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Your JEE Guide

CBSE Class XII · Biology (044)

Sample Question Paper 6 · 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.	The intine of a pollen grain is made up of: (A) cellulose and pectin (B) suberin (C) sporopollenin (D) lignin	1
2.	The scutellum is the: (A) endosperm of maize (B) radicle of a grass embryo (C) cotyledon of a grass embryo (D) seed coat of a bean	1
3.	Which of the following is an example of a parthenocarpic fruit? (A) apple (B) mango (C) strawberry (D) banana	1
4.	Which of the following is a hormone-releasing IUD? (A) Multiload 375 (B) LNG-20 (C) Lippes loop (D) CuT	1
5.	A morula is the embryo with: (A) 2 blastomeres (B) 8 to 16 blastomeres (C) three germ layers (D) a trophoblast and an inner cell mass	1
6.	The endometrium regenerates during the: (A) follicular (proliferative) phase (B) ovulatory phase (C) luteal phase (D) menstrual phase	1

7.	A colour-blind man marries a woman who is neither colour blind nor a carrier. The probability that their son is colour blind is: (A) 1 (B) ½ (C) 0 (D) ¼	1
8.	Which of the following is a stop codon? (A) GGG (B) AUG (C) UUU (D) UAG	1
9.	The human genome has approximately: (A) 3×10^4 base pairs (B) 3×10^{12} base pairs (C) 3×10^9 base pairs (D) 3×10^6 base pairs	1
10.	The flippers of penguins and of dolphins are an example of: (A) homologous organs (B) convergent evolution (C) vestigial organs (D) divergent evolution	1
11.	Elephantiasis (filariasis) is caused by: (A) Entamoeba (B) Plasmodium (C) Ascaris (D) Wuchereria	1
12.	Which of the following is a method of ex situ conservation? (A) cryopreservation of gametes (B) biosphere reserve (C) national park (D) sacred grove	1
13.	**Assertion (A):** Typhoid is spread through contaminated food and water. **Reason (R):** Salmonella typhi enters the small intestine through contaminated food and water and migrates to other organs through the blood. (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):** In a test cross, an F_1 individual is crossed with its dominant parent. **Reason (R):** A test cross is used to find the genotype of an individual showing the dominant phenotype. (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):** Restriction endonucleases are found in bacteria. **Reason (R):** Restriction endonucleases cut DNA at specific palindromic sequences. (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):** Mutations are random and directionless. **Reason (R):** Mutations are caused only by UV radiation. (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.	Which cells are found at the micropylar end and which at the chalazal end of a mature embryo sac? **OR** What does each of the following develop into after fertilisation: (i) ovule, (ii) ovary, (iii) integuments, (iv) zygote?	2
18.	Name the hormone responsible for (a) the development of male secondary sexual characters, and (b) the maintenance of the endometrium. Name the source of each.	2
19.	Give two reasons why Drosophila melanogaster was found very suitable for genetic studies. **OR** Distinguish between aneuploidy and polyploidy.	2
20.	What is the Ti plasmid? How has it been used in genetic engineering?	2
21.	What are co-extinctions? Give one example. **OR** Why are alien species a threat to native species? Give two examples.	2

Section C

22.	Distinguish between chasmogamous and cleistogamous flowers. Why do cleistogamous flowers give an assured seed set? Name a plant that has both types of flowers.	3
23.	State the roles of the placenta, the umbilical cord and the stem cells of the inner cell mass during pregnancy.	3
24.	Give three possible causes of infertility. What is artificial insemination, and when is it used?	3
25.	Explain the chromosomal theory of inheritance. Who proposed it?	3
26.	Why is tRNA called an adapter molecule? Describe its structure.	3
27.	Name the causative organism and mode of transmission of (a) amoebiasis, (b) ascariasis and (c) elephantiasis.	3

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28.	What is biocontrol? State how each of the following is used for it: (a) ladybird and dragonflies, (b) Trichoderma, (c) Nucleopolyhedrovirus.	3

