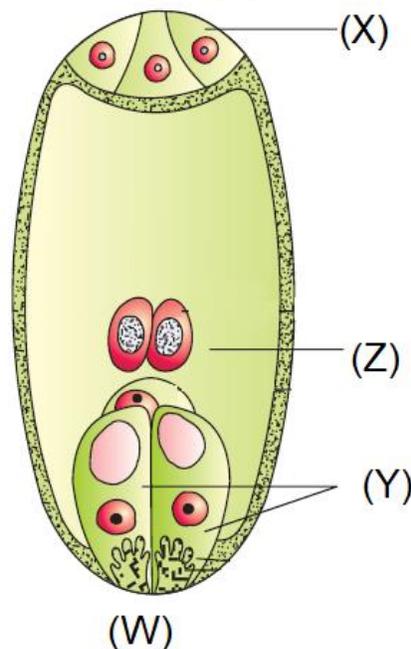
**Question 4.**

The ploidy of the apomictic embryo developed from the integument cells and megaspore mother cell without reduction division respectively will be -

- (a)  $2n$  and  $2n$
- (b)  $n$  and  $n$
- (c)  $2n$  and  $n$
- (d)  $3n$  and  $2n$

**Question 5.**

Given below is a diagrammatic representation of a mature embryo sac of a typical angiosperm plant. Choose the option showing the correct labelling for the parts W, X, Y and Z from the table given below.



	W	X	Y	Z
(a)	Micropylar end	Antipodals	Synergids	Central cell
(b)	Chalazal end	Antipodals	Central cell	Synergids
(c)	Micropylar end	Synergids	Central cell	Antipodals
(d)	Chalazal end	Synergids	Central cell	Antipodals

**Question 6.**

Breast – feeding the baby acts as a natural contraceptive for the mother because it prevents:

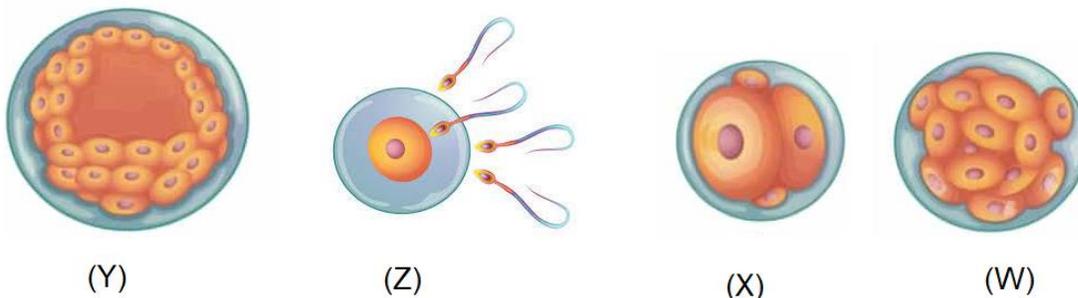
- (i) Ovulation
- (ii) Menstruation
- (iii) Insemination
- (iv) Fertilization

Choose the correct option:

- (a) (ii) and (iv)
- (b) (i) and (iii)
- (c) (i) and (iv)
- (d) (i) and (ii)

**Question 7.**

The given figure shows the different stages of human embryo.



Identify the correct labellings for W, X, Y and Z and choose the correct option from the table below:

	W	X	Y	Z
(a)	Cleavage	Blastocyst	Morula	Fertilization
(b)	Blastocyst	Morula	Cleavage	Fertilization
(c)	Morula	Cleavage	Blastocyst	Fertilization
(d)	Morula	Blastocyst	Cleavage	Fertilization

**Question 8.**

During human embryonic development the external genital organs are well developed in the fetus by the end of -

- (a) 6 weeks of pregnancy
- (b) 12 weeks of pregnancy
- (c) 18 weeks of pregnancy
- (d) 24 weeks of pregnancy

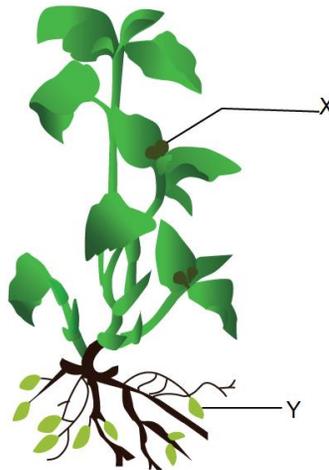
**Question 9.**

The accessory ducts in the human male reproductive system consists of -

- (a) Epididymis, Prostrate, Rete testis
- (b) Rete testis, Vas efferentia, Seminal vesicles
- (c) Vas efferentia, Bulbourethral, Epididymis
- (d) Rete testis, epididymis, Vas deferens

**Question 10.**

Given below is a figure of an angiosperm plant showing two different types flowers 'X' and 'Y' and the possible type of pollination in them:



Select the correct option for the flower (X) and flower (Y) and the possible type of pollination from the given table:

Flower X	Flower Y
(a) Chasmogamous, assured seed set	Cleistogamous, cross pollination
(b) Cleistogamous self/cross pollination	Chasmogamous, assured seed set
(c) Chasmogamous, self/cross pollination	Cleistogamous, self pollination
(d) Cleistogamous self pollination only	Chasmogamous, cross pollination only

**Question 11.**

An undifferentiated sheath covering the root cap of a monocotyledonous embryo is

- (a) Scutellum
- (b) Coleorhiza
- (c) Coleoptile
- (d) Epiblast

**Question 12.**

The Cause of Down's syndrome in humans is:

- (a) Extra copy of an autosome
- (b) Extra copy of a sex chromosome
- (c) Absence of an autosome
- (d) Absence of a sex chromosome

**Question 13.**

What of the following features show the mechanism of sex determination in honey – bee?

