QUESTION PAPER

BIOLOGY CODE- 865

CLASS – XII

MAX MARKS 70 **TIME ALLOWED 3 Hrs**

GENERAL INSTRTUCTIONS:

1. All questions are compulsory.

2. The question paper has five sections and 35 questions.

3. Section A has 18 questions of mark 1 each; Section B has 7 questions of 2 mark each; Section C has 5 questions of 3 marks each; Section D has 2 case-based questions of 4 marks each; 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. Where ever necessary, neat and properly labelled diagrams should be drawn.

SECTION A

1. The Pistils more than one when fused together are knowns as:
   a) Monocarpellary
   b) Syncarpous
   c) Apocarpous
   d) None of the above

2. The number of primary follicles left in each ovary at puberty are:
   a) 20,000-40,000
   b) 40,000-60,000
   c) 60,000-80,000
   d) 80,000-100,000

3. In ZIFT (Zygote Intra Fallopian Transfer) the zygote or early embryos could be transferred into the fallopian tube with up to……blastomeres.

4. Sickle-cell anaemia is a …… trait

5. Triplet codon AUG performs dual functions:
   a) AUG codes for Methionine, and it also acts as initiator codon.
   b) AUG codes for Phenylalanine, and it also acts as initiator codon.
   c) AUG codes for Methionine, and it also acts as terminator codon.
   d) AUG codes for Phenylalanine, and it also acts as terminator codon.

6. Write the name of ship on which Charles Darwin went for sea voyage.

7. In RNA uracil is found in place of:
a) Cytosine
b) Guanine
c) Adenine
d) Thymine

8. The number of peptide chains found in protein antibodies produced by B-lymphocytes is……

9. Name the widely used diagnostic test for AIDS.

10. The application of statins produced by yeast *Monascus purpureus* is:
   a) As a clot buster from blood vessels.
   b) As a blood cholesterol lowering agent.
   c) As an immunosuppressive agent.
   d) For removing oily stains.

11. Who created first recombinant DNA:
   a) Stanley Cohen
   b) Herbert Boyer
   c) Stanley Cohen and Herbert Boyer
   d) None of the above.

12. The toxic insecticide produced by some strains of *Bacillus thuringiensis* harming lepidopterans and dipterans is chemically a:
   a) Carbohydrate
   b) Protein
   c) Lipid
   d) Fatty acid

13. In a pond there were 20 lotus plants last year and through reproduction 8 new plants are added, increasing the current population to 28. The calculated birth rate of offsprings will be:
    a) 0.2
    b) 0.4
    c) 0.8
    d) 0.16

14. Net primary productivity is:
    a) Gross primary productivity minus respiration losses
    b) Gross primary productivity plus respiration losses
    c) Gross Secondary productivity minus respiration losses
    d) Gross Secondary productivity plus respiration losses

15. What is the name of the specific place occupied by the organisms in the food chain on the basis of their nutrition source?

Assertion Reason based questions:

Answer these questions by choosing right option.

(a) Both A and R are true an R is right explanation of A.

(b) Both A and R are true an R is not right explanation of A.

(c) A is true and R is false.

(d) A is false and R is true.

16. Assertion A: Grasshopper is an example of XO type of sex determination.

    Reason R: In grasshoppers besides autosomes males have only one X chromosome whereas females have a pair of X chromosomes.

17. Assertion A: Genetic code is degenerate.
    Reason R: Some amino acids are coded by more than one codon.

18. Assertion A: In earth's biodiversity animals constitute 70 percent of all the species recorded.
    Reason R: Number of fungi species is less than the combined total species of fishes, amphibians, reptiles and mammals.

Section- B

19. Point out two main events in double fertilization of flowering plants.

20. Write two important steps to bring down the population growth rate.

21. Name the cross which is conducted between two pea plants bearing contrasting traits of height, resulting in 50 percent of parental characteristics. Why do the geneticists work out this cross?

22. What was proposed by Oparin and Haldane on evolution?

23. Name the parasite which causes ascariasis? State any two symptoms of ascariasis.

    Or

    What is interferon? What is it's role in immunity?

