HALF YEARLY EXAMINATION, 2024-25

BIOLOGY

Time – 3:00 Hrs. **Class – XII** **M.M. : 70**

Date – 20.09.2024 (Friday)

Name of the student _____Section _____

General Instructions:

(1) There are 33 questions in all. All questions are compulsory.
(2) This question paper has five sections: Section A, B, C, D and E.
(3) All the sections are compulsory.
(4) **Section A** contains sixteen questions of **one mark** each, **Section B** contains five questions of **two marks** each, **Section C** contains seven questions of **three marks** each, **Section D** contains two case study-based questions of **four marks** each and **Section E** contains three long answer questions of **five marks** each.
(5) There is no overall choice. You have to attempt only one of the choices in choice based questions.
(6) Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION - A

Q1. A group of compactly arranged homogeneous mass of cells occupying the centre of a typical microsporangium in an

A) Sporogenous tissue B) Pollen sacs C) micro spore tetrad D) spores

Q2. A botanist studying Viola (common Pansy) noticed that one of the two flower types withered and developed no further due to some unfavourable condition; but the other flower type on the same plant survived and it resulted in assured seed set. Which of the following will be correct.

A) The flower type which survived is cleistogamous and it always exhibits autogamy

B) The flower type with survived is chasmogamous and it always exhibits geitonogamy

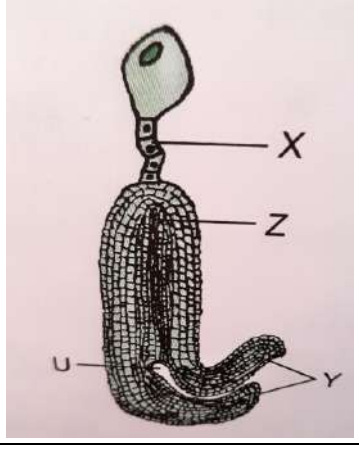
C) The flower type which survived cleistogamous and it exhibits both autogamy and geitonogamy

D) the flower type which survived is Chasmogamous and it never exhibits autogamy.

Q3. Xenogamy is ensured as the plants are dioecious in

A) Maiza B) cucurbits C) peas D) papaya

Q4. Select the option that shows the correctly identified U,X,Y and Z in a developing dicot embryo



A) X-plumule 2n,Y suspensor-n,Z Cotyledon 2n,U radicle 2n

B) X-plumule 2n,Y suspensor-2n,Z Radicle 2n,U Cotyledon 2n

C) X suspensor 2n,Y Cotyledon 2n,Z radicle 2n,U plumule 2n

D) X Cotyledon 2n,Y radicle n,Z plumule n,U suspensor n

Q5. The hormone that regulates the synthesis and secretion of androgen in human male is

A) GH B) FSH C) LH D) prolactin

Q6. All the ogonia in human female are formed during embryonic development stage i.e., in the female foetus and none after birth.Fill in the blanks in the flowchart showing the development of an oogonium into a mature graafian follicle and select the correct option

Ogonium >1>Primary follicle >2>3>Mature graafian follicle

A) 1 primary oocyte 2 tertiary follicle 3 secondary follicle

B) 1 primary oocyte 2 secondary follicle 3 tertiary follicle

C) 1 secondary oocyte 2 secondary follicle 3 tertiary follicle

D) 1 secondary follicle 2 secondary oocyte 3 tertiary follicle

Q7. The source organ and function of hormone FSH are

A) anterior pituitary, Corpus luteum formation

B) posterior pituitary, graafian follicle formation

C) anterior pituitary, follicular development

D) hypothalamus, primary oocyte formation

Q8. Select the incorrect statement

A) Lippes loop - causes phagocytosis of sperms in the uterus

B) Multiload 375 - causes phagocytosis of sperms in the uterus

C) Subcutaneous implants - causes thickening of cervical mucus

D) Saheli- inhibition of ovulation

Q9. The gene that controls the ABO blood group system in human being has three alleles, I^A, I^B, and i. A child has blood group O and his father has blood group A and mother has blood group B. Genotypes of the offspring can be

A) I^BI^B, I^Bi, I^AI^B, ii B) I^Ai,I^Bi, I^AI^B,ii C) I^Bi, I^AI^B, ii D) I^BI^B, I^AI^B, ii

Q10. In a dihybrid Mendelian cross, garden pea plants heterozygous for yellow flowers and round seeds are crossed with homozygous white flowers and wrinkled seeds. The genotypic and phenotypic ratio of F1-progeny would be

A) 9:3:3:1 B) 1:2:2:1 C) 1:1:1:1 D) 3:1

Q11. In human beings where genotypes AABBBCC represent dark skin color, aabbcc represent light skin color, AaBbCc represent intermediate skin color, the pattern of genetic inheritance can be termed as

A) pleiotropy and co-dominance B) pleiotropy and incomplete dominance

C) polygenic and qualitative inheritance D) polygenic and quantitative inheritance.

