PRACTICE PAPER - 01

Maximum Time: 3 hours **MM: 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. Embryo sac is to ovule as _____ is to an anther.
   (A) stamen (B) filament
   (C) pollen grain (D) androecium [1]
2. Match the assistant reproductive technique given in column A with their description given in column B.

	Column A		Column B
(a)	GIFT	(i)	Both eggs and sperm are transferred into the Fallopian tubes in a procedure called laparoscopy.
(b)	ZIFT	(ii)	It is used when blockage in uterine tube prevents the normal binding of sperm to egg.
(c)	ICSI	(iii)	A single sperm is injected directly into each egg to carry out fertilisation.
(d)	IUI	(iv)	It involves placing sperm inside a woman's uterus to facilitate fertilisation.

   Options :
   (A) (a) – (i), (b) – (ii), (c) – (iii), (d) – (iv) (B) (a) – (ii), (b) – (iii), (c) – (i), (d) – (iv)
   (C) (a) – (iii), (b) – (ii), (c) – (iv), (d) – (i) (D) (a) – (iv), (b) – (i), (c) – (ii), (d) – (iii) [1]
3. ZZ / ZW type of sex determination is seen in
   (A) *Platypus*. (B) snails.
   (C) cockroach. (D) peacock. [1]
4. A nucleoside differs from a nucleotide because it lacks the
   (A) Base. (B) Sugar.
   (C) Phosphate group. (D) Hydroxyl group. [1]
5. The chemical test that is used for diagnosis of typhoid is:
   (A) ELISA-Test. (B) ESR-Test.
   (C) PCR-Test. (D) Widal-Test. [1]
6. The substance produced by a cell in viral infection that can protect other cells from further infection is:
   (A) serotonin. (B) colostrum.
   (C) interferon. (D) histamine. [1]
7. Match the following list of bioactive substances and their roles.

	Bioactive substance		Role
(a)	Statins	(i)	Removal of oil stains
(b)	Cyclosporine A	(ii)	Removal of clots from blood vessels
(c)	Streptokinase	(iii)	Lowering of blood cholesterol
(d)	Lipase	(iv)	Immuno-suppressive agent

   Choose the correct match.
   (A) (a) – (ii), (b) – (iii), (c) – (i), (d) – (iv) (B) (a) – (iv), (b) – (ii), (c) – (i), (d) – (iii)
   (C) (a) – (iv), (b) – (iii), (c) – (ii), (d) – (i) (D) (a) – (iii), (b) – (iv), (c) – (ii), (d) – (i) [1]
8. The most important feature in a plasmid to be used as a vector is
   (A) origin of replication (ori). (B) presence of a selectable marker.
   (C) presence of sites for restriction endonuclease. (D) its size. [1]

9. A population has more young individuals compared to the older individuals. What would be the status of the population after some years?
(A) It will decline
(B) It will stabilize
(C) It will increase
(D) It will first decline and then stabilize [1]

10. Lichens are the associations of:
(A) Bacteria and fungus
(B) Algae and bacterium
(C) Fungus and algae
(D) Fungus and virus [1]

11. Match the animals given in column A with their location in column B.

	Column A Plant Name		Column B Type
A	*Hydrilla*	(i)	Rooted emergent
B	*Typha*	(ii)	Rooted with floating leaves
C	*Vallisneria*	(iii)	Submerged hydrophyte
D	*Nymphaea*	(iv)	Rooted submerged hydrophytes

Choose the correct match from the following:
(A) A – (i), B – (iii), C– (iv), D – (ii)
(B) A – (ii), B – (iii), C – (i), D – (iv)
(C) A – (iii), B – (i), C – (iv), D – (ii)
(D) A – (i), B – (ii), C – (iv), D – (iii) [1]

12. Select the statement which best explains the term parasitism.
(A) One organism is benefited.
(B) Both the organisms are benefited.
(C) One organism is benefited, other is not affected.
(D) One organism is benefited, other is affected. [1]

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):** Urethra in human male act as a urinogenital canal.
Reason (R): Urethra carries only urine while sperms are carried by vas deferens only. [1]

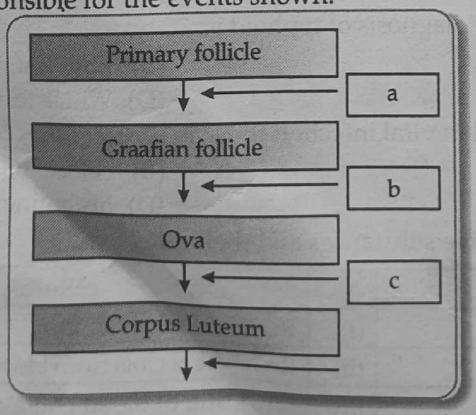
14. **Assertion (A):** ABO blood group in human being is an example of multiple allelism.
Reason (R): It has three alleles for the gene I i.e., I^A, I^B, i. [1]

15. **Assertion (A):** Chargaff's rule is applicable to RNA.
Reason (R): RNA contains ribose sugar in them. [1]

16. **Assertion (A):** Trophic level represents a functional level.
Reason (R): Trophic level represents a species level. [1]

SECTION - B

17. (a) Given below is a flow chart showing ovarian changes during menstrual cycle. Fill in the spaces giving the name of the hormones responsible for the events shown.



