Model Question Paper

This chapter deals with the design of Model Question Paper of Biology for Class XII. This design is based on model question paper of Biology for Class XII on NCERT web site (www.ncert.nic.in). Very Short Answer (VSA) type questions of two marks each are included in the present design and Multiple Choice Question (MCQ) of one mark each is also suggested. This chapter is divided into three parts, such as Design of the Question Paper, Model Questions and Answers with Marking Scheme.

I Design of the Question Paper

In order to develop a balance question paper various parameters are taken into consideration. These are the type of questions, marks allocation, number of questions, time allocation, chapterwise distribution of topics, difficulty level etc. An attempt has been made to provide proper weightage to these parameters under four separate sub-headings.

Type of Questions and Marking

1. Multiple Choice Questions **(MCQ)** (1) mark
2. Very Short Answer Type Questions **(VSA)** (2) marks
3. Short Answer Type Questions **(SA)** (3) marks
4. Long Answer Type Questions **(LA)** (5) marks

Number, Marks and Time Allocation to Each Type of Questions

Type and Marks	Time in Minutes	Number of Questions	Marks distribution	Time distribution
MCQ - 1 mark	2	10	10 × 1 = 10	10 × 2 = 20
VSA - 2 marks	5	12	12 × 2 = 24	12 × 5 = 60
SA - 3 marks	8	7	7 × 3 = 21	7 × 7 = 49
LA - 5 marks	12	3	3 × 5 = 15	3 × 12 = 36
Total		Questions 32	Marks 70	Minutes 165

Unit-wise Distribution of the Questions and Marks

Unit	Unit wise Questions of each type and marks in( )				Unit wise Distribution of total question and marks	
	MCQ	VSA	SA	LA	Total No. Question	Total Marks
Reproduction	3 (3)	1 (2)	2 (6)	1 (5)	7	16
Genetics and Evolution	3 (3)	2 (4)	2 (6)	1 (5)	8	18
Biology in Human Welfare	1 (1)	4 (8)	1 (3)	-	6	12
Biotechnology	1 (1)	2 (4)	2 (6)	-	5	11
Ecology	2 (2)	3 (6)	-	1 (5)	6	13
Total	10	12	7	3	32	70

Difficulty Level of the Question

Easy (E) - 20% = 14 marks
Average (A) - 60% = 42 marks
Difficult (D) - 20% = 14 marks

MODEL QUESTIONS

MULTIPLE CHOICE QUESTION (MCQ's) **Mark 01**

Tick the correct statement

1. During microsporogenesis, meiosis occurs in:
   a. Endothecium
   b. Microspore mother cells
   c. Microspore tetrads
   d. Pollen grains.

2. Which one of the following is not a male accessory gland?
   a. Seminal vesicle
   b. Ampulla
   c. Prostate
   d. Bulbourethral gland

3. Which of the following statements is correct?
   a. Surgical methods of contraception does not prevent gamete formation
   b. In E. T techniques, embryos are always transferred into the uterus
   c. Oral pills are very popular contraceptives among the rural women
   d. All STDs are completely curable

4. The synthesis of DNA is discontinuous on one strand of the replication fork because:
   a. DNA molecule being synthesised is very long
   b. DNA-dependent DNA polymerase catalyse polymerisation only in one direction (5' → 3')
   c. It is more efficient process
   d. It help to use DNA ligase

5. To analyse the genotype of an organism, it is made to:
   a, Self cross
   b. Cross with recessive parent
   c. Cross with dominant parent
   d. Cross with another species

6. The conditions of the earth atmosphere conducive for the origin of life were:
   a. Presence of high temperature, CH_4, NH_3, and O_3
   b. High temperature, CH_4, NH_3, volcanic eruption
   c. High temperature, volcanic eruption, O_2, NH_3
   d. Volcanic eruption, CH_3, NH_3 and O_2

