ROLL NUMBER					

SET	A

INDIAN SCHOOL MUSCAT
HALF YEARLY EXAMINATION 2023
BIOLOGY (044)

CLASS: XII
DATE: 12.09.2023

TIME ALLOTED : 3 HRS.
MAXIMUM MARKS: 70

GENERAL INSTRUCTIONS:

(i) *All questions are compulsory.*

(ii) *The question paper has five sections and 33 questions. All questions are compulsory.*

(iii) *Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section-E has 3 questions of 5 marks each.*

(iv) *There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.*

(v) *Wherever necessary, neat and properly labeled diagrams should be drawn.*

SECTION A

1. Choose the wrongly matched following pairs of nitrogenous bases in nucleic acids. 1
   a) Guanine -Adenine -purines
   b) Adenine -Thymine -purines
   c) Thymine -Uracil -pyrimidines
   d) Uracil -Cytosine -pyrimidines

2. The study of family history about the inheritance of a particular trait in several generations of a family is known as 1
   (a) Hybridization
   (b) Mutations
   (c) Aberrations
   (d) Pedigree analysis

3. Among the terms listed below, those that are not technically correct names for a floral whorl are 1
   (i) androecium (ii) carpel (iii) corolla (iv) sepal

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

(d) (i) and (ii)

4. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is: 1
(a) Autosomal dominant
(b) Autosomal recessive
(c) Sex-linked dominant
(d) Sex-linked recessive

5. If the percentage of cytosine is 18%, then the percentage of adenine will be – 1
a) 64%
b) 32%
c) 36%
d) 23%

6. In sickle cell anemia glutamic acid is replaced by valine. Which one of the following triplets codes for valine? 1
(a) GGG
(b) AAG
(c) GAA
(d) GUG

7. The vas deferens receives duct from the seminal vesicle and opens into urethra as 1
(a) epididymis
(b) ejaculatory duct
(c) efferent duct
(d) ureter

8. Person having genotype $I^A I^B$ would show the blood group as AB. This is because of: 1
(a) Pleiotropy
(b) Co-dominance
(c) Segregation
(d) Incomplete dominance

9. Repressor protein is produced by – 1
a) Operator gene
b) Structural gene
c) Regulator gene
d) Promotor gene

10. The membranous cover of the ovum at ovulation is 1
(a) corona radiata
(b) zona radiata
(c) plasma membrane
(d) chorion

11. A national level approach to build up a reproductively healthy society was taken up in our country in 1
(a) 1950s
(b) 1960s
(c) 1980s
(d) 1990s

12. Which of the following enzymes is used for transcription? 1
a) Amino acid synthetase
b) DNA polymerase III
c) RNA polymerase
d) DNA ligase

Question No. 13 to 16 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.

13. Assertion: A woman passes out hCG in the urine during pregnancy. 1
Reason: Presence of hCG is the basis of pregnancy test.

14. Assertion: Primary endosperm nucleus is diploid. 1
Reason: It is the product of double fertilization.

15. Assertion: Use of condom is a safe guard against AIDS and sexual diseases besides checking pregnancy. 1
Reason: Certain contraceptives are planted under the skin of the upper arm to prevent pregnancy.

16. Assertion: Wind pollination is quite common in grasses. 1
Reason: They possess well exposed stamens and large feathery stigma to easily trap air-borne pollen grains.

SECTION B

17. Name the disorder with the following chromosome complement. 2
(i) 22 pairs of autosomes + X X Y
(ii) 22 pairs of autosomes + 21st chromosome + XY.

OR

How is the child affected if it has grown from the zygote formed by an XX-egg fertilized by Y-carrying sperm? What do you call this abnormality?

18. Mention the differences between spermiogenesis and spermiation. 2

19. A map distance between genes A and B is 3cM between B and C is 10cM and between C and A is 7cM. what is the order of the genes on the linkage map. Express it in a diagram? 2

20. Differentiate between the two cells enclosed in a mature male gametophyte of an angiosperm. 2

21. At the time of independence, the population of India was 350 million which exploded to over one billion by May 2000. List any two reasons for the rise in population and any two steps taken by the government to check this population explosion. 2

SECTION C

22. a) Describe the endosperm development in coconut. 3
b) Why is tender coconut considering a healthy source of nutrition?
c) How are pea seeds different from castor seed?

23. A pea plant with purple flowers was crossed with a plant with white flowers producing 40 plants with only purple flowers. On selfing these plants produced 470 plants with purple flowers and 162 with white flowers. What genetic mechanisms account for these results? 3

OR

A test is performed to know whether the given plant is homozygous dominant or heterozygous. Name the test and phenotypic ratio of this test for a monohybrid cross. Illustrate with an example.