Q12. Which one of the following statements describes the function of the promoter in a transcription unit?

A) Signals the termination of polypeptide chain

B) serves a sequence where transcription will initiate

C) serves as a DNA template for transcription to take place

D) determines the first nucleotide to be transcribed into RNA.

Q13 A region of coding strand of DNA has the following nucleotide sequence 5'A-T-G-C-G-G-C.3' The sequence of bases on mRNA transcribed by this would be

A) 5'AUGCGGC3' B) 5'TACGCCG3' C) 3'AUGCGGC5' D) 3'TACGCCG5'

Q14. Which one of the following was not present during Mesozoic era of the geological time Scale

A) ferns B) horsetails C) ginkgos D) bryophytes

Q15. Introduction of an alien DNA into plant host cell is achieved by

A) Making them competent with bivalent cations B) Using microinjection

C) using gene gun D) using lysozyme chitinase

Q16. A mixture of DNA fragments P, Q, R, and S was subjected to agarose gel electrophoresis. The molecular weight of the fragments are as follows R > S , S – P = Q, Q >P. The position of these fragments in the gel from cathode to anode will be

A) PQRS B) RSQP C) QPSR D) PSQR

SECTION - B

Q17. a) Mention two environmental factors that affect Pollen viability.

b) How can pollen grain of wheat and rice which tend to lose their viability within 30 minutes of the release be made available months later for breeding programs?

Q18. Write any two ways by which apomictic seeds may be developed in angiosperms.

Q19. Differentiate between -

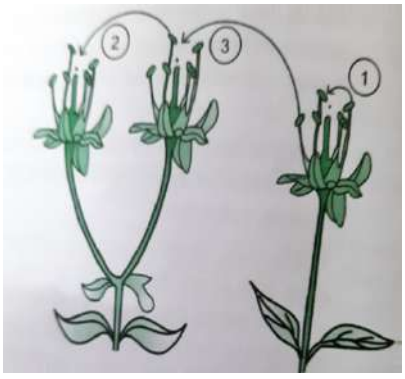
a) primary and secondary follicle b) secondary and tertiary follicle

Q20. By using a Punnett square, depict the genotypes and phenotypes of the test crosses where green pod color (G) is dominant over yellow pod color(g) in garden Pea with unknown genotypes.

Q21. Define mutation. In which type of cells are chromosomal aberrations commonly found?

SECTION - C

Q22. Study the diagram given below showing the modes of pollination. Answer the questions that follows



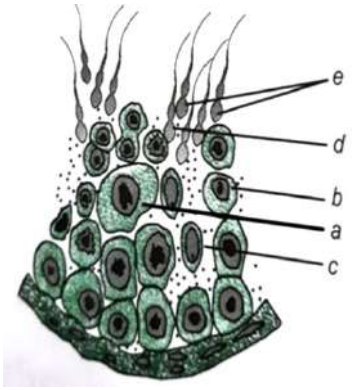
a) The given diagram shows three methods of pollen transfer in plants. What are the technical terms used for pollen transfer in Method 1, 2 and 3?

b) How do following plants achieve pollination successfully

i) water lily ii) Vallisneria

c) Flowering plants have developed many devices to avoid inbreeding depression. Explain one hereditary and one physiological device which help plan to achieve this target.

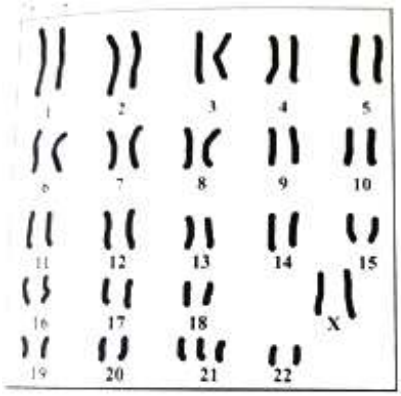
Q23. Given below is a diagrammatic sectional view of a seminiferous tubule. State the developmental process of.



a) b from a b) e from d c) d from b d) Identify a, b, c

Q24. Polydactyly (six-fingered hand) is a genetic condition due to dominant allele P over recessive allele p. If a six-fingered woman and a five-fingered man have a normal child, the genotype of the parents and the child will be.

Q25. Given diagram depicts a karyotype obtained after the analysis of foetal cells for probable genetic disorder. Based on the karyotype, name the chromosomal disorder detected in unborn foetus and what will be the consequent symptoms the child may suffer from?



Q26. How does EcoR1 specifically act on DNA molecule?

Q27. Identify and name the structures A and B marked in the image given below –

State their importance in various biotechnological experiments.