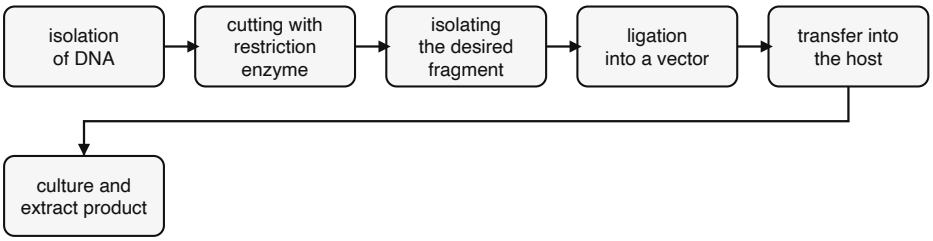
Section D

29.	**Case study.** Mendel crossed true-breeding tall pea plants with true-breeding dwarf ones. All the F_1 plants were tall. When the F_1 plants were self-pollinated, he obtained 787 tall and 277 dwarf plants in the F_2. (i) What is the approximate ratio of tall to dwarf plants in the F_2? *[1]* (ii) Which trait is dominant? How do you know? *[1]* (iii) Use a Punnett square to explain the F_2 result. Which law does it illustrate? *[2]* **OR** (iii) How would you find out whether a tall F_2 plant is homozygous or heterozygous? *[2]*	4
30.	**Case study.** India has only 2.4 per cent of the world's land area, but its share of the global species diversity is about 8.1 per cent. It has more than 45 000 recorded species of plants and twice as many of animals, and is one of the 12 mega-diversity countries of the world. (i) What is the share of India in the global species diversity? *[1]* (ii) What is meant by a mega-diversity country? *[1]* (iii) Why are global estimates of the total number of species uncertain? What did Robert May estimate? *[2]* **OR** (iii) What is genetic diversity? Give two examples from India. *[2]*	4

Section E

31.	(a) Describe the structure of the human oviduct and uterus. (b) What is the role of the fimbriae? (c) Name the three layers of the uterine wall and state the role of any one. **OR** (a) Describe megasporogenesis. (b) Describe how the functional megaspore develops into the embryo sac. (c) Why is this called monosporic development?	5
32.	(a) With one example each, distinguish between dominance, incomplete dominance and codominance. (b) What is pleiotropy? Give a human example. (c) Why is human skin colour an example of polygenic inheritance? **OR** (a) List the salient features of the double-helix model of DNA. (b) State Chargaff's rule. (c) Who obtained the X-ray diffraction data used by Watson and Crick?	5

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33.	(a) Explain three ways in which predators are important in an ecosystem. (b) Give one example each of a chemical and a morphological defence of plants against herbivores. (c) How does the monarch butterfly avoid being eaten? **OR** (a) The flow chart shows the steps of recombinant DNA technology. Explain each step briefly. (b) What is downstream processing?  	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)** cellulose and pectin. *Working:* The exine is made of sporopollenin.

2. **(C)** cotyledon of a grass embryo. *Working:* Grass embryos have one shield-shaped cotyledon on one side of the axis.

3. **(D)** banana. *Working:* Banana develops without fertilisation.

4. **(B)** LNG-20. *Working:* Progestasert and LNG-20 release hormones.

5. **(B)** 8 to 16 blastomeres. *Working:* The morula develops into the blastocyst.

6. **(A)** follicular (proliferative) phase. *Working:* Rising oestrogen from the growing follicles causes this.

7. **(C)** 0. *Working:* Sons get their X chromosome from the mother, who has only normal alleles.

8. **(D)** UAG. *Working:* UAA, UAG and UGA are stop codons.

9. **(C)** 3×10^9 base pairs. *Working:* About 3164.7 million base pairs.

10. **(B)** convergent evolution. *Working:* They are analogous structures.

11. **(D)** Wuchereria. *Working:* W. bancrofti and W. malayi, transmitted by female mosquitoes.

12. **(A)** cryopreservation of gametes. *Working:* Gametes of threatened species can be preserved in viable and fertile condition for long periods.

13. **(A)** Both A and R are true, and R is the correct explanation of A. *Working:* R gives the route of infection.

14. **(D)** A is false but R is true. *Working:* A is false: a test cross is made with the recessive parent. R is true.

15. **(B)** Both A and R are true, and R is not the correct explanation of A. *Working:* Both are true, but R does not explain why bacteria have them (they restrict the growth of bacteriophages).

16. **(C)** A is true but R is false. *Working:* A is true. R is false: many physical and chemical agents cause mutations, and mutations also occur spontaneously.

Section B

17. Micropylar end: the egg apparatus, i.e. two synergids and one egg cell (1). Chalazal end: three antipodal cells (1).

OR (i) Seed, (ii) fruit, (iii) seed coat, (iv) embryo (½ each).