7. Virus-free plants can be raised *in vitro* from
   a. Any plant part
   b. Meristems of infected plants
   c. Stem of infected plants
   d. Leaves of infected plants

8. If a radiolabel is used to tag a DNA molecule, the technique used to localise would be
   a. X-ray crystallography
   b. Autoradiography
   c. Fluorescence microscopy
   d. Electron microscopy

9. An inverted Pyramid of biomass is represented by:
   a. Aquatic ecosystem
   b. Ecosystem of a big tree
   c. Grassland ecosystem
   d. Tropical fresh ecosystem

10. Some of the problems that have come in the wake of green revolution are:
   a. Water logging and permafrost
   b. Soil erosion and desertification
   c. Water logging and soil salinity
   d. Snow blindness and water logging

Very Short Answer Type Questions (VSA) Marks 02

1. Right two important conditions of MTP to avoid its misuse.
2. Which of the following are homologous or analogous (Indicate H for homologous and A for Analogous)
   a. Wing of bat and butterfly _____
   b. Wing of bat and flipper of whale _____
   c. Wing of butterfly and flipper of whale _____
   d. Flipper of whale and wing of bird _____
3. How does incomplete dominance differ from co-dominance?
4. The yellowish fluid colostrum is secreted by mother during initial days of lactation, mention the antibody present in it and mention the type of immunity.
5. With the help of a suitable example mention the role of microbes in:
   a. Single cell protein
   b. Organic farming
6. Differentiate between
   a. Benign and malignant tumours
   b. Viral oncogenes and protooncogenes
7. Name the microbe used for production of Swiss cheese.
8. How does human insulin formed using rDNA technique?
9. What are selectable markers? Give two example.
10. Differentiate between
   a. Grazing food chain and Detritus food chain
   b. Gross primary productivity and Net primary productivity

11. Arrange the following steps of decomposition in a sequential order:
Catabolism, Leaching, Mineralisation, Humification and Fragmentation.

12. Write the appropriate method for disposals of e-waste.

SHORT ANSWER TYPE QUESTIONS (SA) MARKS 03

1. The number of taxa exhibiting asexual reproduction is drastically reduced in higher plants (angiosperms) and higher animals (vertebrates) as compared with lower groups of plants and animals. Analyse the possible reasons for this situation.

2. Corpus luteum in pregnancy has a long life. However, if fertilisation does not take place, it remains active only for 10-12 days. Explain.

3. Why is the frequency of red-green colour blindness is many times higher in males than in the females?

4. DNA is more suitable genetic material over RNA. Why?

5. A sportsperson was tested positive for cannabinoid what are these? From where are these extracted? What are its effects on human body?

6. What is Bt toxin? Name an organism that produces it? How has man exploited it?

7. Discuss in detail how RNA can be used to silence specific genes.

LONG ANSWER TYPE QUESTIONS (LA) Marks 05

1. Draw a neat, labelled diagram of a mature angiosperm, embryo sac. Mention the role of synergids.

OR

Enumerate and describe any five reasons for introducing sex education to school-going children.

