



BK BIRLA CENTRE FOR EDUCATION
SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY| CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL



PRE- BOARD EXAMINATION 2023-24

BIOLOGY (044)

Class : XII
Date : 21.12.23

MARKING SCHEME

Duration : 3 Hrs
Max. Marks : 70

Section–A

MCQ Ans:

- | | |
|---------------------------------------|----|
| 1. b.) Leydig cells | 1M |
| 2. b.) Amniocentesis | 1M |
| 3. d.) cell-mediated immune response | 1M |
| 4. d) Aspergillus niger | 1M |
| 5. a.) Sal I | 1M |
| 6. b.) Habitat loss and fragmentation | 1M |
| 7. d) 36 | 1M |
| 8 .b) Adaptive radiation. | 1M |
| 9. d) Bacillus thuringiensis | 1M |
| 10. d) gel electrophoresis | 1M |
| 11. a) Mutualism | 1M |
| 12.c) oxytocin | 1M |

ASSERTION AND REASON

- | | |
|---|----|
| 13. (a) Both assertion and reason are true, and reason is the correct explanation of assertion | 1M |
| (b) Both assertion and reason are true, but reason is not the correct explanation of assertion. | 1M |
| 14. Ans: (c) Assertion is true, but reason is false. | 1M |
| 15. Ans: (a) Both assertion and reason are true, and reason is the correct explanation of assertion | 1M |
| 16. Ans:(c) Assertion is true, but reason is false. | 1M |

Section–B (2 marks)

17. During favourable condition the encysted amoeba divides by multiple fission and produces Pseudopodiospores. 1/2 mark x4 =2 Marks

OR

Gemmules are tough-coated dormant cluster of embryonic cells produced by a freshwater sponge for development in more favourable conditions. Chlamydomonas produce zoospores, Hydra produces buds and Penicillium produces conidia. 1/2 mark x4 =2 Marks

18. The copper releasing IUDs are Cu-T, Cu-7 and multiload 375. Cu-releasing IUDs act by increasing phagocytosis of sperms within the uterus. The Cu²⁺ ions released suppresses sperm motility as well as their fertilizing capacity, thus preventing contraception. Thus, they are effective contraceptives in human females. 1/2 mark x4 =2 Marks
19. Control crosses cannot be performed in human beings, Alternate method-Pedigree analysis (study of the traits in several generations of a family). 1/2 mark x4 =2 Marks
20. The female egg always has an X chromosome. So if the male gamete with the X chromosome fuses with the female egg, the child will be female. Similarly, if the male gamete with the Y chromosome fuses with the female egg, the child will be male. 1/2 M x4 =2 M

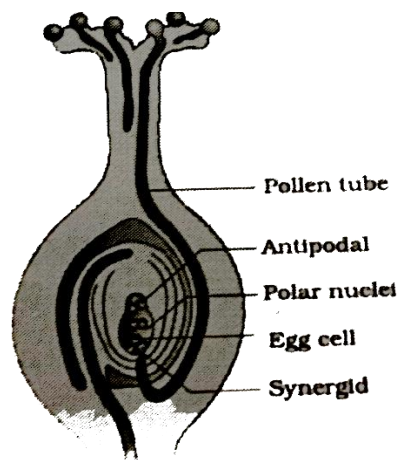
21. By using *Agrobacterium* vectors, nematode-specific genes were introduced into the host plants which produce both sense and antisense RNA in the host cells. These two RNAs are complementary to each other and form a double-stranded RNA (ds RNA) that initiates RNA and hence, silences the specific mRNA of the nematode. 1/2 M x4 =2 M

Section– C (3 marks)

22. Pyramid is inverted because in pond ecosystem, producers are the smallest organisms while herbivores and carnivores are larger in size. Consequently, there is a gradual increase in biomass of organisms at successive trophic levels.