24. What are molecular scissors? Point out the role of molecular scissors in recombinant DNA technology.

    Or

    What is gel electrophoresis? What is the need to stain DNA? Name the compound used to stain DNA in gel electrophoresis.

25. "Pyramid of energy is always upright"- Critically analyse the statement.

    Or

The egrets come in close association with grazing cattle. Name this type of interaction between egrets and grazing cattle. Mention the reason for such close interaction.

Section-C

26. Draw a well labelled diagrammatic sectional view of seminiferous tubule in human.
27. Point out the salient features of double helical structure of DNA.

28. In the given table are shown three genetic disorders with their cause and symptoms. Match each genetic disorder with accurate cause and symptoms:

Sr. No	Name of genetic disorder	Reasons	Symptoms
1.	Klinefelter's syndrome	Trisomy 21	Sterile female with rudimentary ovary
2.	Down's syndrome	Absence of one of the X chromosomes	Overall masculine development with Gynaecomastia
3	Turner's syndrome	An additional copy of X chromosome resulting into a karyotype of 47, XXY	Small rounded head, furrowed tongue, partially open mouth, palm broad with characteristic crease.

Or

In process of Eukaryotic transcription describe following points:

(a) Function of RNA Polymerase I, RNA Polymerase II and RNA Polymerase III

(b) Gene Splicing

29. Explain, why secondary treatment of the sewage is known as biological treatment?

Or

Cancer is one of the most dreaded diseases of human beings and is major cause of death across the globe. In reference to cancer describe following points:

(i) What is contact inhibition?

(ii) What is malignant tumour?

(iii) What are carcinogens?

30. What is GMO? List out two advantages of genetic modifications in plants.

Section-D

31. Case Based Question 1:

A wide range of organisms belonging to bacteria, viruses, fungi, protozoans, helminths, etc., could cause diseases in man. Such diseasecausing organisms are called pathogens. Most parasites are therefore pathogens as they cause harm to the host by living in (or on) them. The pathogens can enter our body by various means, multiply and interfere with normal vital activities, resulting in morphological and functional damage. Pathogens have to adapt to life within the environment of the host.

a) Mention the group of viruses which causes common cold in human beings. 1
b) Point out the name of causative organism of malaria. 1
c) Name the disease caused by *Entamoeba histolytica*. and list out three symptoms of the disease. 2

   Or

   Name the pathogenic bacterium which causes typhoid in human beings. Name the test which could confirm typhoid fever. 2

32. Case Based Question 2:

Faced with the conflict between development and conservation, many nations find it unrealistic and economically not feasible to conserve all their biological wealth. Invariably, the number of species waiting to be saved from extinction far exceeds the conservation resources available. On a global basis, this problem has been addressed by eminent conservationists. They identified for maximum protection certain ‘biodiversity hotspots’ regions with very high levels of species richness and high degree of endemism (that is, species confined to that region and not found anywhere else). Initially 25 biodiversity hotspots were identified but subsequently nine more have been added to the list, bringing the total number of biodiversity hotspots in the world to 34.

a) What is meant by *In situ* conservation? Give an example. 1

b) Name the place and country where the world summit on sustainable development was held in 2002. 1

c) List out four major causes (the Evil Quartet) of biodiversity losses. 2

Or

Describe the broadly utilitarian argument to conserve biodiversity with the help of one example. 2

Section- E

33. Study the flow chart given below, and name the hormones acting on each stage with their functions:

Hypothalamus→ Anterior Pituitary→ Leydig cell→ Spermatogenesis

Or

Draw a well labelled diagrammatic view of a typical anatropous ovule.

34. What is meant by transcription? Explain, the process of transcription in Bacteria.

Or

Describe the following points in experiment conducted by Hershey and Chase:

(i) What was the aim of experiment?
(ii) Name of the virus on which they carried out experiment.
(iii) Main steps in process of experiment.
(iv) Conclusion drawn by them after experiment.