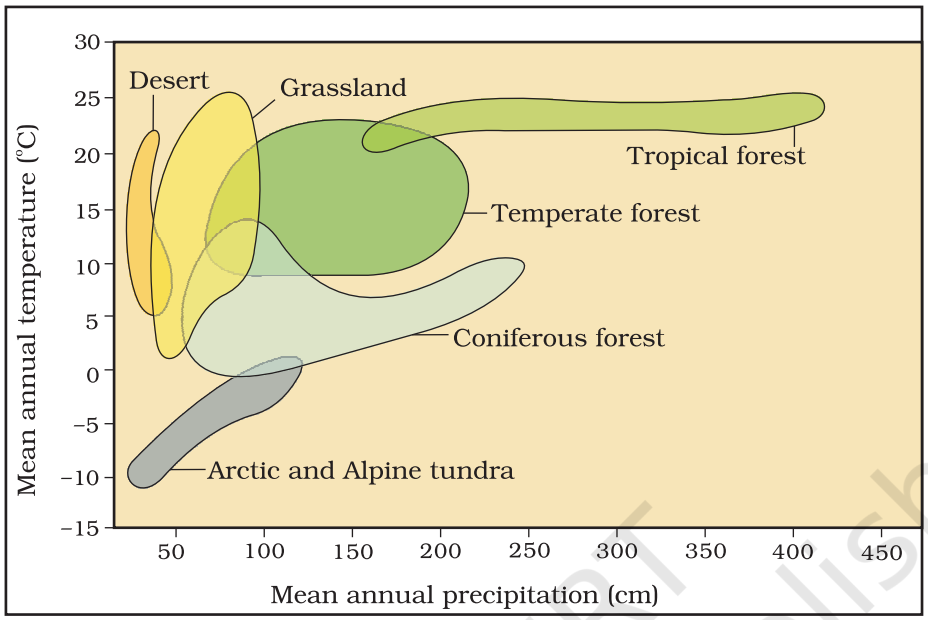
2. a. In humans, males are heterogametic and females are homogametic. Explain. Are there any examples where males are homogametic and females heterogametic?

b. Who determines the sex of an unborn child? Mention whether temperature has a role in sex determination.

OR

Give an account of post transcriptional modifications of a eukaryotic mRNA with diagramatic representation.

3. Observe the diagram given below and answer the following.



a. Which biome shows maximum range of annual precipitation?
b. Which biome shows maximum range of annual temperature?
c. Give range of mean annual temperature by corniferous forest
d. Give range of mean annual precipitation by temperate forest
e. Which biome has lowest mean annual temperature?

OR

Every year in winter Siberian cranes migrate from Russia to India for breeding. In the year 2006, a survey was done which has the values in the given equation

$N_{(t+1)} = N_t + \{(B+I)-(D+E)\}$ as follows

$N_{(t+1)} = 1200 + \{(600+700)-(200+800)\}$

On the basis of above answer the followings

a. Natality rate
b. Mortality rate
c. Number of cranes immigrated
d. Number of cranes emigrated
e. Population of cranes in India in year 2006.

ANSWER WITH MARKING SCHEME

Answers	Marking Schime
MCQ: 1 Mark	
1. b — Microspore mother cells	1
2. b — Ampulla	1
3. a — Surgical methods of contraception does not prevent gamete formation	1
4. b — DNA-dependent DNA polymerase catalyse polymerisation only in one direction (5' → 3')	1
5. b — Cross with recessive parent	1
6. b — High temperature, CH_4, NH_3, volcanic eruption	1
7. b — Meristems of infected plants	1
8. b — Autoradiography	1
9. a — Aquatic ecosystem	1
10. c — Water logging and soil salinity	1
	10

VERY SHORT ANSWER TYPE QUESTIONS (VSA) — Marks 02

1. Illegal female foeticides,
   Misuse of amniocentesis — 1+1

2. a — A — ½
   b — H — ½
   c — A — ½
   d — H — ½

3. | **Incomplete dominance** | **Co-dominance** | 1+1 |
   |---|---|---|
   | (i) One allele is incompletely dominant over the other | (i) Both alleles are dominants and express themselves | |
   | (ii) Phenotype of F_1 is an intermediate of the two parents | (ii) Phenotype of F_1 resembles both parents | |

4. IgA antibody is present
   Innate immunity and Passive immunity — 1+1

5. a. Spirulina; nutritious food
   b. Rhizobium or Azobacter; Biofertiliser — 1+1

6. a. Non cancerous; cancerous
   b. Virus causing cancer; normal cell can be activated to cancerous. 1+1

7. *Propionibacterium sharmanii* 2

8. Gens for 'A' and 'B' chains of human insulin are introduced in E.coli. ½
   Both 'A' and 'B' chains are produced separately. ½
   It is extracted and combined by creating disulphide bond to form human insulin. 1

