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Your JEE Guide

CBSE Class XII · Biology (044)

Sample Question Paper 5 · Session 2026-27

Time allowed: 3 hours **Maximum marks: 70**

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This is an original practice paper written to the official CBSE 2026-27 design; it is not issued by CBSE.

General instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions.
3. 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.
4. 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.
5. Wherever necessary, neat and properly labelled diagrams should be drawn.

Section A

1.	Pollination by water occurs in: (A) Vallisneria (B) sunflower (C) Salvia (D) maize	1
2.	The pollen grains of wind-pollinated flowers are usually: (A) covered with mucilage (B) brightly coloured (C) large and sticky (D) light and non-sticky	1
3.	How many meiotic divisions are needed to form 100 pollen grains? (A) 75 (B) 50 (C) 25 (D) 100	1
4.	Which of the following hormones is NOT produced by the human placenta? (A) hPL (B) FSH (C) hCG (D) progesterone	1
5.	Spermiation is the: (A) transformation of spermatids into sperms (B) formation of spermatogonia (C) release of sperms from the seminiferous tubules (D) formation of spermatids	1

6.	Medical termination of pregnancy is considered relatively safe up to: (A) any stage of pregnancy (B) 24 weeks of pregnancy (C) 30 weeks of pregnancy (D) 12 weeks of pregnancy	1
7.	The ABO blood groups in humans are controlled by the gene I, which has: (A) three alleles (B) four alleles (C) six alleles (D) two alleles	1
8.	Which of the following is a chromosomal disorder? (A) sickle-cell anaemia (B) Turner's syndrome (C) colour blindness (D) haemophilia	1
9.	The VNTRs used in DNA fingerprinting belong to: (A) satellite DNA (B) tRNA genes (C) mRNA (D) the coding sequences of genes	1
10.	Industrial melanism in the peppered moth is an example of: (A) mutation theory (B) use and disuse of organs (C) natural selection (D) genetic drift	1
11.	The antibody present in colostrum, which protects the newborn, is: (A) IgM (B) IgE (C) IgG (D) IgA	1
12.	The "clot buster" streptokinase is obtained from the bacterium: (A) Clostridium (B) Streptococcus (C) Streptomyces (D) Lactobacillus	1
13.	**Assertion (A):** The seeds of some species remain viable for hundreds of years. **Reason (R):** In a dormant seed, metabolic activity is very low and water content is greatly reduced. (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.	1
14.	**Assertion (A):** DNA is acidic in nature. **Reason (R):** DNA contains thymine in place of uracil. (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.	1
15.	**Assertion (A):** Bt toxin kills the insects that feed on Bt cotton. **Reason (R):** Bt toxin is active inside the cells of Bacillus thuringiensis. (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.	1

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16.	**Assertion (A):** Lichens are an example of commensalism. **Reason (R):** In a lichen, a fungus and a photosynthesising alga live in close association that benefits both. (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.	1

Section B

17.	How is artificial hybridisation carried out when the female parent bears unisexual flowers? **OR** What is self-incompatibility? How does it prevent self-pollination from leading to fertilisation?	2
18.	In which animals does a menstrual cycle occur? What are menarche and menopause?	2
19.	A DNA sample was cut into fragments of 3000, 1500 and 500 base pairs and separated by agarose gel electrophoresis. Which fragment will remain closest to the well? Explain. **OR** What are sticky ends? Why are they useful in genetic engineering?	2
20.	Give two reasons for producing transgenic animals, with one example of each.	2
21.	Define population density. Why is it not always measured as the number of individuals? Give one example. **OR** What is parasitism? Give an example of a parasite that needs two intermediate hosts.	2

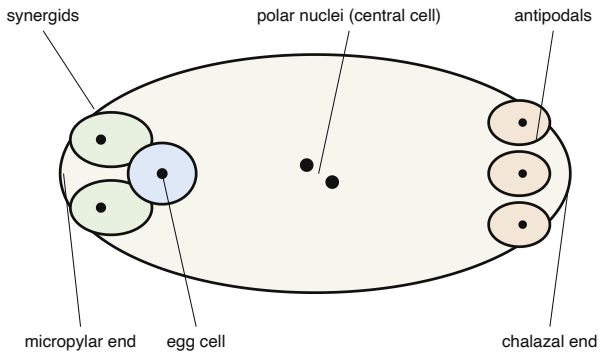
Section C

22.	State two advantages that seeds offer to flowering plants. What happens to the water content and metabolism of a seed as it matures?	3
23.	Describe the events of fertilisation in humans. When is the sex of the baby decided?	3
24.	What is meant by reproductive health according to WHO? Suggest two measures to build a reproductively healthy society.	3
25.	Explain how ABO blood groups show both multiple allelism and codominance. Write the possible genotypes of persons with blood groups A and B.	3

