

APEEJAY COMMON PRE BOARD EXAMINATION (2022 – 23)
CLASS- XII SUBJECT - BIOLOGY

Maximum Marks: 70

Time: 3 hours

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 labelled diagrams should be drawn.

SECTION - A

1. The technique called gamete intra-fallopian transfer (GIFT) is recommended for those females: 1
(a) Who cannot produce an ovum.
(b) Who cannot retain the foetus inside the uterus.
(c) Whose cervical canal is too narrow to allow passage of the sperm.
(d) Who cannot provide a suitable environment for fertilisation.

2. In the case of a couple where the male is having a very low sperm count, which technique will be suitable for fertilization? 1
(a) Intrauterine transfer
(b) Gamete intracytoplasmic fallopian transfer
(c) Artificial Insemination
(d) Intracytoplasmic sperm injection

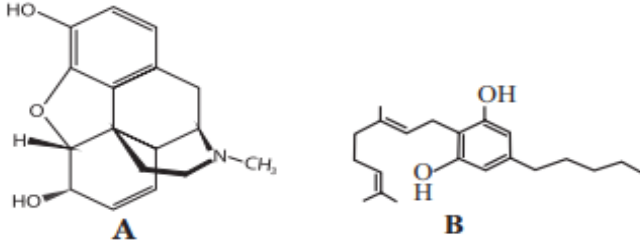
3. The haploid content of human DNA is 3.3×10^9 bp and the distance between two consecutive base pair is 0.34×10^{-9} . What is the length of the DNA molecule? 1
(a) .224m
(b) 22.4m
(c) 2.24 m
(d) 20. 24m

4. In a species, the weight of new-born ranges from 2 to 5 kg. 97% of the new-born with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weights from 2 to 2.5 or 4.5 to 5 kg the chance of survival is very low. Which type of natural selection process is operational in the above case? 1
(a) Cyclical selection
(b) Directional selection
(c) Stabilising selection
(d) Disruptive selection

5. If you suspect a major deficiency of antibodies in a person, to which of the following would you look for confirmatory evidence? 1
(a) Fibrinogen in plasma

- (b) Serum albumins
- (c) Haemocytes
- (d) Serum globulins

6. Identify the molecules (A) and (B) shown below and select the right option giving their source and use 1



- (a) B-Molecule - Cannabinoid, Source - *Atropa belladonna*, Use - Produces hallucinations
- (b) A-Molecule - Cocaine, Source - *Erythroxylum coca*, Use - hastens the transport of dopamine.
- (c) B-Molecule - Heroin, Source - *Cannabis sativa*, Use - Depressant and slows down body functions
- (d) A- Molecule - Morphine, Source - *Papaver somniferum*, Use - Sedative and pain killer

7. Which of the following is wrongly matched in the given table? 1

	Microbe	Product	Application
(a)	<i>Monascus purpureus</i>	Statins	Lowering of blood cholesterol
(b)	<i>Trichoderma polysporum</i>	Cyclosporin A	Immunosuppressive drug
(c)	<i>Streptococcus</i>	Streptokinase	Removal of clot from blood vessel
(d)	<i>Clostridium butylicum</i>	Lipase	Removal of oil stains

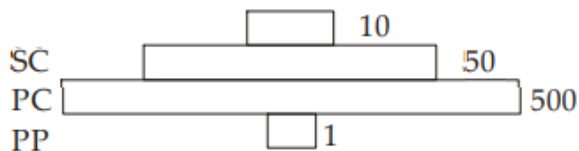
8. Match the items in Column 'A' and Column 'B' and choose the correct answer 1

	Column 'A'		Column 'B'
a.	Lady bird	i.	Methanobacterium
b.	Mycorrhiza	ii.	Trichoderma
c.	Biological control	iii.	Aphids
d.	Biogas	iv.	Glomus