35. In reference to PCR answer the following questions:

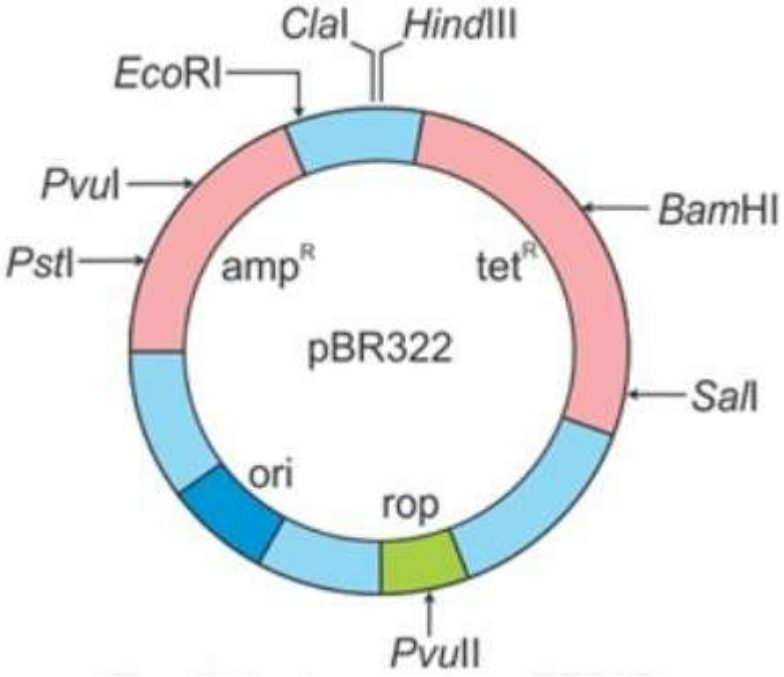
(i) What is expanded form of PCR?
(ii) How many steps are involved in one cycle of PCR? Name these steps.
(iii) What is the role played by *Thermus aquaticus* bacterium in PCR?

Or

Describe following features that are required to facilitate cloning in a vector:

- Origin of Replication (ori)
- Recognition sites
- Selectable marker

Recognise and list out the selectable markers in the diagram of *E. Coli cloning* vector pBR322 given below:



Diagrammatic representation of *E. coli* cloning vector pBR322

…….

MARKING SCHEME (2024-25)

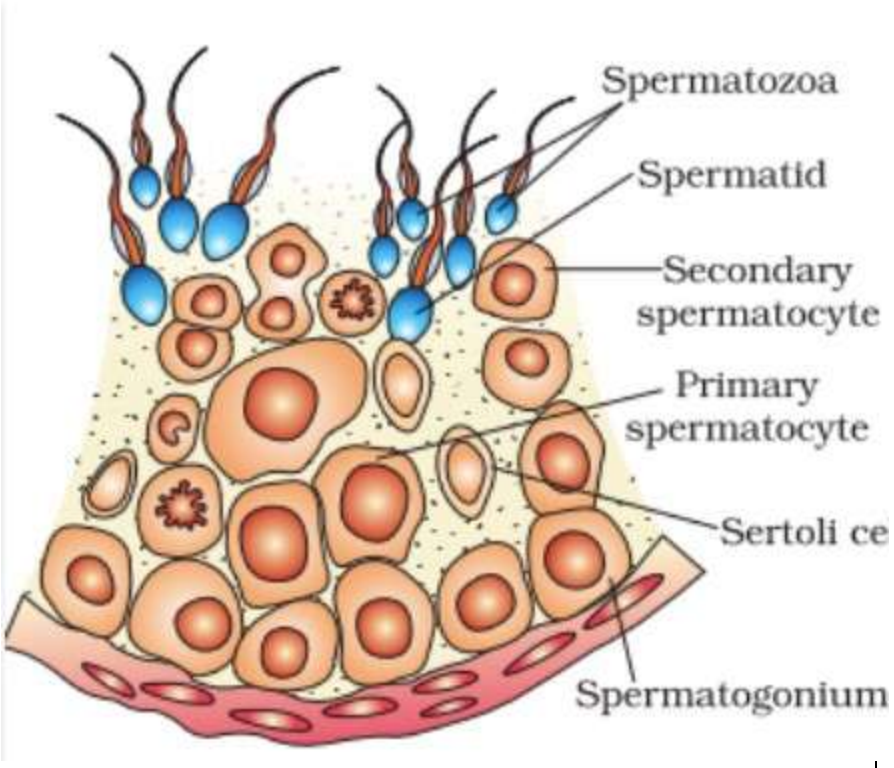
CLASS – XII

BIOLOGY (CODE- 865)