- (i) An offspring formed from the union of a sperm and egg develops as a male.
  - (ii) Males have half the number of chromosomes than that of female.
  - (iii) The females are diploid having 32 chromosomes.
  - (iv) Males have father and can produce sons.
- (a) (i) and (ii)
  - (b) (ii) and (iii)
  - (c) (i) and (iv)
  - (d) (ii) and (iv)

**Question 14.**

Select the pair that is incorrect:

- (a) Sickle-cell anemia : Autosome linked recessive trait
- (b) Haemophilia : Autosome linked recessive trait
- (c) Colour blindness : Sex linked recessive trait
- (d) Thalassemia : Autosome linked recessive trait

**Question 15.**

An example of a human trait where a single gene can exhibit multiple phenotypic expression is -

- (a) Phenyl ketonuria
- (b) Cystic fibrosis
- (c) Thalassemia
- (d) Haemophilia

**Question 16.**

Life cycle of *Drosophila melanogaster* is completed in -

- (a) 7 days
- (b) 14 days
- (c) 21 days
- (d) 28 days

**Question 17.**

How many types of gametes would develop by an organism with genotypes AaBBcDD?

- (a) 1
- (b) 2
- (c) 3
- (d) 4

**Question 18.**

Given below are the observations drawn in HGP. Select the option that shows the correct observations.

- (i) The human genome contains 3164.7 billion base pairs.
  - (ii) The average gene consists of 3000 bases.
  - (iii) Less than 2% of the genome codes for proteins.
  - (iv) Chromosome one has most genes (2698).
- (a) (i) and (ii)
  - (b) (ii) and (iii)
  - (c) (iii) and (iv)
  - (d) (i) and (iii)

**Question 19.**

The phosphoester linkage in the formation of a nucleotide involves the bonding between

- (a) Phosphate group and OH of 3'C of a nucleoside
- (b) Phosphate group and OH of 5'C of a nucleoside
- (c) Phosphate group and H of 3'C of a nucleoside
- (d) Phosphate group and H of 5'C of a nucleoside

**Question 20.**

The switching 'on' and 'off' of the lac operon in prokaryotes is regulated by

- (a) Glucose
- (b) Galactose
- (c) Lactose
- (d) Fructose

**Question 21.**

For 'in-vitro' DNA replication, which one of the following substrates need to be added along with the necessary enzymes, the DNA template and specific conditions?

- (a) Ribonucleotide triphosphate
- (b) Deoxyribonucleoside triphosphate
- (c) Deoxyribonucleotide triphosphate
- (d) Ribonucleoside triphosphate

**Question 22.**

Which one of the following factor will associate transiently with RNA polymerase to terminate transcription in prokaryotes?

- (a) sigma factor
- (b) RHO factor
- (c) Delta Factor
- (d) Theta factor

**Question 23.**

Choose the correct pair of codon with its corresponding amino acid from the following list:

- (a) UAG: Glycine
- (b) AUG: Arginine
- (c) UUU: Phenylalanine
- (d) UGA : Methionine

**Question 24.**

During elongation process of translation, the peptide bond formation between amino acids is catalysed by -

- (a) ribosomal RNA
- (b) Protein in small subunit of ribosome
- (c) Protein in large subunit of ribosome
- (d) transfer RNA

**SECTION - B**

Section - **B** consists of **24** questions (Sl. No.**25** to **48**). Attempt any 20 questions from this section.

The first attempted 20 questions would be evaluated.

Question No. **25** to **28** consist of two statements –

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- A. Both A and R are true and R is the correct explanation of A
- B. Both A and R are true and R is not the correct explanation of A
- C. A is true but R is false
- D. A is False but R is true

**Question 25.**

**Assertion (A):** Through Reproductive and Child Health (RCH) programmes in India, we could bring down the population growth rate.

**Reason (R):** A rapid increase in MMR and IMR were the reasons, along other reasons for this.

**Question 26.**

**Assertion (A):** Sterilisation methods are generally advised for male/ female partner as a terminal method to prevent any more pregnancies.

**Reason (R):** These techniques are less effective and have high reversibility.

**Question 27.**

**Assertion (A):** The inner cell mass of blastocyst gets attached to the endometrium during embryonic development in humans.

**Reason (R):** The blastomeres in the blastocyst gets arranged into trophoblast and inner cell mass.

**Question 28.**

**Assertion (A):** There is expression of only one gene of the parental character in a Mendelian Monohybrid cross in  $F_1$  generation.

**Reason (R):** In a dissimilar pair of factor one member of the pair dominates the other.

**Question 29.**

Select the correct option for Human Chorionic Gonadotropin (HCG) released during embryonic development in humans.

- 1.Helps in maintains of pregnancy.
- 2.Leads to rupture of Graafian follicle.
- 3.Cause strong uterine contraction during childbirth.
- 4.Brings metabolic changes in the mother.