9. Selectable marker permitts the growth of the transformants. 1
   Ampicillin and tetracycline. ½+½

10. a. The grazing food chain begins with living organism called as producers and detritus food chain begins with dead organic matter ½+½
    b. Rate of production of organic matter duirng photosynthesis. Gross primary productivity minus respiration loss. ½+½

11. Fragmentation, Leaching, catabolism, humification, mineralisation 2

12. Recycling 2

SHORT ANSWER TYPE QUESTIONS (SA) Marks 03

1. Both angiosperms and vertebrates have a more complex structural organisation. They have evolved very efficient mechanism of sexual reproduction. Since asexual reproduction does not create new genetic pools in the offspring and consequently hampers their adapability to external conditions, these groups have resorted to reproduction by sexual methods. 3

2. During pregnancy (in presence of Zygote) the maternal endometrium sends a neural signal to hypothalamus to sustain the gonadotropin (LH) secretion. This maintains the corpus luteum. In the absence of a zygote, however the corpus luteum can not be maintained longer because of the absence of signal. 3

3. For becoming colourblind, the female must have the allele for it in her both X-chromosomes; but males develop colourblindness when their sole chromosome has the allele for it. 3

4. DNA is a more suitable genetic material than RNA, because it is chemically less reactive and structurally more stable. 3

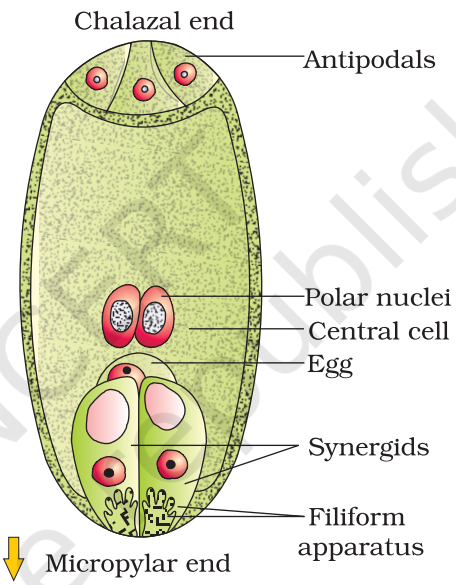
5. They are a group of chemical that interact with cannabinoid receptors present in the brain
   cannabis sativa; Flower and leaves
   stimulates body, effect cardio-vascular system 1+1+1

6. Cry protein
Bacilus thuringiensis
As biopesticide in cotton plant 1+1+1

7. RNA can be used to silence certain specific genes through the process of RNA interference (RNAi), a process of cellular difence in all eukaryotic organisms. In this method a ds RNA binds to a specific site in the mRNA and silences it by preventing it's translatino. 3

LONG ANSWER TYPE QUESTIONS (LA) Marks 05

1.



Synergids have special cellular thickenings at the micropylar tip which play an important role in guiding the pollen tubes into the synergid.

3+2

OR

(a) Proper information about reproductive organs-physiology and functioning; (b) Discourage myths and misconceptions about sex-related aspects; (c) Knowledge about safe and hygienic sexual practices; (d) Adolescence related changes, (e) Prevention of STDs, AIDS etc.