18. (a) Androgens (testosterone), from the Leydig cells of the testis (1). (b) Progesterone, from the corpus luteum (1).

19. Any two, 1 mark each: it can be grown on a simple synthetic medium in the laboratory; it completes its life cycle in about two weeks; a single mating produces a large number of progeny;

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the male and female are clearly distinguishable; it has many hereditary variations that can be seen with a low-power microscope.

OR Aneuploidy: gain or loss of one or a few chromosomes, due to failure of segregation of chromatids during cell division (1). Polyploidy: increase in whole sets of chromosomes, due to failure of cytokinesis after telophase; it is often seen in plants (1).

20. The tumour-inducing plasmid of Agrobacterium tumefaciens, a pathogen of several dicot plants, which delivers a piece of DNA (T-DNA) that transforms normal plant cells into tumour cells (1). It has been modified into a cloning vector that is no longer pathogenic but can still deliver genes of interest into a variety of plants (1).

21. When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct (1). Example: when a host fish species becomes extinct, its unique assemblage of parasites also becomes extinct; or a plant and its pollinator in co-evolved mutualism (1).

OR Some introduced species turn invasive and cause decline or extinction of indigenous species (1). Any two: the Nile perch introduced into Lake Victoria led to the extinction of more than 200 species of cichlid fish; Parthenium (carrot grass), Lantana and water hyacinth (Eichhornia); the African catfish Clarias gariepinus threatening indigenous catfishes (1).

Section C

22. Chasmogamous flowers are similar to other flowers, with exposed anthers and stigma; cleistogamous flowers do not open at all (1). In cleistogamous flowers, anthers and stigma lie close to each other, and pollen falls on the stigma when the anthers dehisce, so self-pollination is assured even without pollinators (1). Viola (common pansy), Oxalis or Commelina (1).

23. The placenta supplies oxygen and nutrients to the embryo, removes carbon dioxide and wastes, and acts as an endocrine tissue (1). The umbilical cord connects the placenta to the embryo and helps transport substances to and from the embryo (1). The inner cell mass contains stem cells, which can give rise to all the tissues and organs; it differentiates into the ectoderm, mesoderm and endoderm (1).

24. Physical, congenital, diseases, drugs, immunological or even psychological causes (any three) (1). Artificial insemination: semen collected from the husband or a healthy donor is introduced artificially into the vagina or into the uterus (IUI, intra-uterine insemination) (1). It is used when the male partner is unable to inseminate the female or has a very low sperm count (1).

25. Sutton and Boveri (½). Genes are located on chromosomes, and the behaviour of chromosomes in meiosis explains Mendel's laws (½). Chromosomes, like genes, occur in pairs; the two alleles of a gene pair are located on homologous chromosomes at the same site (1). Homologous chromosomes segregate during gamete formation so that only one of each pair goes to a gamete, and different pairs segregate independently (1).

26. tRNA reads the code on mRNA through its anticodon and also carries the specific amino acid, linking the language of nucleotides with that of amino acids (1). It has an anticodon loop with bases complementary to the codon, and an amino-acid acceptor end where the amino acid binds (1). Its secondary structure looks like a clover leaf; in three dimensions it is an inverted L shape.

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There is a specific tRNA for each amino acid, a special initiator tRNA, and no tRNA for stop codons (1).

27. (a) Entamoeba histolytica; houseflies act as mechanical carriers, transmitting the parasite through faecally contaminated food and water (1). (b) Ascaris; eggs passed in the faeces of infected persons contaminate soil, water and plants, and a healthy person gets infected through contaminated water, vegetables and fruits (1). (c) Wuchereria (W. bancrofti, W. malayi); transmitted by the bite of female mosquito vectors (1).

28. Use of biological methods to control plant diseases and pests (½). (a) Ladybird beetles eat aphids, and dragonflies eat mosquitoes (½). (b) Trichoderma, a free-living fungus of root ecosystems, is an effective biocontrol agent of several plant pathogens (1). (c) Baculoviruses of the genus Nucleopolyhedrovirus attack insects and other arthropods; they are species-specific, narrow-spectrum insecticides with no harm to non-target organisms, useful in IPM (1).

Section D

29. (i) 787 : 277 ≈ 2.84 : 1, i.e. about 3 : 1.
(ii) Tall, because it alone appears in the F_1.
(iii) F_1 (Tt) forms T and t gametes in equal numbers; random fusion gives TT : Tt : tt = 1 : 2 : 1, i.e. 3 tall : 1 dwarf.