- (a) (i) and (ii)
- (b) (i) and (iv)
- (c) (ii) and (iii)
- (d) (ii) and (iv)

**Question 30.**

Residual persistent nucellus in black pepper is known as

- (a) Perisperm
- (b) Pericarp
- (c) Pulvinus
- (d) Perianth

**Question 31.**

Amongst the insects the dominant biotic pollinating agents are –

- (a) Ants
- (b) Wasps
- (c) Beetles
- (d) Bees

**Question 32.**

The source of gonadotropin LH and its corresponding function is

- (a) Anterior pituitary, ovulation
- (b) Anterior pituitary Graafian follicle formation
- (c) Hypothalamus Ovulation
- (d) Hypothalamus, Graafian follicle formation

**Question 33.**

A specialized procedure to form an embryo in the laboratory in which sperm is directly, injected into the ovum is

- (a) IUT
- (b) IUI
- (c) ICSI
- (d) ZIFT

**Question 34.**

Listed below are all reproductive tract infections except

- (a) Genital herpes
- (b) Filariasis
- (a) Trichomoniasis
- (b) Syphilis

**Question 35.**

A genetic mechanism which prevents inbreeding depression in majority of angiospermic plants is

- (a) Parthenogenesis
- (b) Parthenocarpy
- (c) Mutation
- (d) Self-incompatibility

**Question 36.**

In *Pisum sativum* the flower colour may be Violet (V) or White (v). What proportion of the offspring in a cross of  $VV \times vv$  would be expected to be violet?

- (a) 25%
- (b) 50%
- (c) 75%
- (d) 100%

**Question 37.**

Which one of the gene pair is expected to give a ratio of 1:1:1:1 in the progeny of a Mendelian Dihybrid cross?

- (a)  $AaBb \times AaBb$
- (b)  $AABB \times AaBb$
- (c)  $AaBb \times aabb$
- (d)  $AABB \times aabb$

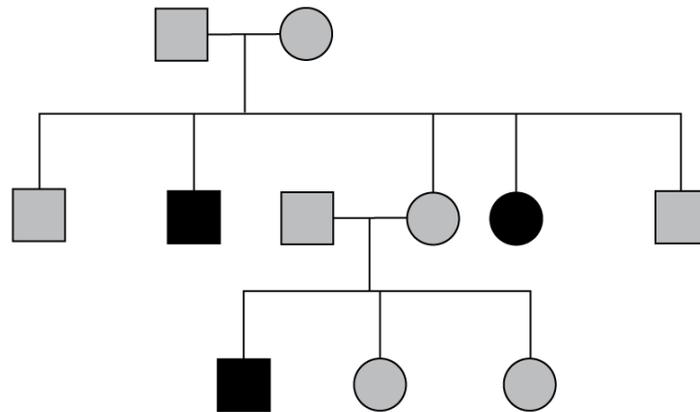
**Question 38.**

The progeny of a cross between two snap dragon plants, heterozygous for flower colour, bearing different coloured flower would be:

- (a) 50% pink, 50% white
- (b) 25% red, 50% pink, 25% white
- (c) 50% red, 50% white
- (d) 75% red, 25% white

**Question 39.**

Study the given pedigree of a family and select the trait that shows this pattern of inheritance:



- (a) Autosomal recessive, Phenylketonuria
- (b) Sex –linked recessive, colour- blindness
- (c) Autosomal dominant, Myotonic dystrophy
- (d) Sex – linked dominant, Vitamin – D resistant Rickets

**Question 40.**

A child with blood Group A has father with blood group B and mother with blood group AB. What would be the possible genotypes of parents and the child? Choose the correct option:

**Father    Mother    Child**

- (a)  $I^A i$        $I^B i$        $I^A i$
- (b)  $I^A I^B$      $I^A i$        $I^A I^A$
- (c)  $I^B i$        $I^A I^B$      $I^A i$
- (d)  $I^B I^B$      $I^A I^B$      $I^A I^A$

**Question 41.**

In a dihybrid Mendelian cross, garden pea plants heterozygous for violet flowers and round seeds are crossed with homozygous, white and wrinkled seeds. The genotypic and phenotypic ratio of  $F_1$  progeny would be.

- (a) 9 : 3 : 3 : 1
- (b) 1 : 2 : 2 : 1
- (c) 1 : 1 : 1 : 1
- (d) 3 : 1

**Question 42.**

A region of coding strand of DNA has the following nucleotide sequence:

5' - TGCGCCA -3'

The sequence of bases on mRNA transcribed by this DNA strand would be:

- (a) 3' — ACGCOGT — 5'
- (b) 5' — ACGCGGT — 3'
- (c) 5' — UGCGCCA — 3'
- (d) 3' — UGCGCCA —5'

**Question 43.**

A DNA molecule is 160 base pairs long. It has 20% adenine. How many cytosine bases are present in this DNA molecule?

- (a) 192
- (b) 96
- (c) 64
- (d) 42

**Question 44.**

A template strand in a bacterial DNA has the following base sequence:

5' — TTTAACGAGG - 3'

What would be the RNA sequence transcribed from this template DNA?

- (a) 5'— AAATTGCTCC — 3'
- (b) 3'— AAATTGCTCC — 5'
- (c) 3'— AAAUCCUCC — 3'
- (d) 5'— CCUCGUUAAA — 3'

**Question 45.**

Colour-blindness is a sex linked recessive trait in humans. A man with normal colour vision marries a women who is colourblind. What would be the possible genotypes of the parents, the son and the daughter of this couple?