1×5

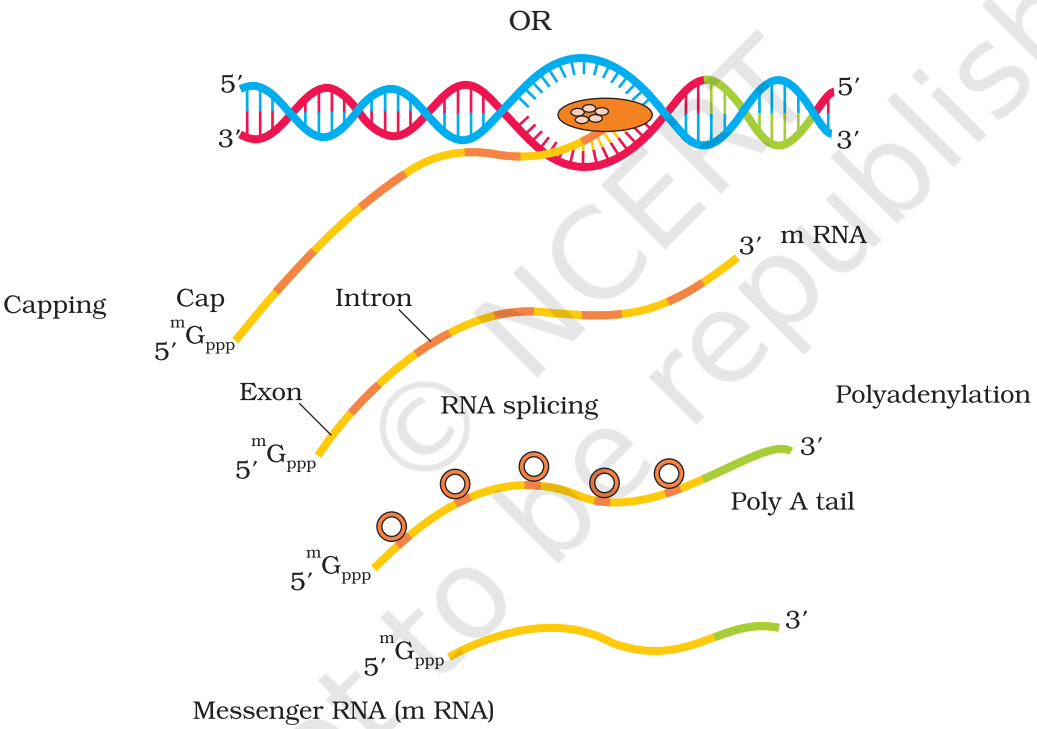
2. (a) The terms homogametic and heterogametic refer to the organisms depending upon whether all the gametes contain one type of sex chromosome (Homo = same) or two different types of sex chromosomes (Hetero = different). Humans show XX / XY type of sex determination i.e. females contain two copies of X chromosome and males contain one X

and one Y chromosome. Therefore, ova produced by females contain the same sex chromosome i.e. X. On the other hand the sperms contain two different types of chromosomes i.e. 50% sperms have X and 50% have Y chromosome. Therefore, in case of humans, females are considered to be homogametic while males are heterogametic. 2½

There are examples where males ae homogametic and females are heterogametic. In some birds the mode of sex determination is denoted by ZZ (males) and ZW(females). 1

(b) As a rule the heterogametic organism determines the sex of the unborn child. In case of humans, since males are heterogametic it is the father, and not the mother, who decides the sex of the child. In some animals like crocodiles, temperature plays a role in sex determination. Lower temperature favours hatching of female offsprings and higher temperatures lead to hatching of male offsprings. 1½

OR



2½

The primary transcripts (hnRNA) contain both the exons and the introns and are non-functional. Hence, it is subjected to a process called splicing where the introns are removed and exons are joined in a defined order. hnRNA undergo two additional processing called as capping and tailing. In capping an unusual nucleotide (methyl guanosine triphosphate) is added to the 5'-end of hnRNA. In tailing, adenylate residues (200-300) are added at 3'-end in a template independent manner. It is the fully processed hnRNA, now called mRNA, that is transported out of the nucleus for translation. 2½

3.	a.	Tropical Forest	1
	b.	Grassland	1
	c.	0°C — 15°C	1
	d.	55 —250 cms	1
	e.	Arctic and alpine tundra	1
		OR	
	a.	600 – Natality (B)	1
	b.	200 – Mortality (D)	1
	c.	700 – Imrgrated (I)	1
	d.	800 – emigrated (E)	1
	e,	1500 – $N_{(t+1)}$	1