Q28. Explain RNA interference.

SECTION - D

Q29. Read the following passage and answer the questions that follow:

Spermatogenesis is the process of formation of spermatozoa in the testes of male while oogenesis is the formation of ova in the ovary of female. Spermatogenesis starts at puberty whereas oogenesis is initiated in the embryonic stage in the fetal ovary.

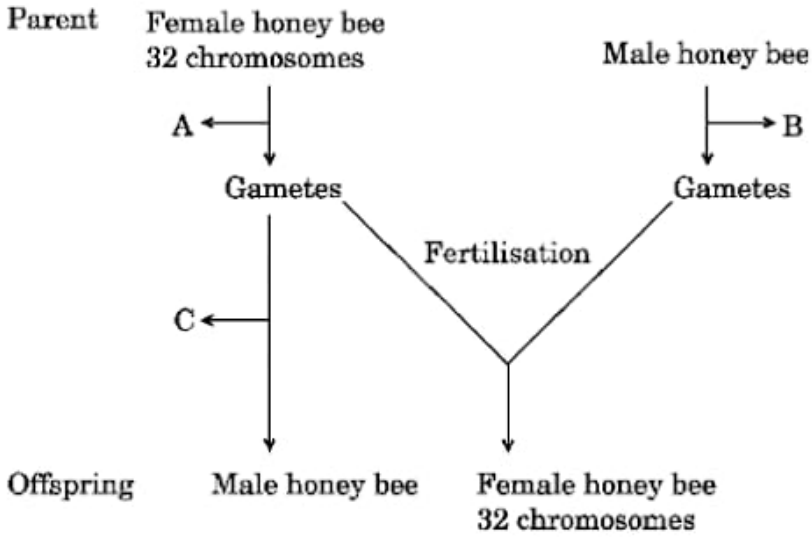
a) About 300 million spermatozoa may be present in human female ejaculate at one time. Calculate how many primary spermatocytes will be involved to produce this number of spermatozoa. Justify your answer.

b) How many spermatids will be formed in the above case? How many chromosomes will each one of them have?

c) How many chromosomes are found during oogenesis in the primary oocyte and first polar body in human female give reason?

d) Mention the number of chromosomes in spermatozoa and ovum respectively.

Q30. The cytological observation made during gamete formation in a number of insects, led to the development of the concept of genetic /chromosomal basis of sex determination mechanism in drosophila, grasshopper, honeybee, etc. Honeybee is an interesting example to study the mechanism of sex determination. Study the schematic representation of the cross between a male and a female honeybee given below and answer the questions that follow.



a) Identify the type of cell division at A and B occurring during gamete formation in the female and male honeybees respectively.

b) Name the process C that leads to the development of male honeybee.

c) Name the scientist who conducted the cytological studies during gametogenesis in insects. What did he observe?

SECTION - E

Q31. Answer the following questions based on Messelson and Stahl experiment on E. coli.

a) Write the name of the chemical substance used as the only source of nitrogen in the experiment.

b) Why did they allow the synthesis of light and heavy DNA molecules in the experiment?
c) How did they distinguish the heavy DNA molecule from the light DNA molecule?

d) Write the conclusion the scientists arrived at the end of the experiment.

OR

d) Explain the relationship of ribosome, tRNA and mRNA during the process of translation in prokaryote.

Q32. A short stretch of DNA that codes for a polypeptide is given below. 3'C-A-T-C-A-T-A-G-A-T-G-A-A-A-C5' .In the different cells of an organism, two different types of errors have occurred during replication of DNA, and sequence of bases in the DNA in the two cells are given below.

Cell 1 3'-C-A-T-C-A-T-A-G-A-T-G-A-A-T-C 5'

Cell 2 3'C-A-T-A-T-A-G-A-T-G-A-A-A-C 5'

a) What term is given to the stretch of DNA that codes for polypeptide?

b) Write the type of mutation in cell 1 and cell 2 respectively.

c) Write the mRNA transcribed by mutated DNA in cell 1. How many amino acids are coded by this mRNA? Justify your answer.

OR

a) Draw a labelled diagram of nucleosome.

b) What will be the effect on histone protein in the nucleus on neutralization of their positive charge?

c) What are the criteria a molecule should have to act as a genetic material?

Q33. a) How have biotechnologists effectively used Agrobacterium plants and retrovirus in animals?

b) Explain how an antibiotic resistant gene in pBR322 help in selecting the recombinants and non-recombinants?

OR

a) Give the technical term for each of the method described below

i. Transfer of ovum collected from a donor into the fallopian tube of another female.

ii. an embryo is formed in lab by directly injecting the sperm into the ovum

b) Name two assisted reproductive technologies where fertilization is in vivo.

c) Name and explain the two methods of embryo transfer followed in invitro fertilisation.