The correct answer is

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

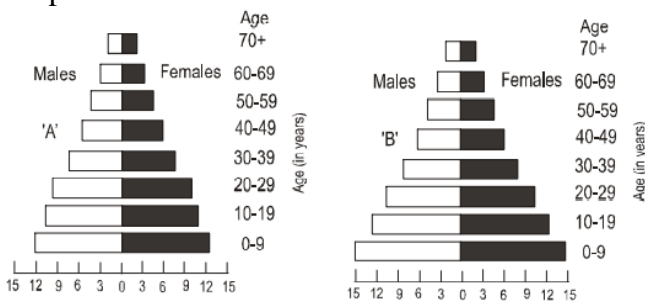
9. Given below is an imaginary pyramid of numbers. Choose the correct option that indicates the possibilities of organisms that could belong to different trophic levels? 1



- (a) Level PC is “insects” and level SC is “small insectivorous birds”.
- (b) Level PP is “phytoplanktons” in sea and “whale” on top level TC

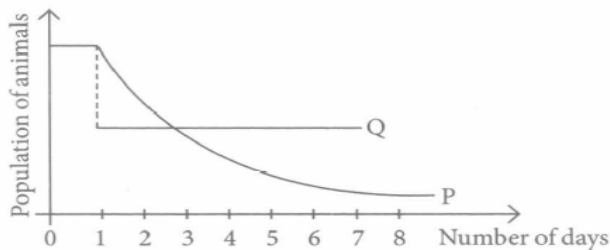
- (c) Level one PP is “peepal trees” and the level SC is “sheep”.
- (d) Level PC is “rats” and level SC is “cats”.

10. If 8 individuals in a population of 80 butterflies die in a week, calculate the death rate of population of butterflies during that period. 1
- (a) 10%
 - (b) 40%
 - (c) 30%
 - (d) 80%
11. A country with a high rate of population growth took measures to reduce it. The figure below shows age sex pyramids of populations A and B twenty years apart. Select the correct interpretation about them. 1



Interpretations:

- (a) “B” is earlier pyramid and shows stabilized growth rate.
 - (b) “B” is more recent showing that population is very young.
 - (c) “A” is the earlier pyramid and no change has occurred in the growth rate.
 - (d) “A” is more recent and shows slight reduction in the growth rate.
12. The population of species P in a certain community was constant until a population Q from a distant land was subsequently introduced into the community. The interaction between the two population is reflected in the graph below 1



What could be the possible reason for decrease in the population of species P

- (a) Species Q is a predator of species P.
- (b) Species Q is a prey species which wiped out the population of species P.
- (c) Species P and Q compete for space but feeds on different food
- (d) Species P died due to the non-availability of food.

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

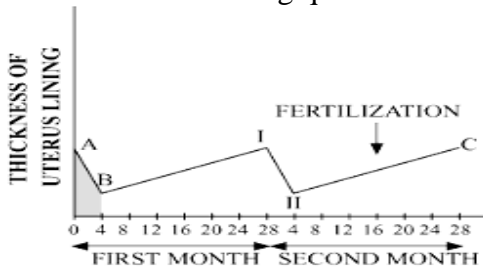
- A. Both A and R are true, and R is the correct explanation of A.
- B. Both A and R are true, and R is not the correct explanation of A.

- C. A is true, but R is false.
 D. A is False, but R is true.

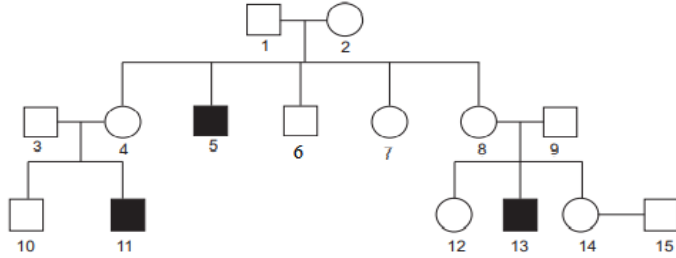
13. **Assertion:** Although geitonogamy is functionally cross-pollination involving a pollinating agent, genetically it is similar to autogamy. 1
Reason: In geitonogamy, pollen grains from the anthers of one flower are transferred to the stigma of another flower borne on the same plant.
14. **Assertion:** A geneticist crossed two pea plants and got 50% tall and 50% dwarf in the progeny. 1
Reason: One plant was heterozygous tall and the other was dwarf.
15. **Assertion:** DNA is considered to be better genetic material than RNA for most organisms. 1
Reason: 2'-OH group present in DNA makes it labile and less reactive.
16. **Assertion:** Species with low genetic variability are generally at greater risk of extinction than the species with more genetic variability. 1
Reason: Species with low genetic variability are more vulnerable to diseases, predators, or other environmental challenges.