	T	t
T	TT	Tt
t	Tt	tt

Law of segregation: the two alleles of a pair separate during gamete formation. **OR** By a test cross with a dwarf (tt) plant: if all offspring are tall the plant is TT; if tall and dwarf appear in a 1 : 1 ratio it is Tt.

30. (i) About 8.1 per cent.
(ii) One of the few countries that together hold a very large share of the world's species diversity.
(iii) Many species, especially insects and microbes in the tropics, have not been discovered or described; estimates are extrapolated from the ratios in well-studied groups. Robert May estimated about 7 million species globally. **OR** Diversity at the genetic level within a species. Examples: Rauwolfia vomitoria growing in different Himalayan ranges varies in the potency and concentration of reserpine; India has more than 50 000 strains of rice and about 1000 varieties of mango.

Section E

31. (a) Each oviduct (fallopian tube) is about 10–12 cm long; its parts are the funnel-shaped infundibulum near the ovary, the wider ampulla and the narrow isthmus, which joins the uterus (1½). The uterus (womb) is a single, inverted-pear-shaped organ supported by ligaments; it opens into the vagina through a narrow cervix (1). (b) The finger-like fimbriae on the edge of the infundibulum help collect the ovum after ovulation (1). (c) Perimetrium (outer), myometrium (middle, thick smooth muscle that contracts strongly during delivery) and endometrium (inner glandular layer that changes during the menstrual cycle) (1½).

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OR (a) A megaspore mother cell (MMC) differentiates in the micropylar region of the nucellus (1). It undergoes meiosis to form four megaspores, of which one is usually functional and the other three degenerate (1). (b) The nucleus of the functional megaspore divides mitotically three times, giving 2, 4 and then 8 free nuclei, four at each pole (1); cell walls are then laid down, organising the 7-celled, 8-nucleate embryo sac with the egg apparatus, the antipodals and the central cell with two polar nuclei (1). (c) Because the embryo sac forms from a single megaspore (1).

32. (a) Dominance: in a heterozygote only one allele is expressed, e.g. Tt pea plants are tall (1). Incomplete dominance: the heterozygote is intermediate, e.g. pink flowers (Rr) in snapdragon (½). Codominance: both alleles are expressed, e.g. AB blood group (½). (b) A single gene affecting several phenotypic traits (1); e.g. phenylketonuria, caused by a mutation in the gene for phenylalanine hydroxylase, which shows several effects such as mental retardation and reduced hair and skin pigmentation (1). (c) It is controlled by three genes (A, B, C), each adding to the effect; AABBCC is darkest, aabbcc lightest, and many intermediate shades occur (1).

OR (a) Two polynucleotide chains with a sugar–phosphate backbone and bases projecting inwards (½); the chains are antiparallel (½); bases pair specifically, A with T by two hydrogen bonds and G with C by three (1); the chains are coiled in a right-handed fashion, the pitch is 3.4 nm with about 10 bp per turn, so the distance between bp is about 0.34 nm (1); the plane of one base pair stacks over the next (½). (b) In double-stranded DNA, A = T and G = C, so (A + G) = (C + T) (1). (c) Maurice Wilkins and Rosalind Franklin (½).

33. (a) They transfer energy across trophic levels; keep prey populations under control (e.g. the prickly pear cactus in Australia was controlled by a cactus-feeding moth); and maintain species diversity by reducing competition among prey: when the starfish Pisaster was removed from an intertidal community, more than 10 invertebrate species became extinct within a year (3). (b) Chemical: Calotropis produces highly poisonous cardiac glycosides; morphological: thorns in Acacia and cactus (1). (c) It is distasteful to its predator (birds) because of a chemical it acquires by feeding on a poisonous weed during its caterpillar stage (1).

OR (a) DNA is isolated and cut into fragments with restriction enzymes; the fragment with the gene of interest is separated by gel electrophoresis and eluted (1). It is ligated into a vector cut with the same enzyme, using DNA ligase, to form recombinant DNA (1). The rDNA is transferred into a competent host (e.g. E. coli); transformed cells are selected and grown on a large scale in bioreactors so that the gene product is formed (1). (b) The processes the product goes through before it is ready for marketing: separation and purification, formulation with suitable preservatives, and, for drugs, clinical trials and strict quality-control testing (2).

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