Q. No	Expected Answer/ Value Point	Marks
1	b) Syncarpous	**1**
2	c) 60000-80000	**1**
3	8	**1**
4	Autosome linked recessive trait	**1**
5	a) AUG codes for Methionine, and it also act as initiator codon.	**1**
6	H.M.S. Beagle	**1**
7	d) Thymine	**1**
8	Four	**1**
9	ELISA (Enzyme Linked Immuno-sorbent Assay)	**1**
10	b) As a blood cholesterol lowering agent.	**1**
11	c) Stanley Cohen and Herbert Boyer	**1**
12	b**)** Protein	**1**
13	b) 0.4	**1**
14	a) Gross primary productivity minus respiration losses.	**1**
15	Trophic level	**1**
16	**(a) Both A and R are true an R is right explanation of A**	**1**

17	**(a) Both A and R are true an R is right explanation of A**	**1**
18	**(c) A is true and R is false**	**1**
19	**a) Syngamy:** Fusion of one male gamete with nucleus of egg cell to form diploid zygote. **b) Triple fusion:** Fusion of other male gamete with two polar nuclei to form triploid primary endosperm nucleus.	**1** **1**
20	a) Motivate people for small families through contraceptive methods b) Statutory raising the marriageable age of females to 18 and males to 21 years	**1** **1**
21	Test cross To determine the genotype of an organism.	**1** **1**
22	Theory of chemical evolution was proposed by Oparin and Haldane. They proposed that the first form of life could have come from pre-existing non- living organic molecules and the formation of life was preceded by chemical evolution.	**2**
23	Ascaris **Two symptoms** of **ascariasis** are as follows: (i) Internal bleeding and anemia (ii) Fever **Or** **Interferons** are the proteins which are secreted by virus infected cells.	**1** **1/2** **1/2** **1**

	Interferons protect non infected cells from further viral infection.	**1**
24	**Restriction Enzymes** are molecular scissors which cut DNA at specific locations. **Role in r-DNA technology:** The cut piece of DNA is linked with plasmid DNA to form recombinant DNA and to further, transfer in host organism for cloning. **Or** Gel electrophoresis is a technique to separate, the fragments of DNA, cut by action of restriction enzymes, under electric field. Separated DNA fragments can be visualized only after staining the DNA followed by exposure to UV radiation. Ethidium bromide.	**1** **1** **1** **1/2** **1/2**
25	**Pyramid** of energy is always upright because some energy is always lost in form of heat, when energy flows from one trophic level to next trophic level in pyramid of energy. **Or** The close association between egrets and grazing cattle is called **commensalism.** The **reason** for this interaction is that when grazing cattle move, they stir up and flush out insects from vegetation that otherwise will be	**2** **1** **1**

	difficult for egrets to find and catch.	
26	 **Diagrammatic sectional view of seminiferous tubule in human being.**	**3**
27	**Salient features of the Double-helix structure of DNA**: (i) DNA structure constitutes two polynucleotide chains, where the backbone is made by sugar-phosphate, and the nitrogenous bases are flanked inside. (ii) The two chains have anti-parallel polarity. It means, if one chain has the polarity 5'→3', the other has 3'→5'. (iii) The bases in two strands are paired through hydrogen bond. (a). Adenine is linked with two hydrogen bonds with Thymine. (b) Guanine is linked with Cytosine with three H-bonds. (c) Therefore, purine comes opposite to a	**½** **½** **½**

pyrimidine.

(iv) The pitch of the helix is 3.4 nm and there are roughly 10 bp in each turn. The distance between a bp in a helix is approximately 0.34 nm. ½

(v) The two chains are coiled in right handed fashion. ½

(vi) The plane of one base pair stacks over the other in double helix. ½

28

Sr. No	Name of genetic disorder	Reasons	Symptoms	
1.	Klinefelter's syndrome	An additional copy of X chromosome resulting into a karyotype of 47, XXY	Overall masculine development with Gynaecomastia	**1**
2.	Down's syndrome	Trisomy 21	Small rounded head, furrowed tongue, partially open mouth, palm broad with characteristic crease	**1**
3	Turner's syndrome	Absence of one of the X chromosomes	Sterile female with rudimentary ovary	**1**

Or

RNA Polymerase I: it transcribes rRNAs (28S, 18S, 5.8S).