24. Differentiate between major structural changes in the human ovary during the follicular and luteal phase of the menstrual cycle. 3

25. Mention the sites of action of the 'hormone GnRH and FSH during spermatogenesis in human males. Give one, function of each of the hormones. 3

26. How are assisted reproductive technologies helpful to humans? How are ZIFT and GIFT different from intra uterine transfers? Explain. 3

27. In a cross between a tall plant with yellow seeds (DdYy) and a tall plant with green seeds (Ddyy) what proportion of the offspring could be expected to be (i) tall and green (ii) dwarf and green? Which law of Mendel is known as Universal Law? 3

28. It is established that RNA is the first genetic material. Explain giving three reasons. 3

SECTION D

29. Read the following and answer any four questions from (i) to (v) given below: 4

According to Mendel, one gene controls the expression of one character only. The ability of a gene to have multiple phenotypic effect because it influences a number of characters is an exception. The gene having a multiple phenotypic effect because of its ability to control of two or more characters can be seen in cotton. In cotton, a gene for the lint also influences the height of plant, size of the ball, number of ovules and viability of seeds.

(i) Genes with multiple phenotypic effects are known as?
a) Hydrostatic genes.
b) Duplicate genes.
c) Pleiotropic genes.
d) Complimentary genes.

(ii) Which of the following disorder is an example of genes with multiple phenotypic effects?
a) Phenylketonuria.

b) Hemophilia.
c) Sickle cell anemia.
d) Both (a) and (c)

(iii) Which of the following is an example of gene with multiple phenotypic effect?
a) flower color and flower position in Pea
b) starch size and seed shape in pea
c) Height in human beings.
d) Skin color in human beings.

(iv) illustrate the disorder you choose as an answer for question number (ii) with symptoms.

OR

(v) How is polygenic inheritance different from pleiotropy?

30. Read the following and answer any four questions from (i) to (v) given below: 4
Cleavage is the series of rapid mitotic divisions in zygote and forms blastula. 2,4,8,16 daughter cells are called blastomeres. Embryo with 64 blastomeres is known as blastocyst and has blastocoel cavity. Blastocyst gets implanted in uterine wall and leads to pregnancy.

(i) Solid mass of cells with 16 cells is called
(a) Zygote (b) morula (c) blastula (d) gastrula

(ii) Site of implantation is
(a) Endometrium of uterus (b) cervix (c) infundibulum of oviduct (d) uterine fundus

(iii) Correct sequence of various structures formed during embryonic development.
(a) Morula-embryo-gastrula-blastula
(b) Zygote-embryo-morula-blastula
(c) Blastula-morula-gastrula-embryo
(d) Zygote-morula-blastula-gastrula

(iv) The structure that helps to collect the ovum during ovulation is
(a) Infundibulum
(b) Bulbourethral gland
(c) Fimbriae
(d) Perimetrium

OR

(v) Which structure secretes progesterone after ovulation?
(a) Corpus albicans
(b) Corpus luteum
(c) Anterior pituitary
(d) Primary follicle

SECTION E

31. Study the schematic representation of the genes involved in lac operon given below and answer the questions that follow: 5

a) Identify and name the regulatory gene in this operon. Explain its role in „switching off" the operon.
b) What kind of gene regulation is lac operon? Positive or negative?
c) Name the inducer molecule and the products of the genes" „z" and „y" of the operon. State the functions of these gene products.

OR

How did Alfred Hershey and Martha Chase arrive at the conclusion that DNA is the genetic material?

32. a) List the different parts of human oviduct through which the ovum travels till it meets the sperm for fertilization. 5
b) Identify and draw the stage at which the embryo gets implanted in the uterus.

OR

a) Why do some female use "Saheli" pills?
b) Describe any one natural method of contraception.
c) Write one use of Amniocentesis. Sometimes it is misused. Justify.

33. a) State the law of independent assortment. 5
b) Using Punnett square demonstrate the law of independent assortment in a dihybrid cross involving two heterozygous parents.

OR

Describe the pattern of mechanism of inheritance of ABO blood group in human.