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26.	What is the central dogma of molecular biology? Name an exception to it. Why does mRNA have untranslated regions?	3
27.	How does a normal cell become a cancer cell? Name two methods of detecting cancer.	3
28.	(a) Name the yeast used to produce ethanol and alcoholic beverages. (b) Why are whisky and rum distilled while wine and beer are not? (c) Name one enzyme made by microbes and state its use.	3

Section D

29.	**Case study.** The figure shows the mature female gametophyte of a flowering plant just before fertilisation.  (i) How many cells and nuclei does it have? *[1]* (ii) Which cell forms the endosperm after fertilisation? *[1]* (iii) What is the role of the synergids and of the filiform apparatus? *[2]* **OR** (iii) What happens to the synergids and the antipodals after fertilisation? *[2]*	4
30.	**Case study.** The hepatitis B vaccine is now made from yeast. Using recombinant DNA technology, the antigenic polypeptide of the pathogen is produced in yeast and used as a vaccine. A person bitten by a snake, by contrast, is injected with preformed antibodies. (i) Is vaccination active or passive immunisation? *[1]* (ii) Which cells formed after vaccination give protection later? *[1]* (iii) Why are preformed antibodies, not a vaccine, given after a snake bite? *[2]* **OR** (iii) How does a newborn baby get passive immunity from its mother? *[2]*	4

Section E

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31.	(a) Distinguish between autogamy, geitonogamy and xenogamy. (b) List three features of wind-pollinated flowers. (c) Describe pollination in Vallisneria. **OR** (a) Describe three natural methods of contraception. (b) Name two barrier methods. (c) What are the surgical methods of contraception in males and females?	5
32.	(a) What is a point mutation? Give an example of a disorder caused by one. (b) Explain frameshift mutations, using the sentence RAM HAS RED CAP to illustrate the effect of an insertion and a deletion. (c) Name two mutagens. **OR** (a) What were Lamarck's and Darwin's explanations of evolution? (b) Explain adaptive radiation with the example of Australian marsupials. (c) How is the existence of both placental and marsupial mammals in Australia an example of convergent evolution?	5
33.	(a) On what principle is ELISA based? What does it detect? (b) Why are conventional methods of diagnosis unable to detect an infection early, and how does PCR help? (c) How is a mutated gene detected using a probe? **OR** (a) Name the three types of ecological pyramids. Why is the pyramid of energy always upright? (b) Draw a pyramid of energy. (c) State two limitations of ecological pyramids.	5

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Answers and Marking Scheme

Marks for each step are shown in brackets. Any correct alternative method gets full credit.

Section A

1. **(A)** Vallisneria. *Working:* Also in Hydrilla and the sea grass Zostera.

2. **(D)** light and non-sticky. *Working:* So that they can be carried by wind currents.

3. **(C)** 25. *Working:* Each meiosis of a pollen mother cell gives a tetrad of four microspores.

4. **(B)** FSH. *Working:* The placenta secretes hCG, hPL, oestrogens and progestogens; FSH comes from the anterior pituitary.

5. **(C)** release of sperms from the seminiferous tubules. *Working:* The transformation of spermatids is spermiogenesis.

6. **(D)** 12 weeks of pregnancy. *Working:* That is, during the first trimester.

7. **(A)** three alleles. *Working:* I^A, I^B and i, giving six genotypes.

8. **(B)** Turner's syndrome. *Working:* Turner's syndrome (45, X0) is due to the absence of one X chromosome.

9. **(A)** satellite DNA. *Working:* VNTRs are a class of satellite (repetitive) DNA.

10. **(C)** natural selection. *Working:* Dark moths had better survival on soot-covered tree trunks.

11. **(D)** IgA. *Working:* Colostrum has abundant IgA.

12. **(B)** Streptococcus. *Working:* It is used to remove clots from blood vessels of patients with myocardial infarction.

13. **(A)** Both A and R are true, and R is the correct explanation of A. *Working:* For example, a 2000-year-old date palm (Phoenix dactylifera) seed was found to be viable.

14. **(B)** Both A and R are true, and R is not the correct explanation of A. *Working:* Both are true, but DNA is acidic because of its phosphate groups.

15. **(C)** A is true but R is false. *Working:* A is true. R is false: the toxin exists as an inactive protoxin in the bacterium and is activated only in the alkaline gut of the insect.