RNA Polymerase II: It transcribes precursor of mRNA and heterogeneous nuclear RNA.

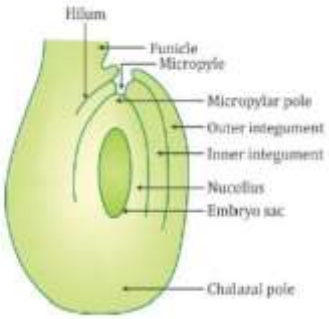
RNA Polymerase III: It helps in transcription of tRNA, 5srRNA, and snRNAs.

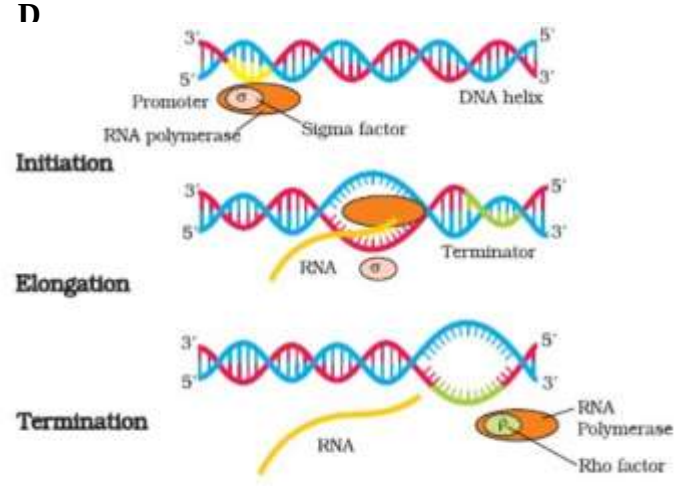
1½

	Gene Splicing: Primary transcript in eukaryotes contain both exons and introns. These introns are non- coding parts in transcript. Therefore, the removal of introns and joining of exons is called gene splicing.	**1½**
29	**Secondary treatment** of sewage is also called biological treatment because in this treatment, sewage is biodegraded with the help of microorganisms. Micro-organisms have following **roles** in sewage treatment: (i) Masses of bacteria and fungi (Flocs) are produced when primary effluent is passed into large aeration tanks which consumes major part of organic matter in effluent reducing it's BOD. (ii) Now this effluent is passed to settling tank where bacterial flocs settle as activated sludge. Small amount of activated sludge works as inoculum when passed back into aeration tank. (iii) Remaining part of sludge is taken into anaerobic sludge digester tanks where different anaerobic bacteria perform digestion of sludge to produce Biogas which is mixture of gases such as methane, hydrogen sulphide and carbon dioxide. **Or**	**3**

	(i) **Contact inhibition** is a property of normal cells. When normal cells come in contact with other cells inhibit their uncontrolled growth or tumorous growth. (ii) **Malignant tumour** is the mass of proliferating, neoplastic rapidly growing cells which invade and damage surrounding tissues. (iii) **Carcinogens** are the physical, chemical or biological agents which induce transformation of normal cells into cancerous neoplastic cells e.g. Radiations (X-rays, gamma rays and UV rays) and Chemical carcinogen like tobacco smoke.	**1** **1** **1**
30	**GMO** or Genetically Modified Organisms are plants, animals, bacteria and fungi, whose genes have been altered by manipulation. **Usefulness** of GM plants: (i) GM crops are more tolerant to abiotic stresses (Cold, draught, salt, heat). (ii) GM plants have less reliance on chemical pesticides.	**1** **1** **1**
31	(i) Rhino Virus (ii) Plasmodium which is a protozoa (iii) Amoebiasis.	**1** **1** **2**

