ANSWER KEY

Test # 01 **Test Date : 06.04.2022**

Class-XII

Biology

1. **(c)**

2. **(c)**

3. **(d)**

4. **(b)**

5. **(a)**

6. **(b)**

7. **(c)**

8. **(b)**

9. **(a)**

10. **(b)**

11. **(a)**

12. **(c)**

13. **(c)**

14. **(d)**

15. **(d)**

16. **(b)**

17. i. He would have loaded the samples near end A; in the wells.

ii. The DNA fragments separate (resolve) according to their size through the sieving effect provided by the agarose gel. Hence, the smaller the fragment size, the farther it moves.

18. Taq Polymerase

Heat stable enzyme used for elongation of DNA chain

19. Anti-snake venom is an example of Passive Immunisation.

It is preformed/readymade Abs which act quickly.

20. (a) Aspergillus niger - Citric Acid , natural preservative / flavouring agent = ½ + ½ (b) Trichoderma polysporum - Cyclosporin A , immunosuppressive agent = ½ + ½

21. Human chorionic gonadotropin (hCG)-Placenta.

Human placental lactogen (hPL)-Placenta.

Relaxin (towards the end of pregnancy)-Ovary (Any 2)

OR

In apple only the thalamus (along with ovary) portion contributes to fruit formation. Therefore, it is a false fruit. Mango develops only from the ovary, therefore it is a true fruit

22. i. An individual organism passes on the variations, mutations and adaptations from one generation to another.

ii. Darwin explained it as the process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats), called adaptive radiation.

iii. According to Darwin, "fitness of an individual" is the ability of an organism to survive and pass on its genes to future generations

23. (a) Each mother cell on reductional division produces four microspore tetrads also known as pollen.

So 128 microspore cell are formed by=128/4=32.

Therefore 32reductional division are required to form 64 mother cells.

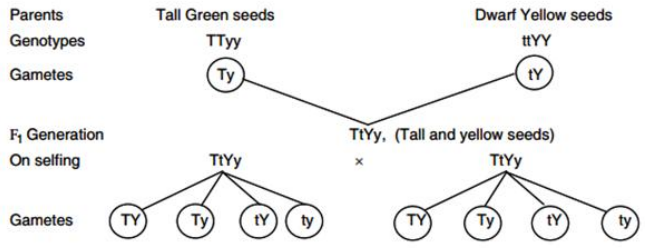
(b) Tapetum is important for the nutrition and development of pollen grains, as well as the source of precursors for the pollen coat.

(c) Emasculation is the method of removal of anthers from flowers. The anthers are removed before they mature. Emasculation is an important part of artificial hybridization. The process ensures passing on favorable and superior traits to off-springs or introducing favorable characters from one variety to another.

24. Denaturation , Two strands of DNA are separated by heating = ½ × 2 Annealing , Two sets of primers are attached / annealed to the separated DNA strands = ½ × 2 Extension , Taq polymerase catalyses the extension of primers using genomic DNA as template and nucleotides provided in the reaction = ½ × 2 (correctly labelled diagrams with polarity of strands to be accepted in lieu of explanation

25. Selection of recombinants on the basis of antibiotic resistant genes is a cumbersome process.On the basis of colour production in the presence of chromogenic substrate, the recombinants and non-recombinants can also be differentiated. Here, a recombinant DNA is inserted within the coding sequence of an enzyme ?-galactosidase, which results into the inactivation of the enzyme and hence there is no conversion of substrate to products. Hence, the bacterial colonies having transformed plasmid, shows no colouration while those without inserted plasmid form blue colour colonies.

26.