******END OF THE QUESTION PAPER******

ROLL NUMBER				

SET	B

INDIAN SCHOOL MUSCAT
HALF YEARLY EXAMINATION 2023
BIOLOGY (044)

CLASS: XII
DATE: 12.09.2023

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(v) *Wherever necessary, neat and properly labeled diagrams should be drawn.*

SECTION A

1. The study of family history about the inheritance of a particular trait in several generations of a family is known as 1
(a) Hybridization
(b) Mutations
(c) Aberrations
(d) Pedigree analysis

2. Choose the correct number of pollen grains that will be formed after 250 microspore mother cells undergo microsporogenesis. 1
a) 325
b) 650
c) 1000
d) 975

3. Which of the following enzymes is used for transcription? 1
a) Amino acid synthetase
b) DNA polymerase III
c) RNA polymerase
d) DNA ligase

4. Which among the following has 23 chromosomes? 1
(a) Spermatogonia
(b) Zygote
(c) Secondary oocyte
(d) Oogonia

5. Choose the wrongly matched following pairs of nitrogenous bases in nucleic acids. 1
a) Guanine -Adenine -purines
b) Adenine -Thymine -purines
c) Thymine -Uracil -pyrimidines
d) Uracil -Cytosine -pyrimidines

6. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is: 1
(a) Autosomal dominant
(b) Autosomal recessive
(c) Sex-linked dominant
(d) Sex-linked recessive

7. The method of directly injecting a sperm into ovum in assisted by reproductive technology is called 1
(a) GIFT (b) ZIFT (c) ICSI (d) ET

8. Repressor protein is produced by – 1
a) Operator gene
b) Structural gene
c) Regulator gene
d) Promotor gene

9. In sickle cell anemia glutamic acid is replaced by valine. Which one of the following triplets codes for valine? 1
(a) GGG
(b) AAG
(c) GAA
(d) GUG

10. If the percentage of cytosine is 18%, then the percentage of adenine will be – 1
a) 64%
b) 32%
c) 36%
d) 23%

11. Urethral meatus refers to the 1
(a) urinogenital duct
(b) opening of vas deferens into urethra
(c) external opening of the urinogenital duct
(d) muscles surrounding the urinogenital duct

12. Person having genotype $I^A I^B$ would show the blood group as AB. This is because of: 1
(a) Pleiotropy
(b) Co-dominance
(c) Segregation
(d) Incomplete dominance

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R).
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13. Assertion: Wind pollination is quite common in grasses. 1
Reason: They possess well exposed stamens and large feathery stigma to easily trap air-borne pollen grains.

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Reason: Certain contraceptives are planted under the skin of the upper arm to prevent pregnancy.

16. Assertion: Primary endosperm nucleus is diploid. 1
Reason: It is the product of double fertilization.

SECTION

17. A map distance between genes A and B is 3cM between B and C is 10cM and between C and A is 7cM. what is the order of the genes on the linkage map. Express it in a diagram? 2

18. All reproductive tract infections RTIs are STDs, but all STDs are not RTIs. Justify with example. 2

19. Given below are the events that are observed in an artificial hybridization programme. Arrange them in the correct sequential order in which they are followed in the hybridization programme 2
(a) Re-bagging
(b) Selection of parents
(c) Bagging
(d) Dusting the pollen on stigma
(e) Emasculation
(f) Collection of pollen from male parent.

20. Mention the differences between spermiogenesis and spermiation. 2

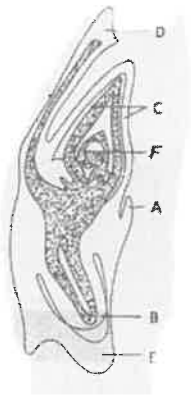
21. Name the disorder with the following chromosome complement. 2
(i) 22 pairs of autosomes + X X Y
(ii) 22 pairs of autosomes + 21st chromosome + XY.

OR

How is the child affected if it has grown from the zygote formed by an XX-egg fertilized by Y-carrying sperm? What do you call this abnormality?

SECTION C

22. 3



In the given diagram label the parts A to F. (Need not redraw the diagram).

23. A pea plant with purple flowers was crossed with a plant with white flowers producing 40 plants with only purple flowers. On selfing these plants produced 470 plants with purple flowers and 162 with white flowers. What genetic mechanisms account for these results? 3

OR

A test is performed to know whether the given plant is homozygous dominant or heterozygous. Name the test and phenotypic ratio of this test for a monohybrid cross. Illustrate with an example.

24. Describe male and female heterogamety with suitable examples. 3

25. Differentiate between major structural changes in the human ovary during the follicular and luteal phase of the menstrual cycle. 3

26. In a cross between a tall plant with yellow seeds (DdYy) and a tall plant with green seeds (Ddyy) what proportion of the offspring could be expected to be (i) tall and green (ii) dwarf and green? Which law of Mendel is known as Universal Law? 3

27. Mention the sites of action of the 'hormone GnRH and FSH during spermatogenesis in human males. Give one, function of each of the hormones. 3

28. (i) What would happen if histones were to be mutated and made rich in acidic amino acids such as aspartic acid and glutamic acid in place of basic amino acids such as lysine and arginine? 3
(ii) Mention the dual roles played by AUG codon.