	<b>Mother</b>	<b>Father</b>	<b>Daughter</b>	<b>Son</b>
(a)	XX	X <sup>e</sup> Y	X <sup>c</sup> X	XY
(b)	X <sup>c</sup> X <sup>c</sup>	X <sup>e</sup> Y	X <sup>c</sup> X <sup>c</sup>	X <sup>c</sup> Y
(c)	X <sup>c</sup> X	XY	X <sup>c</sup> X	XY
(d)	X <sup>c</sup> X <sup>c</sup>	XY	X <sup>c</sup> X	X <sup>c</sup> Y

**Question 46.**

tRNA has an \_\_\_\_\_ that has bases complementary to the codon, its actual structure is a compact molecule which looks like \_\_\_\_\_. Select the option that has correct choices for the two blanks.

- (a) amino acid acceptor end, clover-leaf
- (b) anticodon loop, clover-leaf
- (c) amino acid acceptor end, inverted L
- (d) anticodon loop, inverted L

**Question 47.**

Which type of RNA is correctly paired with its function?

- (a) small nuclear RNA: Possesses rRNA
- (b) transfer RNA : attaches to amino acid
- (c) ribosomal RNA : involved in transcription
- (d) micro RNA : involved in translation

**Question 48.**

Given below are the pairs of contrasting traits in *Pisum sativum* as studied by Mendel. Select the incorrectly mentioned option from the table given below:

Character	Dominant	Recessive
(a) Flower position	Terminal	Axial
(b) Seeds shape	Round	Wrinkled
(c) Pod colour	Green	Yellow
(d) Pod shape	Constricted	Inflated

**SECTION -C**

Section -C consists of one page followed by 6 questions linked to this case (Q. No. 49 to 54). Besides this, 6 more questions are given. Attempt any 10 questions in this section.

The first attempted 10 questions would be evaluated.

**Case:**

A woman of 35 years age with a married life of eight years and having normal reproductive cycles visits a doctor along with her husband for consultation for infertility. They were not using any contraceptive methods. They have no child. The doctor advises them after a detailed physical examination of both of them to undergo following investigations:

- Seminal analysis of the husband
- Follicular study of the wife
- Blood test for Follicle Stimulating Hormone (FSH) estimation for both.

With your basic knowledge of human embryology and the case given above, answer the following questions (49-54):

**Question 49.**

Seminal analysis of the husband was done for determining

- (i) Sperm morphology and sperm count
  - (ii) Quantity and pH of semen
  - (iii) Rate of sperm release into the Vagina
- (a) (i) only
  - (b) (i) and(ii)
  - (c) (ii) and (iii)
  - (d) (ii) only

**Question 50.**

An ultrasound - guided follicular study was done for the wife for determining the size and physical appearance of the

- (a) Ovary
- (b) Oogonia
- (c) Antral follicles
- (d) Corpus Luteum

**Question 51.**

The blood test report of the wife showed low FSH value, which is indicative of -

- (a) low rate of formation of ovarian follicles
- (b) high rate of formation of ovarian follicles
- (c) low rate of maturation of ovarian follicles
- (d) high rate of maturation of ovarian follicles

**Question 52.**

In the above case if the husband is found to have sperm count of less than 20 million/mL and the wife is diagnosed with blockage in the oviduct, the couple would be advised for:

- (i) ZIFT
  - (ii) AI
  - (iii) IVF
  - (iv) ICST
- (a) (i) and (iii)
  - (b) (ii) and (iii)
  - (c) (iii) and (iv)
  - (d) (i) and (iv)

**Question 53.**

The high level of which gonadotropin/ovarian hormone in the blood sample of the wife taken on day 20 of her reproductive (menstrual) cycle would indicate the luteal phase of the ovarian cycle ?

- (a) FSH
- (b) LH
- (c) Estrogens
- (d) Progesterone

**Question 54.**

In which phase of the menstrual cycle is the blood sample of a women taken if, on analysts. It shows high levels of L.H. and estrogen?

- (a) Ovulatory phase
- (b) Menstrual phase
- (c) Secretory phase
- (d) Follicular phase

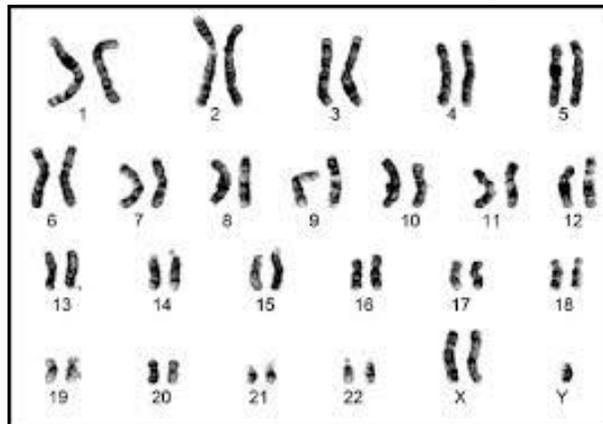
**Question 55.**

How many types of gametes can be produced in a diploid organism which is heterozygous for 4 loci?

- (a) 1
- (b) 8
- (c) 16
- (d) 32

**Question 56.**

Given below a Karyotype obtained after analysis of fetal cells for probable genetic disorder.