		Three symptoms: a) Constipation b) abdominal pain c) Stools with excess mucous and blood clots. **Or**	**1**
	(i)	*Salmonella typhi*	**1**
	(ii)	Widal Test.	
32	(i)	The approach in which we conserve and protect the whole ecosystem and it's biodiversity at all levels is called *in situ* conservation. To protect entire forest to save the tiger.	**1**
	(ii)	Johannesburg, South Africa.	**1**
	(iii)	Four major causes of biodiversity losses are: (a) Habitat loss and fragmentation. (b) Over-exploitation (c) Alien species invasions (d) Co-extinctions	**2**
		Or **Broadly Utilitarian argument:** Biodiversity plays a major role in many ecosystem services that nature provides. For example Amazon forest is estimated to produce 20 percent of the total oxygen in the earth's atmosphere with the help of photosynthesis.	

33	**(i)**	In flow chart the hormone released by hypothalamus is **gonadotropin releasing hormone (GnRh)** **Function**: • It begins spermatogenesis at the age of puberty. • It Stimulates secretion of two gonadotropins: a) **Luteinising hormone** b) **Follicle stimulating hormone**	**1** **1** ½ ½
	(ii)	The hormone released by anterior pituitary which acts on Leydig cell is **Luteinising hormone.** **Function**: Luteinizing hormone stimulates synthesis and secretion of androgens.	½ ½
	(iii)	The hormone released by Leydig cells is androgen. Function: Androgen stimulates the process of spermatogenesis.	½ ½
		Or Labelled diagram of typical anatropous ovule in flowering plants.  	**5**
34	**Transcription**: The process of copying the genetic information from one strand of DNA into		**1**

	RNA is known as transcription. **Process of transcription in bacteria**: The process of transcription in bacteria consists of 3 steps: (i) **Initiation** of transcription Process: RNA polymerase binds to promotor and associates transiently with initiating factor sigma ρ(σ) initiates transcription. (ii) **Elongation** of transcription process: After binding to promotor, RNA polymerase facilitates opening of DNA helix. It uses nucleoside triphosphates as substrates and polymerises into nucleotides following principle of complementarity (except base pairing of adenosine with uracil instead of thymine). **D**  **ng process of Transcription in Bacteria**	**1** **1** **1**

	(iii)	Termination of transcription process: Once the polymerase reaches to terminator region the nascent RNA falls off. Polymerase transiently associated with rho (ρ) termination factor also falls off.	**1**
		Or	
	(i)	**Aim of the experiment done by Hershey and Chase:**	**1**
		They worked to discover whether it was protein or DNA from virus that enters bacteria.	**1**
	(ii)	They worked on **bacteriophage virus** which infects bacteria.	
	(iii)	**Main Steps:**	
		(a). They grew some viruses on a medium that contained radioactive phosphorus to prepare radioactive DNA and some others on medium that contained radioactive sulfur to prepare radioactive protein.	**1**
		(b). Radioactive phages were allowed to attach to E. coli bacteria. Then, the viral coats were removed from the bacteria by agitating them in a blender. The virus particles were separated from the bacteria by a centrifuge.	**1**
	(iv)	**Conclusion:**	**1**
		Bacteria which were infected with viruses that had radioactive DNA were radioactive, indicating that DNA was the genetic material that passed from the virus to the bacteria.	

35	(i)	Polymerase Chain Reaction	**1**
	(ii)	**Three steps** as given below:	**½**
		(a) Denaturation	**½**
		(b) Primer annealing	**½**
		(c) Extension of primers	**½**
		(iii) Role played by *Thermus aquaticus* in PCR: Repeated DNA amplification in PCR is achieved by the use of a thermostable DNA polymerase which is isolated from *Thermus aquaticus* bacteria.	**2**
		Or	
		• **Origin of replication (ori)** is a sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate within host cell.	**1**
		• **Recognition sites**, in vector, are the sequences needed, to link the alien DNA. The presence of recognition site helps particular restriction enzyme to cut the vector DNA at a particular sequence.	**1**
		• **Selectable Marker** is a DNA sequence that aids in detecting and eliminating non-	**1**

	transformants and allowing selective growth of transformants. In given vector pBR322, the genes encoding resistance to following antibiotics are used as selectable markers: • **tet_R resistant** to **tetracycline**. • **amp_R resistant** to **ampicillin.**	**1** **1**