1/2 M x6 =3 M

23. 1 dia +(4 labels)1/2 each =3 M



24. a. Failure of segregation of chromatids during cell division cycle results in the gain or loss of a chromosomes aneuploidy Autosomes:- Down's Syndrome: The cause is the presence of an additional copy of the chromosome number 21 trisomy of 21The affected individual is • short statured with small round head • furrowed tongue 1/2 M x6 =3 M

25. Apomixes are asexual reproduction that mimics sexual reproduction as in this normal sexual reproduction is replaced by asexual reproduction. In this seed formation take place without fertilization. The diploid egg-formed without reductional division forming embryo. Apomixes seen in the *Taraxacum* (dandelions) 1/2 M x6 =3 M

26. Inbreeding has its benefits: It has the power to concentrate a forefather's DNA. It has the ability to quickly repair a certain type. Animals used for breeding may be more likely to pass on their own characteristics on a frequent basis. 1/2 M x6 =3 M

27. Bt-cotton plant is a transgenic plant which produces an insecticide to bollworm. Bt-cotton is produced by inserting cry gene from bacteria *Bacillus thuringiensis* to the plant genome by the help of transgenic technology. 1/2 M x6 =3 M

28. In situ the operation includes breeding programmes, ecosystem management at sacred groves etc. (2)
In ex situ, conservation of plants includes storage of seed, pollens etc. and conservation of animals include techniques like storing animal embryo, storing genetic material (DNA). 1/2 M x6 =3 M

OR

Bt-cotton plant is a transgenic plant which produces an insecticide to bollworm. Bt-cotton is produced by inserting cry gene from bacteria *Bacillus thuringiensis* to the plant genome by the help of transgenic technology. 1/2 M x6 =3 M

Section– D (Case based study 4 marks)

- 29 . a) Law of dominance 1M
b) First filial generation 1M
c) He made similar observations for the other pairs of traits – he found that the F1 always resembled either one of the parents, and that the trait of the other parent was not seen in them. 2M

OR

Crossing between two traits i.e tall and dwarf pea plants to study the inheritance of gene is called hybridisation. Cell formed may be Homozygous or heterozygous.

30. a. The final step in cloning is to incorporate the DNA of interest into the vector. Scientists the gene and the opened vector together with a bacterial enzyme called DNA ligase. The ligase sticks DNA ends together to form a single circular molecule that includes both the vector and the gene. 1M

b. The restriction enzyme is a protein produced by bacteria that cleaves the DNA at specific sites. 1M

- c. BamHI binds at the recognition sequence 5'-GGATCC-3' , and cleaves these sequences just after the 5'-guanine on each strand. This cleavage results in "sticky ends" which are 4 b.p. long. 2M

OR

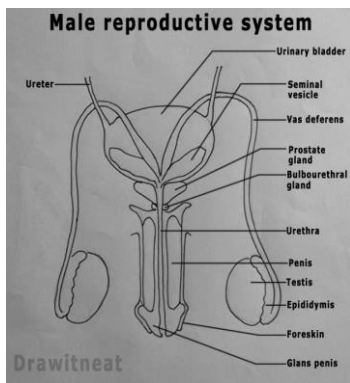
A phosphodiester bond is a group of strong covalent bonds between a phosphate group and two 5-carbon ring carbohydrates (pentoses) over two ester bonds. They are found in DNA, RNA, etc.

Section–E (5 marks)

- 31 a. To produce 300 spermatozoa, approximately 75 million primary spermatocytes will be involved in spermatogenesis.
b. During the embryonic stage in females, the primary oocyte develops from the gamete mother cell or oogonia. It is diploid in nature. Primary oocytes consist of 46 chromosomes.
c. Meiosis II occurs immediately after the sperm enters the secondary oocyte.
d. The development and maintenance of spermatogenesis is dependent on the hypothalamic gonadotropin-releasing hormone (GnRH).
e. hormone is responsible for both spermatogenesis and oogenesis FSH Follicle-Stimulating Hormone .

$$1+1+1+1+1=5$$

OR



Human male reproductive system consists of testes (primary sex organs), scrotum, vas deferens, urethra, penis and accessory glands.