Based on the above karyotype, the chromosomal disorder detected in unborn foetus and the consequent symptoms the child may suffer from are-

- (a) Down's syndrome : Gynaecomastia, overall masculine development
- (b) Down's syndrome : Furrowed tongue, short stature
- (c) Klinefelter's syndrome : Gynaecomastia, Masculine development
- (d) Klinefelter's syndrome : Rudimentary ovaries, short stature

**Question 57.**

The recombinant frequency between the four linked genes is as follows:

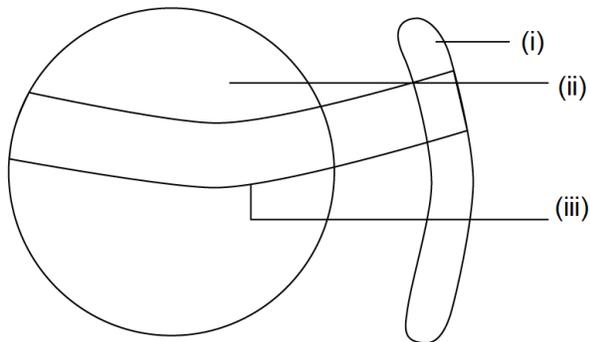
- (i) between X and Y is 40%.
- (ii) between Y and Z is 30%
- (iii) between Z and W is 10%
- (iv) between W and X is 20%

Select the option that shows the correct order of the position of W, X, Y and Z genes on the chromosome:

- (a) Y - X - Z - W
- (b) Y - W - Z - X
- (c) X - Y - Z - W
- (d) Z - X - Y - W

**Question 58.**

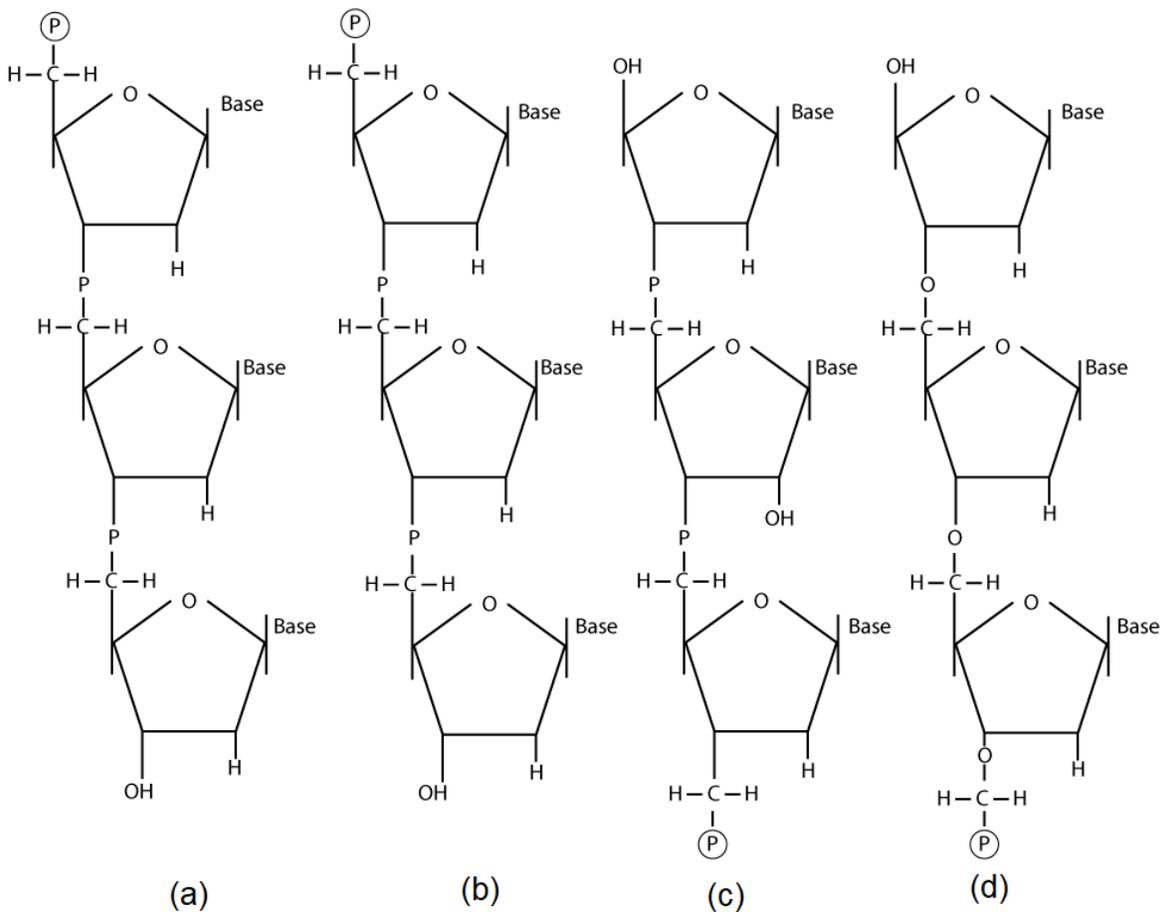
The figure given below has labellings (i), (ii) and (iii), which two labellings in the given figure are components of a nucleosome? Select the correct option.