(b) Explain the menstrual cycle in human females. [2]

18. "Genes contain the information that is required to express a particular trait." Explain. [2]

19. Mention one application for each of the following :
(a) Passive immunisation
(b) Antihistamine
(c) Colostrum
(d) Cytokinin-barrier [2]

20. (a) Explain the significance of 'palindromic nucleotide sequence' in the formation of recombinant DNA.
(b) Write the use of restriction endonuclease in the above process. [2]

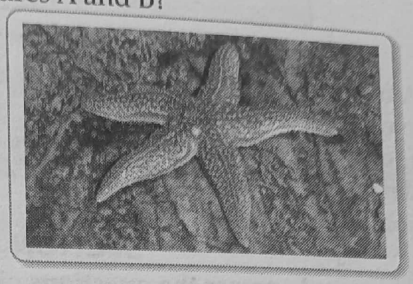
21. (a) What is common to the species shown in figures A and B?

(A)

(B)

(b) What is common to the species shown in figures A and B?

(A)



(B)

OR

[2]

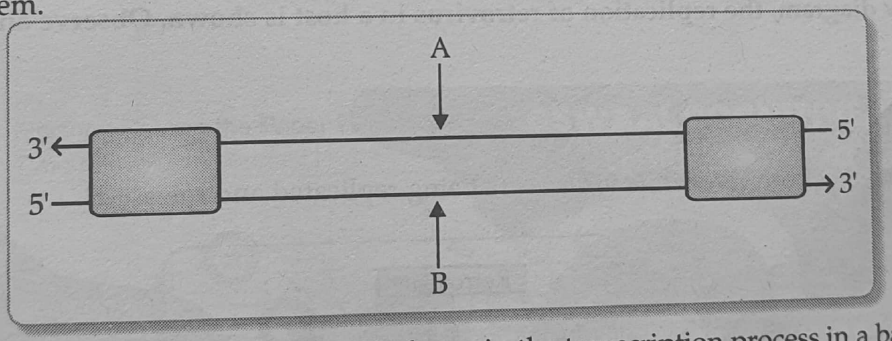
(a) Why should we conserve biodiversity?
(b) Explain the importance of biodiversity hot-spots and sacred groves. [2]

SECTION - C

22. (a) You are given castor and bean seeds. Which one of the two would you select to observe the endosperm?
(b) The development of endosperm precedes that of embryo in plants. Justify .
(c) It is said that apomixis is a type of asexual reproduction. Justify. [3]

23. (a) Trace the development of an endosperm after fertilisation with reference to coconut. Mention the importance of endosperm development.
(b) Write the importance of 'pollen bank'. [3]

24. (a) Identify strands 'A' and 'B' in the diagram of transcription unit given below and write the basis on which you identified them.



(b) State the functions of Sigma factor and *Rho* factor in the transcription process in a bacterium.
(c) Write the functions of RNA polymerase-I and RNA polymerase-III in eukaryotes. [3]

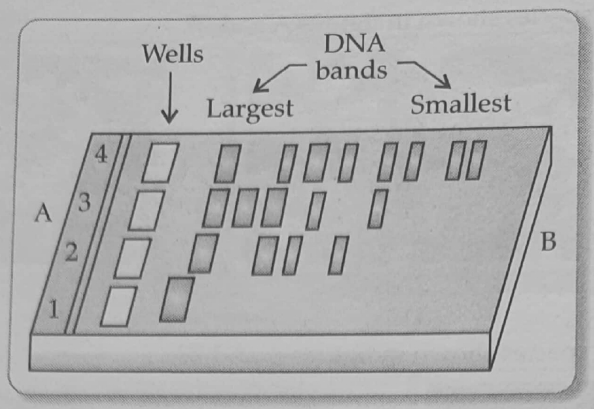
25. Name and explain the type of interaction in the following.
(a) Algae and fungi in lichens
(b) Head louse and humans
(c) Hermit crab and sea anemone. [3]
Find the suitable substratum against each adaptation.