1. Testes: A pair of testes lies outside the abdominal cavity of the male. These testes are the male gonads, which produce male gametes (sperms) and male sex hormone (Testosterone).
2. Scrotum: The scrotum is a loose pouch-like sac of skin
3. Vas deferens:
It is a straight tube which carries the sperms to the seminal vesicles.
4. Urethra:
It is contained inside the penis and conveys the sperms from the vas deferens which pass through the urethral opening
5. Penis :It is external genetilia through which both semen and urine pass through.
6. seminal vesicles ,prostrate glands and bulbourethral glands secrete fluids .

Labelled diagram _2m

1/2 M x6 =3 M

OR

32. Polymerase chain reaction or PCR is a reaction that is utilised to amplify a gene or fragment of DNA of interest. It is done in vitro using a primer. This technique is used in labs to make billions of copies of the desired gene for research, diagnostic and therapeutic purposes.

Each cycle of polymerase chain reaction has three steps. They are:

1. **Denaturation:** The first step in PCR is denaturation. Denaturation is required to separate the double-stranded DNA sample. It is done at 94-98 °C for 20-30 seconds. It breaks the hydrogen bonds present between base pairs. Denaturation leads to the formation of single strands of DNA.
2. **Annealing:** The second step is the annealing of the primer. Here the reaction temperature is lowered to allow the complementary base pairing between the primer and the complementary part of the single strands of the DNA template. A proper temperature needs to be maintained in order to allow highly specific and proper primer hybridisation. Then DNA polymerase binds to the template-primer hybrid and starts the DNA synthesis.
3. **Extension:** A thermostable DNA polymerase is used for this purpose. Taq polymerase is commonly used for this purpose. It is done at a temperature of 75-80 °C (72°C). The DNA polymerase adds nucleotides in the 5'-3' direction and synthesises the complementary strand of the DNA template.

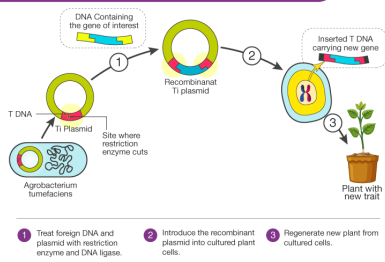
Uses of PCR 1. PCR is used for diagnostics 2. RT-PCR is commonly used to detect the SARS-CoV-2 viral genome.

3+2=5M

OR

Recombinant DNA technology involves the selection of the desired gene for administration into the host followed by a selection of the perfect vector with which the gene has to be integrated and hence the recombinant DNA is formed. This recombinant DNA, then has to be introduced into the host.

RECOMBINANT DNA TECHNOLOGY PROCESS BYJU'S



33. a.1. It affects our immune system. it damages our helper- T cells

2. Cancer is one of the most feared diseases . Cancer is more frightening because the treatment process is painful and its after effects significantly reduce the quality of life. we cannot detect the cause of disease .The detection of disease is only at the advanced stage.

3. Plasmodium is a protozoan which completes its asexual life cycle in human host and completes its Sexual life cycle in mosquitoes body.

4. Vaccines are preparations of deactivated pathogens. they help in predisposing body to pathogens and stimulate body to produce antibodies. Makes our body to be prepared for subsequent infection.

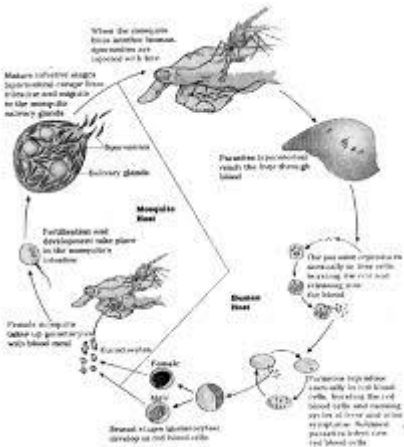
b. AMI is antibody mediated immunity where antibodies are produced against intercellular pathogens. CMI is cell mediated immunity in which cytokinins and interferons are produced to fight against intracellular pathogens.

$$1+1+1+1+1=5M$$

OR

Plasmodium is a protozoan which completes its asexual life cycle in human host and completes its Sexual life cycle in mosquitoes body.

$$1 M \times 5 \text{ points} = 5 M$$



BEST OF LUCK