- (a) (i) - HI histone, (ii) - DNA
- (b) (i) - DNA, (ii) - Historic Octamer
- (c) (ii) - DNA, (iii) - HI Histone
- (d) (ii) - Histone octamer, (iii) - DNA

**Question 59.**

Which one of the following diagram is a correct depiction of a polynucleotide chain to DNA?



**Question 60.**

In molecular biology who proposed that genetic information flows in one direction?

- (a) Hargobind Khorana
- (b) Francis Crick
- (c) Watson and Crick
- (d) Marshall Nirenberg

# Solution

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## SECTION-A

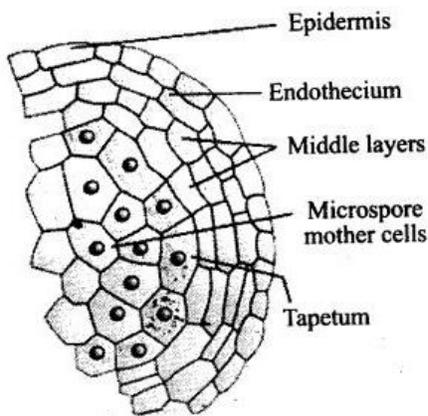
### Ans 1.

Correct option – c: Body of the ovule and the funicle

The point of attachment of funicle to the body of the ovule is known as hilum.

### Ans 2.

Correct option – b: (i) – Tapetum, (ii) – Endothecium, (iii) – Epidermis, (iv) – Middle layers



### Ans 3.

Correct option – d: Dormancy

In dormancy, the seed is in a state of apparent inactivity and will not grow even if favorable conditions are provided, until a definite time has elapsed.

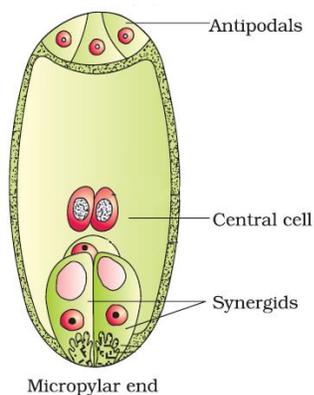
### Ans 4.

Correct option – a:  $2n$  and  $2n$

The apomictic embryo and megaspore mother cell will be diploid with ploidy  $2n$  and  $2n$  respectively.

### Ans 5.

Correct option – a: W – Micropylar end, X - Antipodals, Y – Synergids, Z – Central cell



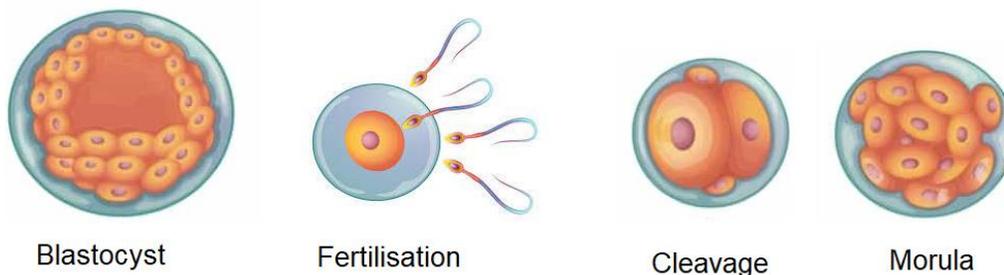
**Ans 6.**

Correct option – d: (i) and (ii)

Breastfeeding the baby acts as a natural contraceptive for the mothers because during lactation there is the decrease in the production of FSH and LH by the pituitary gland which is not enough to trigger the process of ovulation. Hence, ovulation and menstruation do not occur which in turn acts as a natural contraceptive for a mother.

**Ans 7.**

Correct option – c: W – Morula, X - Cleavage, Y – Blastocyst, Z – Fertilisation



**Ans 8.**

Correct option – b: 12 weeks of pregnancy

During human embryonic development the external genital organs are well developed in the fetus by the end of 12 weeks of pregnancy.

**Ans 9.**

Correct option – d: Rete testis, epididymis, vas deferens

Vasa efferentia, epididymis, vas deferens, and rete testis are the male accessory ducts and they play an important role in the transport and temporary storage of sperms.

**Ans 10.**

Correct option – c: Flower X – Chasmogamous, self/cross pollination, Flower Y – Cleistogamous, self pollination

Chasmogamous flowers are usually cross-pollinated. Cleistogamous flowers can only carry out self-pollination.

**Ans 11.**

Correct option – b: Coleorrhiza

Coleorrhiza is an undifferentiated sheath that encloses the radicle and the root cap in a monocot seed.

**Ans 12.**

Correct option – a: Extra copy of an autosome

In Down's syndrome caused by trisomy 21, the person has three copies of chromosome 21, instead of the usual two copies, in all cells.

**Ans 13.**

Correct option – b: (ii) and (iii)

Honeybees show haplodiploid method of sex determination. Haplodiploidy is a sex determination mechanism in which males develop from unfertilised eggs and are haploid. The females develop from fertilised eggs and are diploid having 32 chromosomes.

**Ans 14.**

Correct option – b: Haemophilia: Autosome linked recessive trait

Haemophilia A and haemophilia B are inherited in an X-linked recessive pattern.

**Ans 15.**

Correct option – a: Phenyl ketonuria

An example of a human trait where a single gene can exhibit multiple phenotypic expression is pleiotropy. A common example of pleiotropy is the human disease phenylketonuria (PKU).