26. Can a child have blood group O if his parents have blood group 'A' and 'B'. Explain.

OR

Differentiate between the following.
(a) Dominance and Recessive
(b) Homozygous and Heterozygous
(c) Monohybrid cross and Dihybrid cross. [3]

27. Given below is the diagram representing the observations made for separating DNA fragments by Gel electrophoresis technique. Observe the illustration and answer the questions that follow.



(a) Why are the DNA fragments seen to be moving in the direction A → B?
(b) Write the medium used on which DNA fragments separate.
(c) Mention how the separated DNA fragments can be visualised for further technical use.

28. (a) Explain any two defence mechanisms plants have evolved against their predators. [3]
(b) How does predation differ from parasitism? [3]

SECTION - D

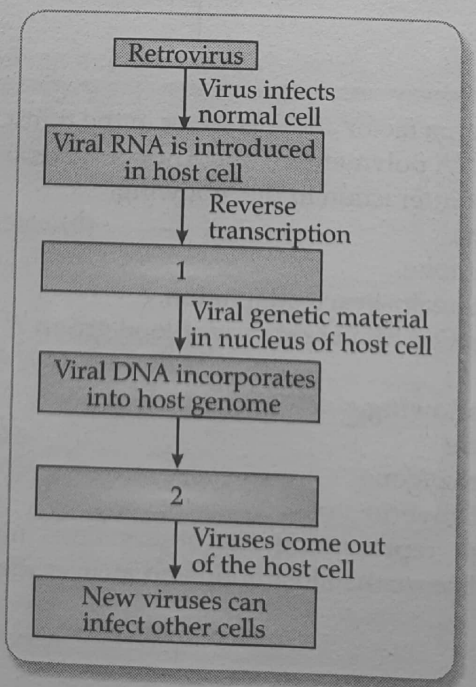
29. **Read the following passage and answer the questions given below:**
RNA was the first genetic material. There is now enough evidence to suggest that essential life processes (such as metabolism, translation, splicing, etc.), evolved around RNA. RNA used to act as a genetic material as well as a catalyst (there are some important biochemical reactions in living systems that are catalysed by RNA catalysts and not by protein enzymes). But RNA being a catalyst was reactive and hence unstable. Therefore, DNA has evolved from RNA with chemical modifications that make it more stable. DNA being double stranded and having complementary strand further resists changes by evolving a process of repair.
(a) Which nucleic acid is more reactive?
(b) Which evidence suggest that RNA used to be the genetic material rather than DNA?
(c) Name the three types of RNA. Which RNA plays structural and catalytic role during translation? [4]

OR

"DNA has evolved from RNA with chemical modifications that make it more stable". Which chemical modification is referred here?

30. **In the given flow diagram, the replication of retrovirus in a host is shown. Observe and answer the questions given below:**

(a) Identify label 1.
(b) Identify label 2.
(c) Can the infected cell survive while viruses are being replicated and released?



OR

Why the HIV virus is called retrovirus?

SECTION - E

31. The zygote passes through several developmental stages till implantation, Describe each stage briefly with suitable diagrams. [4]

OR

STDs are a threat to reproductive health. Describe any two such diseases and suggest preventive measures. [5]

32. Explain the mechanism of DNA replication with the help of a replication fork. What role does the enzyme DNA-ligase play in a DNA replication fork? [5]

OR

Given below is the sequence of coding strand of DNA in a transcription unit.

3'-AATGCAGCTATTAGG-5'.

(a) Write the sequence of:
  (i) its complementary strand.
  (ii) the mRNA.

(b) List two essential roles of ribosome during translation. [5]

33. Lakhan, a farmer cultivates cotton crops. Every year he gets fewer yield. The insects attack his crop and cause a lot of damage to the crop. His friend suggested him to grow Bt cotton to overcome this problem.

(a) Name the insect that attacks cotton crops.
(b) How Bt cotton plants overcome this problem and save the crop?
(c) Write the role of gene Cry I Ab. [5]

OR

Plants having foreign genes in their genome inserted through genetic engineering are called transgenic plants. Genes can be incorporated either through a vector or through direct introduction of DNA. Bt cotton is a genetically modified organism which is pest resistant. It contains gene cry I Ac and cry II Ab of *Bacillus thuringiensis*. It is used to control lepidopterans, coleopterans and dipterans. Bt cotton can resist cotton bollworm and produce higher yields. Cry gene produces cry protein or Bt toxin. It is an endotoxin which remains as protoxin in plants and gets converted to active toxin after getting ingested by the insects. Alkaline pH of the insect gut solubilise the protein crystals. The activated toxin creates pores in the midgut of the insects which in turn leads to their death.

(a) Why does the toxin produced by *B. thuringiensis* not kill the *Bacillus*?
(b) How man has exploited Bt toxin genes for his benefit? What type of changes occur in the gut of insects on consuming this protein? [5]