SECTION D

29. Read the following and answer any four questions from (i) to (v) given below: 4

According to Mendel, one gene controls the expression of one character only. The ability of a gene to have multiple phenotypic effect because it influences a number of characters is an exception. The gene having a multiple phenotypic effect because of its ability to control of two or more characters can be seen in cotton. In cotton, a gene for the lint also influences the height of plant, size of the ball, number of ovules and viability of seeds.

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OR

(v) Which structure secretes progesterone after ovulation?
(a) Corpus albicans
(b) Corpus luteum
(c) Anterior pituitary
(d) Primary follicle

SECTION E

31. Study the schematic representation of the genes involved in lac operon given below and answer the questions that follow: 5

a) Identify and name the regulatory gene in this operon. Explain its role in switching off the operon.
b) What kind of gene regulation is lac operon? Positive or negative?
c) Name the inducer molecule and the products of the genes z and y of the operon. State the functions of these gene products.

OR

How did Alfred Hershey and Martha Chase arrive at the conclusion that DNA is the genetic material?

32. a) List the different parts of human oviduct through which the ovum travels till it meets the sperm for fertilization. 5
b) Identify and draw the stage at which the embryo gets implanted in the uterus.

OR

a) Why do some female use "Saheli" pills?
b) Describe any one natural method of contraception.
c) Write one use of Amniocentesis. Sometimes it is misused. Justify.

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b) Using Punnett square demonstrate the law of independent assortment in a dihybrid cross involving two heterozygous parents.

OR

Describe the pattern of mechanism of inheritance of ABO blood group in human.

******END OF THE QUESTION PAPER******

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HALF YEARLY EXAMINATION 2023
BIOLOGY (044)

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SECTION A

1. Which of the following enzymes is used for transcription? 1
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b) DNA polymerase III
c) RNA polymerase
d) DNA ligase

2. Which among the following has 23 chromosomes? 1
(a) Spermatogonia
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3. The study of family history about the inheritance of a particular trait in several generations of a family is known as 1
(a) Hybridization
(b) Mutations
(c) Aberrations

(d) Pedigree analysis

4. Spot the odd one out from the following structures with reference to the male reproductive system (a) Rete testis 1
(b) Epididymis
(c) Vasa efferentia
(d) Isthmus

5. Repressor protein is produced by – 1
a) Operator gene
b) Structural gene
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6. Person having genotype $I^A I^B$ would show the blood group as AB. This is because of: 1
(a) Pleiotropy
(b) Co-dominance
(c) Segregation
(d) Incomplete dominance

7. Mature Graafian follicle is generally present in the ovary of a healthy human female around 1
(a) 5-8 day of menstrual cycle
(b) 11-17 day of menstrual cycle
(c) 18-23 day of menstrual cycle
(d) 24-28 day of menstrual cycle

8. In sickle cell anemia glutamic acid is replaced by valine. Which one of the following triplets codes for valine? 1
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(b) AAG
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(a) Autosomal dominant
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11. Embryo sac is to ovule as ..... is to an anther. 1
(a) stamen
(b) filament
(c) pollen grain
(d) androecium

12. Choose the wrongly matched following pairs of nitrogenous bases in nucleic acids. 1
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17. Name the disorder with the following chromosome complement. 2
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20. Describe the pollination is Zostera. 2

21. Write two ways in which hormonal IUD functions. 2

SECTION C

22. What is apomixis? Write its significance. What are parthenocarpic fruits? 3

23. A pea plant with purple flowers was crossed with a plant with white flowers producing 40 plants with only purple flowers. On selfing these plants produced 470 plants with purple flowers and 162 with white flowers. What genetic mechanisms account for these results? 3

OR

A test is performed to know whether the given plant is homozygous dominant or heterozygous. Name the test and phenotypic ratio of this test for a monohybrid cross. Illustrate with an example.

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28. Describe the discontinuous synthesis of DNA replication. 3

SECTION D

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OR

How did Alfred Hershey and Martha Chase arrive at the conclusion that DNA is the genetic material?

32. a) List the different parts of human oviduct through which the ovum travels till it meets the sperm for fertilization. 5

b) Identify and draw the stage at which the embryo gets implanted in the uterus.

OR

a) Why do some female use "Saheli" pills?
b) Describe any one natural method of contraception.
c) Which are the two methods of embryo transfer followed by IVF?

33. a) State the law of independent assortment. 5

b) Using Punnett square demonstrate the law of independent assortment in a dihybrid cross involving two heterozygous parents.

OR

Describe the pattern of mechanism of inheritance of ABO blood group in human.

******END OF THE QUESTION PAPER******