**Ans 16.**

Correct option – b: 14 days

Life cycle of *Drosophila melanogaster* is completed in 14 days.

**Ans 17.**

Correct option- d: 4

4 types of gametes would develop by an organism with genotypes AaBBCcDD – ABCD, ABcD, aBCD, aBcD.

**Ans 18.**

Correct option- b: (ii) and (iii)

According to HGP, the average gene consists of 3000 bases. Less than 2% of the genome codes for proteins.

**Ans 19.**

Correct option – b: Phosphate group and OH of 5'C of a nucleoside

The phosphoester linkage in the formation of a nucleotide involves the bonding between the phosphate group and OH of 5'C of a nucleoside.

**Ans 20.**

Correct option- c: Lactose

Lactose is the substrate for the enzyme beta galactosidase and it regulates switching on and off of the operon. It is termed as inducer.

**Ans 21.**

Correct option – c: Deoxyribonucleotide triphosphate

Deoxyribonucleoside triphosphate serves as a substrate in polymerisation and also provides energy to the reaction i.e. energy source.

**Ans 22.**

Correct option b: RHO factor

As a molecule, Rho is a RNA/DNA helicase or translocase that dissociates RNA polymerase from DNA template to release RNA, deriving energy by hydrolyzing ATP through its RNA-dependent ATPase activity to bring about termination.

**Ans 23.**

Correct option c: UUU: Phenylalanine

UAG codes for amber or stop codon, AUG codes for methionine and UGA codes for opal or stop codon.

**Ans 24.**

Correct option a: ribosomal RNA

During elongation process of translation, the peptide bond formation between amino acids is catalysed by ribosomal RNA.

## SECTION - B

### Ans 25.

Correct option – c; (A) is true but (R) is false.

- i) If IMR has been increased then it will result in a decline in growth rate.
- ii) While decreased MMR will cause a rapid increase in growth rate.

### Ans 26.

Correct option – c; (A) is true but (R) is false.

Surgical methods of contraception are called sterilization methods or terminal methods as these procedures makes an individual incapable of further production and are highly effective.

### Ans 27.

Correct option – d; (A) is false but (R) is true.

During implantation, the trophoblast layer gets attached to the endometrium. The inner cell mass of the blastocyst gets differentiated as embryo.

### Ans 28.

Correct option – a; Both (A) and (R) are true and (R) is the correct explanation of (A).

In a dissimilar pair of factors, the dominant member of the pair gets expressed and the recessive member gets suppressed. Hence, there is expression of only one gene of the parental character in a Mendelian monohybrid cross in F<sub>1</sub> generation.

### Ans 29.

Correct option – b: (i) and (iv)

Human Chorionic Gonadotropin (HCG) released during embryonic development in humans helps to maintain pregnancy and brings about metabolic changes in the mother.

### Ans 30.

Correct option – a: Perisperm

In black pepper and beet, nucellus is not completely used up during the development of an embryo and residual persistent nucellus is called perisperm.

### Ans 31.

Correct option – d: Bees

Among the animals, insects particularly bees are the dominant pollinating agents.

### Ans 32.

Correct option – a: Anterior pituitary, ovulation

Gonadotropin LH is secreted by the anterior pituitary. LH in synergy with follicle stimulating hormone (FSH) stimulates follicular growth and ovulation.

**Ans 33.**

Correct option – c: ICSI

Intracytoplasmic sperm injection (ICSI) is an in vitro fertilization (IVF) procedure in which a single sperm cell is injected directly into the cytoplasm of an egg.

**Ans 34.**

Correct option – b: Filariasis

Filariasis is an infectious tropical disease caused by any one of several thread-like parasitic round worms.

**Ans 35.**

Correct option – d: Self-compatibility

One of the most important mechanisms used by higher plants to prevent inbreeding and to promote outcrossing utilizes a sophisticated genetic mechanism of control, called self-incompatibility (SI).

**Ans 36.**

Correct option – d: 100%

When violet flowers (VV) are crossed with white flowers (vv), the progeny obtained are with the genotype (Vv) and phenotype as violet flowers. So, 100% of the progeny are with violet flowers (Vv).

**Ans 37.**

Correct option – c: AaBb × aabb

1:1:1:1 is the phenotypic ratio which is classic Mendelian ratio for a test cross in which the alleles of the two genes assort independently into gametes. It is a test done to investigate the genotype of parents.

**Ans 38.**

Correct option – b: 25% red, 50% pink, 25% white

In snapdragon a cross between true breeding red flowered plant (RR) and true breeding white flowered plant (rr) will result in the progeny being heterozygous (Rr) and having pink flowers. Neither of the traits are dominant over the other and one allele does not mask the effect of the other. As a result, the phenotypic result is a blend in expression of the two phenotypes resulting in pink flowered plants (a third different phenotype). It is therefore a form of intermediate inheritance.

**Ans 39.**

Correct option a: Autosomal recessive, Phenylketonuria

Phenylketonuria is inherited in families in an autosomal recessive pattern. Autosomal recessive inheritance means that a person has two copies of the gene that is altered. Usually, each parent of an individual who has phenylketonuria carries one copy of the altered gene.

**Ans 40.**

Correct option – c: Father –  $I^B i$ , Mother –  $I^A I^B$ , Child -  $I^A i$

The ABO gene has three types of alleles: A, B, and O. The first two, A and B, are codominant, in other words, they dominate equally. However, allele O is recessive. Mother has blood group AB, so her genotype is  $I^A I^B$ . Father has blood group B, so his genotype would be  $I^B i$  and child has blood group A, so his genotype would be  $I^A i$ .