16. **(D)** A is false but R is true. *Working:* A is false: a lichen is an example of mutualism. R is true.

Section B

17. Emasculation is not needed (½). The female flower buds are bagged before the flowers open (½). When the stigma becomes receptive, it is dusted with pollen from the desired male parent and the flower is rebagged (1).

OR A genetic mechanism that prevents pollen from fertilising the ovules of the same flower or of other flowers on the same plant (1). It inhibits pollen germination or pollen-tube growth in the pistil (1).

18. In the females of primates, such as monkeys, apes and humans (1). Menarche is the first menstruation, at puberty; menopause is the stopping of menstrual cycles, at around 50 years of

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age (1).

19. The 3000 bp fragment (1). DNA fragments are separated by size through the sieving effect of the agarose gel: the smaller the fragment, the farther it moves (1).

OR Single-stranded overhanging stretches left at the ends of DNA cut by restriction enzymes such as EcoRI (1). They form hydrogen bonds with complementary cut ends, which helps DNA ligase join DNA from different sources (1).

20. Any two, 1 mark each: to study normal physiology and development (e.g. genes regulating insulin-like growth factor); to study diseases and find treatments (models for cancer, cystic fibrosis, rheumatoid arthritis, Alzheimer's); to make biological products (α-1-antitrypsin for emphysema); to test vaccine safety (transgenic mice for polio vaccine); to test chemical safety (toxicity testing).

21. The number of individuals of a species per unit area or volume (1). Counting is sometimes impossible or not meaningful, so relative measures are used: e.g. percentage cover or biomass for plants (one huge banyan tree versus many Parthenium plants), or pugmarks and faecal pellets to estimate tiger numbers (1).

OR An interaction in which one species (the parasite) benefits at the expense of the other (the host) (1). The human liver fluke, which depends on a snail and a fish as intermediate hosts (1).

Section C

22. Any two advantages: pollination and fertilisation are independent of water, so seed formation is more dependable; seeds can be dispersed to new habitats; they have food reserves that nourish the seedling until it can photosynthesise; the hard seed coat protects the embryo; being products of sexual reproduction they give new genetic combinations (2). The water content falls to about 10–15% of the seed mass, and metabolic activity slows down; the embryo may enter dormancy (1).

23. When a sperm comes in contact with the zona pellucida of the ovum, it induces changes in the membrane that block the entry of other sperms, so only one sperm fertilises the ovum (1). Secretions of the acrosome help the sperm enter the cytoplasm; this induces completion of meiosis II of the secondary oocyte, forming the ovum and the second polar body, and the haploid nuclei of the sperm and ovum fuse to form a diploid zygote (1). The sex is decided at fertilisation, by whether the sperm carries an X or a Y chromosome (1).

24. Total well-being in all aspects of reproduction: physical, emotional, behavioural and social (1). Any two: sex education in schools; awareness about STIs and AIDS and about birth-control options; proper care of pregnant mothers and post-natal care of mother and child; encouraging breastfeeding; equal opportunity for the male and female child; legal checks on female foeticide (2).

25. The gene I has three alleles, I^A, I^B and i, so it shows multiple alleles; a person carries any two (1). I^A and I^B are both dominant over i, but when present together both are expressed, giving group AB: codominance (1). Group A: I^AI^A or I^Ai; group B: I^BI^B or I^Bi (1).

26. Genetic information flows from DNA to RNA to protein (DNA → mRNA → protein), as proposed by Francis Crick (1). In some viruses information flows in reverse, from RNA to DNA

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(reverse transcription) (1). The untranslated regions at the 5′ and 3′ ends of mRNA are needed for efficient translation (1).

27. Physical, chemical or biological agents (carcinogens) such as X-rays, gamma rays, UV rays and the chemicals in tobacco smoke cause transformation of normal cells into cancerous (neoplastic) cells (1). Oncogenic viruses carry viral oncogenes; normal cells contain proto-oncogenes, which can be activated under certain conditions and lead to oncogenic transformation (1). Any two: biopsy and histopathological studies; blood and bone-marrow tests; radiography (X-rays), CT and MRI; antibodies against cancer-specific antigens (1).

28. (a) Saccharomyces cerevisiae (brewer's yeast), which ferments malted cereals and fruit juices (1). (b) Wine and beer are made without distillation; whisky, brandy and rum are made by distilling the fermented broth, which concentrates the alcohol (1). (c) Lipases, used in detergents to remove oily stains; or pectinases and proteases, used to clarify bottled fruit juices (1).