SECTION – B

17. The graph given below shows how the lining of the uterus in a female who has achieved puberty varies with time. Examine the graph and answer the following questions. 2



- (a) What is happening in period between A and B? What will be the corresponding points in the second menstrual cycle when the same event happens?
 (b) Fertilization occurred on the 16th day of the second menstrual cycle. How would you expect the graph to behave after point C? Will the graph depict the same pattern of the first and second months?
18. A red-eyed male fruit fly is crossed with a white-eyed female fruit fly. Work out the possible genotype and phenotype of F1 and F2 generation. 2
19. (a) All human beings have cellular oncogenes but only a few suffer from cancer disease. Give reasons. 2
 (b) How is a malignant tumour different from a benign tumour?
20. Haemophilia is a sex-linked recessive disorder of humans. The pedigree chart given below shows the inheritance of haemophilia in one family. Study the pattern of inheritance and answer the questions given below. 2



- (a) Give all the possible genotypes of the members 4, 5 and 6 in the pedigree chart.
- (b) A blood test shows that the individual 14 is a carrier of haemophilia. The member numbered 15 has recently married the member numbered 14. What is the probability that their first child will be a haemophilic male?

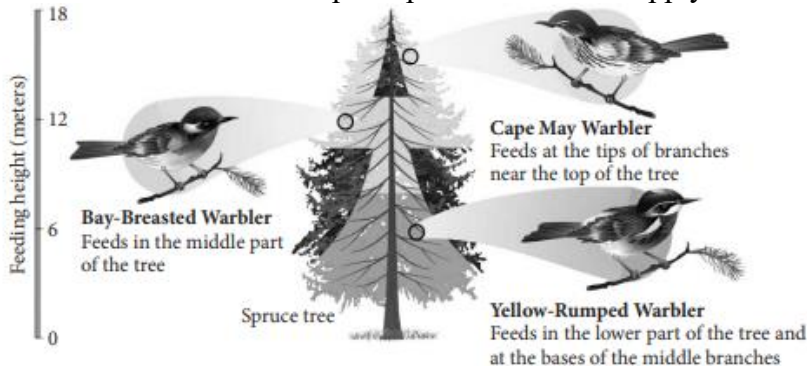
21. Assuming, $GPP \text{ Forest A} = GPP \text{ Forest B} = GPP \text{ Forest C}$, If Forest A has $NPP = 1254 \text{ J/m}^2/\text{day}$; Forest B, $NPP = 2157 \text{ J/m}^2/\text{day}$; and Forest C, $NPP = 779 \text{ J/m}^2/\text{day}$, which forest has maximum energy loss by respiration? Calculate and find the result.

OR

In person suffering from Sickle-cell anaemia, malarial parasites cannot survive well within the "partially defective" red blood cells. Thus, individuals heterozygous of the disease tend to survive better than either of the individuals of homozygous conditions. If 0.09 of an African population is born with a severe form of sickle-cell anaemia (ss), calculate the percentage of the population that will be more resistant to malaria because they are heterozygous (Ss) for the sickle-cell gene?

SECTION – C

22. (i) Draw a sectional view of human ovary and label the following parts 3
- Primary follicle
 - Secondary oocyte
 - Graafian follicle
 - Corpus luteum
- (ii) Which hormone induces the development of corpus luteum?
23. (a) Why does endosperm development precede embryo development in angiosperm seeds? State the role of endosperm in mature albuminous seeds. 3
- (b) Write one advantage of cleistogamy in flowering plants.
24. (a) Diagram depicts different species of Warbler birds feeding on different regions on a Spruce tree. What type of mechanism they have evolved? Explain 3
- (b) What does Gause's exclusion principle state? Does it apply in the case shown below.