**Ans 41.**

Correct option – c: 1 : 1 : 1 : 1

Garden pea plants heterozygous for violet flowers and round seeds ( $VvRr$ ) are crossed with homozygous, white and wrinkled seeds ( $vvrr$ ). So, the genotypic and phenotypic ratio of F1 progeny would be 1 : 1 : 1 : 1.

**Ans 42.**

Correct option – c: 5' - UGCGCCA - 3'

The sequence of bases on mRNA transcribed by the DNA strand 5' - TCGGCCA -3' would be 5' - UGCGCCA - 3'.

**Ans 43.**

Correct option- d: 42

The amount of adenine is always equal to that of thymine, and the amount of guanine is always equal to that of cytosine. 50% is the purine content and 50% is the pyrimidine content.

**Ans 44.**

Correct option- c: 3' - AAAUUGCUC - 5'

RNA sequence transcribed from the template DNA 5' — TTTAACGAGG - 3' will have the sequence 3' - AAAUUGCUC - 5'.

**Ans 45.**

Correct option – d: Mother –  $X^C X^C$ , Father – XY, Daughter –  $X^C X$ , Son –  $X^C Y$

Man with normal colour vision (XY) and woman is colourblind ( $X^C X^C$ ). So, the daughter would be a carrier ( $X^C X$ ) and the son would be colourblind ( $X^C Y$ ).

**Ans 46.**

Correct option- d: anticodon loop, inverted L

tRNA has an anticodon loop that has bases complementary to the codon, its actual structure is a compact molecule which looks like inverted L.

**Ans 47.**

Correct option- b: transfer RNA: attaches to amino acid

Small nuclear RNA: Processing of pre-messenger RNA (hnRNA) in the nucleus.

Ribosomal RNA: Ensures the proper alignment of the mRNA and the ribosomes during protein synthesis and catalyzes the formation of the peptide bonds.

Micro RNA: Play important roles in post-transcriptional gene regulation.

**Ans 48.**

Correct option- d: Character – Pod shape, Dominant – Constricted, Recessive – Inflated  
With respect to pod shape, inflated pods are dominant over constricted pods which are recessive.

**SECTION – C**

**Ans 49.**

Correct option – b: (i) and (ii)

Seminal analysis is done to determine sperm morphology and sperm count and also the quantity and pH of semen.

**Ans 50.**

Correct option – a: Ovary

An ultrasound - guided follicular study helps in determining the size and physical appearance of the ovary.

**Ans 51.**

Correct option – a: low rate of formation of ovarian follicles

Low FSH value indicates low rate of formation of ovarian follicles.

**Ans 52.**

Correct option – a: (i) and (iii)

ZIFT stands for zygote intra-fallopian transfer. This is a modification of the standard IVF procedure. ZIFT is identical to IVF throughout ovarian stimulation, egg retrieval, and fertilization. The only difference is when the embryos are replaced, and also where they are placed during the transfer procedure.

**Ans 53.**

Correct option – d: Progesterone

During the luteal phase of the ovarian cycle, the hormone progesterone reaches its peak levels.

**Ans 54.**

Correct option – a: Ovulatory phase

High levels of L.H. and estrogen are seen in the ovulatory phase of the menstrual cycle.

**Ans 55.**

Correct option – c: 16

Types of gametes produced by organism =  $2^n$  wherein  $n$  = number of loci for which the organism is heterozygous.

The given diploid organism is heterozygous for 4 loci, types of gametes produced =  $2^4 = 16$ .

**Ans 56.**

Correct option – c: Klinefelter's syndrome : Gynaecomastia, Masculine development

Males who have Klinefelter's syndrome may have a small, firm testes, a small penis, sparse pubic, armpit and facial hair, enlarged breasts (called gynecomastia), tall stature, and abnormal body proportions (long legs, short trunk).

**Ans 57.**

Correct option – b: Y – W – Z - X

The recombination frequencies for many gene pairs helps us create linkage maps that show the order and relative distances of the genes on the chromosome. The strength of linkage between two genes depends upon the distance between the genes on the chromosome.

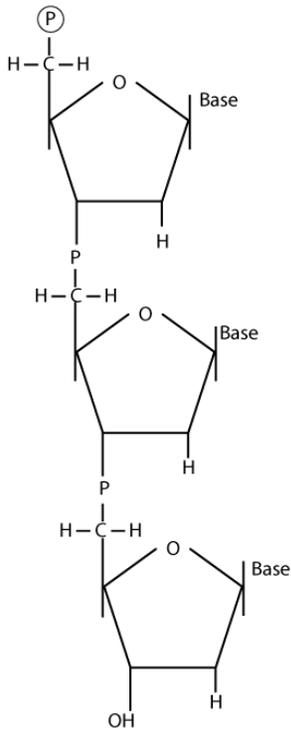
**Ans 58.**

Correct option – d: (ii) – Histone octamer, (iii) – DNA

(i) – H<sub>1</sub> histone, (ii) - Histone octamer, (iii) - DNA

**Ans 59.**

Correct option – b:



**Ans 60.**

Correct option – c: Watson and Crick

Watson and Crick proposed that genetic information flows in one direction.