Section D

29. (i) 7 cells and 8 nuclei.
(ii) The central cell (with its two polar nuclei), which forms the primary endosperm nucleus.
(iii) The synergids, with the egg, form the egg apparatus. The filiform apparatus (cellular thickenings at the micropylar tip of the synergids) guides the pollen tube into the synergid, where the male gametes are released. **OR** They degenerate.

30. (i) Active immunisation.
(ii) Memory B and T cells.
(iii) A quick immune response is needed. Preformed antibodies (antitoxin) act at once against the venom, which is passive immunisation; a vaccine would take time for the body to make its own antibodies. **OR** Antibodies pass from the mother through the placenta to the foetus during pregnancy, and the colostrum secreted during the first days of lactation has abundant IgA antibodies.

Section E

31. (a) Autogamy: pollen transferred from the anther to the stigma of the same flower. Geitonogamy: to another flower of the same plant. Xenogamy: to a flower of a different plant (1½). (b) Any three: light, non-sticky pollen; well-exposed stamens; large, often feathery stigma; flowers often packed in an inflorescence (as the corn cob); a single ovule in each ovary (1½). (c) The female flower reaches the water surface on a long stalk; male flowers or pollen grains are released on the surface of the water and carried passively by water currents, and some reach the female flowers and the stigma (2).

OR (a) Periodic abstinence: avoiding coitus from day 10 to day 17 of the menstrual cycle, when ovulation is expected (the fertile period) (1). Coitus interruptus (withdrawal) before ejaculation (½). Lactational amenorrhoea: absence of menstruation and ovulation during intense breastfeeding, effective up to about six months after parturition (1). (b) Any two: condoms (male and female), diaphragms, cervical caps, vaults (1). (c) Vasectomy: a small part of the vas deferens is removed or tied up. Tubectomy: a small part of the fallopian tube is removed or tied up (1½).

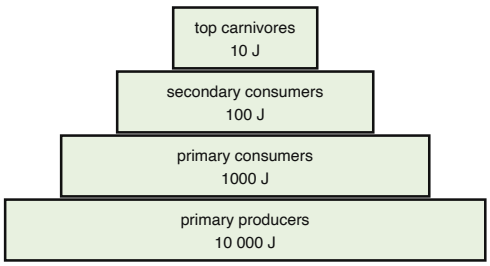
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32. (a) A mutation due to a change in a single base pair of DNA (1), e.g. sickle-cell anaemia (½). (b) Insertion or deletion of one or two bases changes the reading frame from that point onwards (1). Inserting B after HAS gives RAM HAS BRE DCA P…; deleting the R of RED gives RAM HAS EDC AP…; inserting or deleting three bases adds or removes one "word" and the reading frame is restored beyond it (1½). (c) Any two: UV radiation, X-rays, chemical mutagens (1).

OR (a) Lamarck: evolution is driven by use and disuse of organs, e.g. giraffes elongated their necks by stretching to reach leaves on tall trees and passed this on (1). Darwin: branching descent and natural selection; individuals with useful variations survive and leave more progeny (1). (b) Starting from a point in a geographical area, different species evolve to radiate into other habitats; a number of marsupials, each different from the other, evolved from an ancestral stock within the Australian island continent (1½). (c) Placental mammals in Australia also show adaptive radiation into varieties that resemble the corresponding marsupials (e.g. the placental wolf and the Tasmanian wolf), because similar habitats select similar forms (1½).

33. (a) Antigen–antibody interaction (1). It detects infection by the presence of antigens of the pathogen (proteins, glycoproteins) or of antibodies made against the pathogen (1). (b) Conventional methods (serum and urine analysis) cannot detect a pathogen until its concentration is high enough to cause symptoms (½). PCR amplifies even very low amounts of the pathogen's DNA, so it is used to detect HIV in suspected AIDS patients and mutations in genes of suspected cancer patients (1½). (c) A single-stranded DNA or RNA probe tagged with a radioactive molecule is allowed to hybridise to its complementary DNA in a clone of cells and detected by autoradiography; the clone with the mutated gene does not show on the film because the probe does not complement it (1).

OR (a) Pyramids of number, biomass and energy (1). Energy flows in one direction, and at each trophic level some energy is lost as heat, so less energy is available at each higher level (1). (b) Pyramid (1):



(c) Any two: they do not consider the same species belonging to two or more trophic levels; they assume a simple food chain, which hardly occurs in nature, and do not represent a food web; saprophytes are not given a place even though they play a vital role (2).

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