F_2 generation

	TY	Ty	tY	ty
TY	TTYY Tall, Yellow seeds	TTYy Tall, Yellow seeds	TtYY Tall, Yellow seeds	TtYy Tall, Yellow seeds
Ty	TTYy Tall, Yellow seeds	TTyy Tall, Green seeds	TtYy Tall, Yellow seeds	Ttyy Tall, Green seeds
tY	TtYY Tall, Yellow seeds	TtYy Tall, Yellow seeds	ttYY Dwarf, Yellow seeds	ttYy Dwarf, Yellow seeds
ty	TtYy Tall, Yellow seeds	Ttyy Tall, Green seeds	ttYy Dwarf, Yellow seeds	ttyy Dwarf, Green seeds

(i) Phenotype of F1-Tall plants with yellow seeds. Genotype of F1-TtYy.

(ii) The one which is expressed in the F1 generation is called the dominant trait and the one which is suppressed is called a recessive trait. In simple words, the law of dominance states that recessive traits are always dominated or masked by the dominant trait. This law can be described by Mendel's experiment

(iii) Phenotypic ratio of F2 generation

Tall plants, yellow seeds	:	Tall plants, green seeds	:	Dwarf plants, yellow seeds	:	Dwarf plants, green seeds
9	:	3	:	3	:	1

27. (a) Cleistogamous flowers do not open. Therefore, the pollens have to land on the stigma of the same flower. This ensures autogamy.

(b) Advantage: Self-pollination is assured, thus ensuring seed formation. Disadvantage: Least variations observed and it leads to inbreeding depression.

28. Exotic species are defined as species that have been introduced from another geographic region to an area outside its natural range. For example, (i) Parthenium, Lantana and Eichhornia are the exotic species of plants that have invaded the native species of India and caused environmental damage. (ii) Introduction of African catfish Clarias gariepinus for aquaculture purpose is posing threat to many indigenous catfish. (iii) Nile perch introduced into lake Victoria in East Africa led to the extinction of cichlid fish.

OR

(i) They predators act as conduits for energy transfer across trophic levels.

(ii) They keep prey populations under control.

(iii) They help in maintaining species diversity in a community by reducing the intensity of competition among prey species

29. Plasmids which can be used to insert the geneof interest from a desired organism into a host/ they act as vectors to transfer gene of interest into the host. [1]

OR

(a) Ori- Origin of replication (ori) - No replication will take place resulting in no copies of linked DNA.

(b) i) 5'... ATC GTA/AAG CTT /CAT…3' 3'... TAG CAT/TTC GAA /GTA…5' [1 mark for both strand] OR 5'... AAG CTT …3' 3'... TTC GAA …5'' [1 mark for both strand]

ii) No, as the restriction enzymes need to be the same which cut the DNA of the plasmid and the gene of interest from the plant. [0.5+0.5=1]

(c) PUC18 as it has a higher copyrate. [0.5+0.5=1]

30. (i) Sporozoite

(b) undergoes asexual reproduction when the parasites burst the liver cells by multiplying itself that are released into the blood. The liver stage undergoes schizogony

(c) Again it bursts the RBC by entering inside and multiplying by the means of asexual reproduction.

Along with the bursting of RBC, a toxic element called haemozoin is released that causes chill in the body of the human being. Form Gametocytes

(d) Stage -D, disease malaria, toxic element called haemozoin

OR

Gametocytes again form sporozoites by fertilizing inside the intestine of the mosquito. These sporozoites are stored in the salivary glands of mosquito and are released when the healthy person is bitten by this mosquito

31. (a) X-LH, Y-FSH

(b) The corpus luteum secretes estrogens and progesterone. The latter hormone causes changes in the uterus that make it more suitable for implantation of the fertilized ovum and the nourishment of the embryo

(c) In the absence of fertilisation, corpus luteum degenerates which cause disintegration of endometrium leading to menstruation, marking a new cycle.