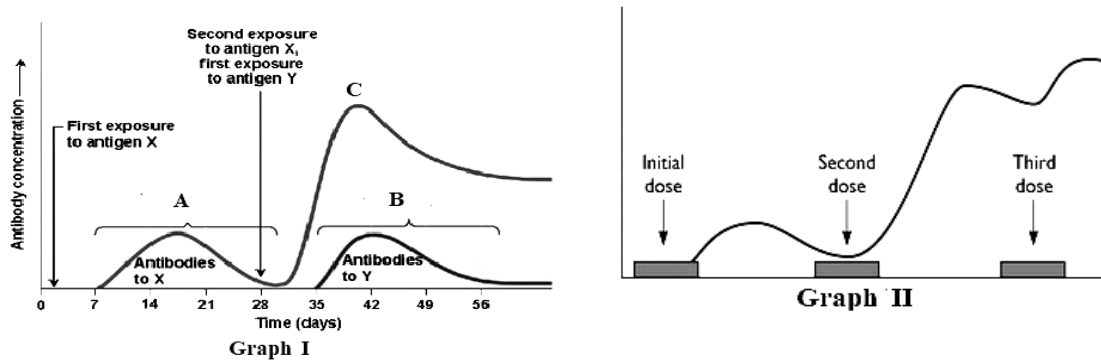
25. Mention how plants have developed mechanical and chemical defence against herbivores to protect 3

themselves, support it with the help of an example in each case.

OR

Describe how climatic conditions, oxygen, and chemical composition of detritus influence the process of decomposition.

26. (a) Observe the Graph I given below, why the peaks labelled as A and B different from C, when plotted against the levels of antibody concentration on the exposure to antigen X/Y ? Give reasons. 3
 (b) Graph II shows the change in the antibody concentration when a preparation of antigenic proteins of a pathogen or inactivated/weakened pathogen was introduced in a person, what is the principle behind it and how is it effective?



27. Observe the given sequence of nitrogenous bases on a DNA fragment and answer the following question 3



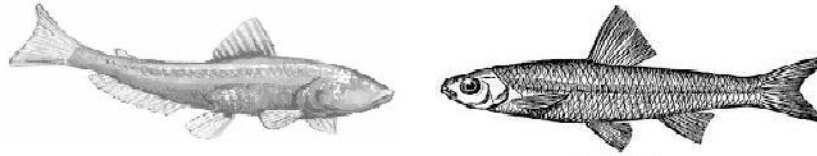
- (a) Name a restriction enzyme that can recognize this DNA sequence.
 (b) Write the sequence after digestion.
 (c) Why are the ends generated after digestion called sticky ends?
28. (a) How does significant decrease in BOD occur during the process of secondary treatment of primary effluent? 3
 (b) What is 'activated sludge' in sewage treatment?

SECTION – D

Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one of the sub-part.

29. Scientists on research found out that, the adaptation of Cave fishes to the environment involves two contrasting trends in the development of structures. One, their eyes and pigment are gradually lost during the process of development- a typical example of regressive evolution and second, the lost organs are replaced by “overdeveloped” structures, such as widely distributed lateral line and chemosensory receptors. 4

The scientists also discovered that the gene that controls the formation of eyes shows pleiotropic effect. When the fish develops without eyes, the skull bones move into the empty eye sockets. This growth leads to the formation of bigger nose, which results in improved sense of smell. It serves as an adaptive advantage to the fish to live in the dark caves.



- (a) As per Darwinian Theory of evolution, are cave fishes fittest individual to survive in the environment? Elucidate.
- (b) 'Animals that dwell in dark are blind'. Does the statement support Lamarckian theory of acquired characters?
- (c) What do understand by regressive evolution?

OR

How over developed sensory system help cave fishes?

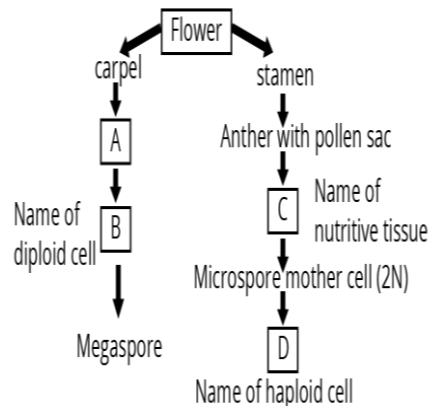
30. Two girls, A and B, aged 4 and 5 years respectively visited a hospital with a similar genetic disorder. Girl A was provided enzyme-replacement therapy and was advised to visit periodically for further treatment. The girl B, was, however, given a therapy that did not require revisits for further treatment.
 - (a) Name the ailments the two girls were suffering from? What is the cause of this ailment?
 - (b) Why did the treatment provided to girl A required revisits?
 - (c) How was the girl B cured permanently?