(d) The umbilical cord is considered both the physical and emotional attachment between mother and fetus. This structure allows for the transfer of oxygen and nutrients from the maternal circulation into fetal circulation while simultaneously removing waste products from fetal circulation to be eliminated maternally

OR

(a) Female partner is often blamed due to following reasons:

(i) Social mind set (ii) Inequality of sexes (iii) Lack of awareness/male dominated society. (iv) Awareness is to be created that abnormality can occur in both male and females and infertility issues with suitable examples (v) Mutual respect towards both the partners in case of the problem and to find the remedy from medical experts (vi) Educate them to find the reason and not believe in superstitions. (Any two)

(b) Infertility is caused due to physical abnormality in reproductive system, congenital, immunological or psychological problems. (Any two)

(c) Intra cytoplasmic sperm injection (ICSI), artificial insemination (AI), Intra uterine insemination (IUI) can help couples where the problem is with male partner.

32. (i) opioid

(ii)heroin/ smack

(iii) Latex of Papaver somniferum

(iv) the adverse effect of opioids: They bind to specific opioid receptors present in the central nervous system and gastrointestinal tract. They are depressants and slow down body functions.

OR

Cancer is an uncontrolled cell division due to failure of checkpoint or proper cell signalling in host.

Biopsy

Three stages:

Surgery + description in one or two sentences

Radiotherapy+ description

Chemotherapy+ description

33. Transcription in Eukaryotes

- The structural genes are monocistronic in eukaryotes.
- The process of transcription is similar to that in prokaryotes.
- It takes place in the nucleus.
- Coding gene sequences called exons form the part of mRNA and non-coding sequence called introns are removed during RNA splicing.
- In eukaryotes, three types of RNA polymerases are found in the nucleus:

  i. RNA polymerase I transcribes rRNAs (28S, 18S, and 5.8S).

  ii. RNA polymerase II transcribes the precursor of mRNA (called heterogeneous nuclear RNA or hnRNA).

  iii. RNA polymerase III transcribes tRNA, 5S rRNA and snRNAs (small nuclear RNAs). Post-transcriptional modifications The primary transcripts are non-functional, containing both the coding region, exon, and region, intron, in RNA and are called heterogenous RNA or hnRNA.
- The hnRNA undergoes two additional processes called capping and tailing.
- In capping, an unusual nucleotide, methyl guanosine triphosphate, is added to the 5'-end of hnRNA.
- In tailing, adenylate residues (about 200-300) are added at 3'-end in a template independent manner.
- Now the hnRNA undergoes a process where the introns are removed and exons are joined to form mRNA by the process called splicing.

Prokaryotic vs Eukaryotic Transcription

Prokaryotic Transcription	Eukaryotic Transcription
Transcription and translation occur simultaneously	Transcription and translation don't occur simultaneously.
Prokaryotic transcription occurs in the cytoplasm	Eukaryotic transcription occurs in the nucleus and translation occurs in the cytoplasm.
RNAS are released and processed in the cytoplasm	RNAs are released and processed in the nucleus
RNA polymerases are a complex of five polypeptides.	RNA polymerases are a complex of 10-15 polypeptides.

OR

ABO blood groups in humans are controlled by the gene I. It has three alleles-I^A, I^B and i.

Genotype	Phenotype
I^AI^A, I^AI^O	A
I^BI^B, I^BI^O	B
I^AI^B	AB
I^OI^O	O

a) Gene 'I' which controls the blood group formation in humans exists in three different allelic forms: I^A, I^B and I^O. The different combinations of the three alleles produces 4 different phenotypes which are A, B, AB and O.

b) i) No, they do not produce children with blood group 'A' only.

ii) Yes, they produce children some with blood group 'A' and some with 'O'.

This is illustrated as follows:

A woman with blood group 'A' can have genotypes-

I^AI^A, I^AI^O

A man with blood group 'O' can have genotype- I^OI^O

Thus there are two possible crosses:

Cross I

I^AI^A × I^OI^O

I^AI^O, I^AI^O, I^AI^O, I^AI^O,

Cross II

I^AI^O, × I^OI^O

I^AI^O, I^AI^O,I^OI^O, I^OI^O

This is evident from the two possible crosses that a child born to such parents can have blood groups A or O.