OR

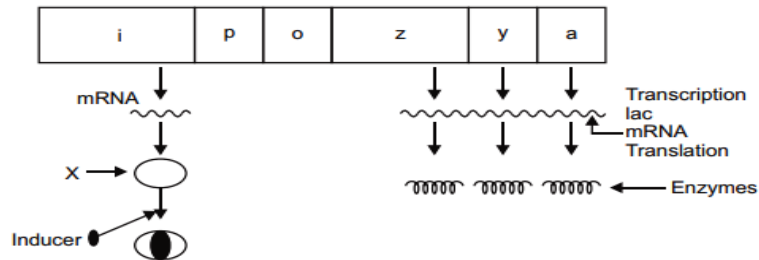
Name any two diagnostic techniques that are very useful for early detection of the disease.

SECTION - E

31. (a) Draw a diagram of L.S. of an anatropous ovule of an Angiosperm & label the following parts:-
 - (i) Nucellus
 - (ii) Integument
 - (iii) Antipodal cells
 - (iv) Secondary Nucleus
 - (b) Why is the process of fertilization in flowering plants referred to as double fertilization?
- OR
- (a) 'Continued self-pollination led to inbreeding depression'. List three devices, which flowering plant have developed to discourage self-pollination.
 - (b) Given below is an incomplete flow chart showing the formation of gamete in angiosperm plants. Observe the flow chart carefully and fill in the blank A, B, C, and D.



32.



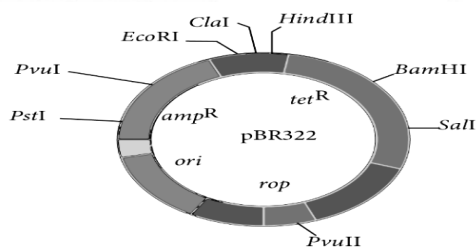
- (a) Name the molecule 'X' synthesised by 'i' gene. How does this molecule get inactivated?
- (b) Which one of the structural genes codes for β -galactosidase?
- (c) When will the transcription of this gene stop?
- (d) Why is the regulation by repressor in lac operon called negative regulation?

OR

- (a) Explain the process of aminoacylation of tRNA. Mention its role in translation.
- (b) How do ribosomes in the cells act as factories for protein synthesis?
- (c) Identify the initiating and terminating codon from the mRNA transcript and also mention the number of amino acids in translated polypeptide chain?

5' AUGGCCAAUGACUUUAAUGACUUUAAUGACUUUCAAUAAAUGACUUU

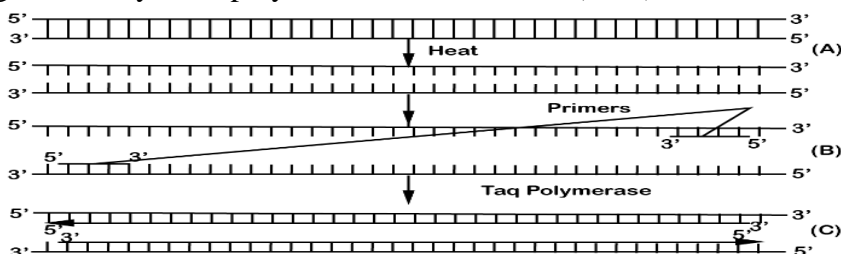
33.



- (a) Study the figure of vector pBR322 given above in which foreign DNA is ligated at the Bam HI site of the tetracycline resistance gene.
 - i. Mention the function of rop.
 - ii. What will be the selectable marker for this recombinant plasmid and why?
- (b)
 - i. A selectable marker is used in the selection of recombinants on the basis of their ability to produce colour in presence of chromogenic substrate. Explain the mechanism involved.
 - ii. Which enzyme is involved in the production of colour?

OR

- (a) In the given figure, one cycle of polymerase chain reaction (PCR) is shown-



- i. Name the steps A and B.
 - ii. State the contribution of the bacterium *Thermus aquaticus* in this process.
- (b) Explain any three properties which a good vector must possess?
