2023-2024

II PUC KARNATAKA BIOLOGY

Super 7 Model Question Papers with Answers

Best Wishes

NOT FOR SALE

ಪ್ರಿಯ ವಿದ್ಯಾರ್ಥಿಗಳೆ,

2023–24 ರ ದ್ವಿತೀಯ ಪಿಯುಸಿ ಪರೀಕ್ಷೆಗಳು ಸಮೀಪಿಸುತ್ತಿವೆ. ಪರೀಕ್ಷಾ ಪೂರ್ವಸಿದ್ದತೆಗಾಗಿ ನಿಮಗೆ ಅನುಕೂಲವಾಗಲೆಂದು **ದ್ವಿತೀಯ ಪಿಯುಸಿ ಜೀವಶಾಸ್ತ್ರದ** ಏಳು ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆಗಳನ್ನು ಉತ್ತರ ಸಹಿತ ಬಿಡುಗಡೆ ಮಾಡಿದ್ದೇವೆ. ಇದನ್ನು ಬಳಸಿಕೊಂಡು ತಾವುಗಳು ಪರೀಕ್ಷೆಯಲ್ಲಿ ಯಶಸ್ಸು ಗಳಿಸಲೆಂದು ಹಾರೈಸುತ್ತೇವೆ.

ಶುಭಾಶಯಗಳೊಂದಿಗೆ,

ಸದಸ್ಯರು

ದೀಕ್ಷಾ ಜೀವಶಾಸ್ತ್ರ

ಮುಖಪುಟ ವಿನ್ಯಾಸ: ಶ್ರೀಮತಿ ಸ್ಮಿತಾ ಜೋಷುವಾ ಫೆರ್ನಾಂಡಿಸ್

II PU MODEL QUESTION PAPER-1
SUBJECT – BIOLOGY (36)

Time: 3hrs 15 Minutes **Max. Marks: 70**

General instructions

1. This question paper consists of four parts A, B, C, and D.
2. Part A consists of I and II and Part D consists of two sections V and VI.
3. All the parts are compulsory.
4. Draw diagrams wherever necessary. Unlabeled diagrams do not carry any marks.

PART-A

I. Select the correct alternative from the choices given below: **15 x 1 = 15**

1. **Select the correct sequence of anther wall layers**
   a) Epidermis → Middle layers → Endothecium → Tapetum
   b) Epidermis → Endothecium → Middle layers → Tapetum
   c) Epidermis → Tapetum → Middle layers → Endothecium
   d) Tapetum → Middle layers → Epidermis → Endothecium
2. **The process of transformation of spermatids into sperms is**
   a) Spermiation b) Spermatogenesis
   c) Spermiogenesis d) Insemination
3. **The ideal contraceptives for females who want to delay pregnancy or space children is**
   a) Barrier methods b) Surgical methods
   c) Natural methods d) Intrauterine devices
4. **Which of the following sex determination is female heterogametic?**
   a)XY b) ZW c) XO d) Haplo-diploid method
5. **In a typical test cross an organism showing a dominant phenotype is crossed with**
   a) Dominant parent b) Recessive parent
   c) Heterozygous parent d) F_1 parent
6. **Statement I:** The 2'-OH group in every nucleotide in RNA makes RNA liable and easily degradable.
   Statement II: Thymine in DNA confers additional stability to DNA.
   a) Statement I is correct and Statement II is incorrect
   b) Statement I is incorrect and Statement II is correct
   c) Both statement I and statement II are incorrect
   d) Both statement I and statement II are incorrect
7. **Pick out the add one from the following**
   a) Vertebrate hearts
   b) Eye of octopus and mammals
   c) Thorn and tendrils of *Bougainvillea* and *Cucurbita*
   d) Pattern of bones in forelimbs of mammals
8. **The most feared property of cancer cells is**
   a) Cell transformation b) Metastasis c) Contact inhibition d) Uncontrolled division
9. **Monascus *purpureus* produces**
   a) Penicillin b) Cyclosporin-A c) Statins d) Insulin
10. ***Hind II* always cuts DNA at a particular point by recognizing a specific sequence of**
    a) 2 base pairs b) 4 base pairs c) 6 base pairs d) 8 base pairs
11. **The following are the source of ds RNA that interferes mRNA translation except**
    a) Infection by viruses with RNA genomes b) Transposons

c) Infection by viruses with DNA genomes d) Mobile genetic elements

12. Cardiac glycosides are produced by

a) *Acacia* b) *Cactus* c) *Datura* d) *Calotropis*

13. In a terrestrial ecosystem, a much larger fraction of energy flows through

a) Grazing food chain b) Detritus food chain

c) Third tropic level d) Higher tropic level

14. Bali, Javan, and Caspian are the subspecies of

a) Lion b) Tiger c) Cow d) Donkey

15. Which of the following statements is true about biodiversity hotspots?

a) Initially 25 biodiversity hotspots have been identified.

b) They cover less than 2% of the earth's land area.

c) Strict protection of these hotspots could reduce mass extinction by 40%

d) Three biodiversity hotspots have been recognized in India

II. Fill in the blanks by choosing the appropriate word/Words from those given below: 5 x 1 = 5

(***Clarius gariepinus, Pacific salmon fish, Meloidegyme incognitia, Gambusia, Agrobacterium tumifaciens***)

16. Ti plasmid is present in……

17. The nematode that infects the roots of Tobacco plants is……

18 ..... Breed only once in its lifetime.

19. Introduction ..... fishes help in reducing mosquito larvae.

20. Illegal introduction of..... fishes posing a serious threat to indigenous catfishes in our country.

PART - B

III. Answer any <u>FIVE</u> of the following questions in 3 – 5 sentences wherever applicable: 5 x 2 = 10

21. What is artificial insemination? When is this technique suggested?

22. Define mycorrhiza. Mention its significance.

23. Draw a labelled sketch of sparged stirred tank bioreactor.

24. What is logistic growth? Write its equation.

25. Distinguish between primary productivity and secondary productivity.

26. Name the "evil quartet of biodiversity losses" in a given habitat.

27. Forelimbs in vertebrates represent homology. Justify.

28. Schematically represent the grazing food chain.

PART - C

IV. Answer any <u>FIVE</u> of the following questions in 40 – 80 words each wherever applicable: 5 x 3 = 15

29. Mention the different categories of intrauterine devices with an example for each.

30. Mention the steps of DNA fingerprinting.

31. a) State Hardy-Weinberg principle. (1)

b) Define: i) Gene pool and ii) Genetic equilibrium with reference to Hardy-Weinberg principle. (2)

32. Name the sources of the following drugs:

a) Opiods b) Cannabinoids c) Coca alkaloids

33. Name the pathogen and any two symptoms of filariasis.

34. Describe the nomenclature of restriction enzymes with a suitable example.

35. Describe sex determination in birds.

36. Write short notes on commensalism.

PART – D

Section - I

V. Answer any <u>FOUR</u> of the following questions in about 200 – 250 words each wherever applicable: 4 x 5 = 20

37. Schematically represent the development of a female gametophyte in angiosperms.

38. Draw a labelled sectional view of mammary gland.

39. In incomplete dominance, the F_1 hybrid did not resemble either of the two parents. Justify the statement by schematically representing the flower colour inheritance in *Snapdragon.*

40. Explain an experiment that provides unequivocal proof that DNA is the genetic material.

41. a) Mention the requirements for pollination by water in plants. (2)
b) How does pollination occur in *Vallisneria* and *Zostera?* (3)

42. a) Distinguish between menarche and menopause. (2)
b) Describe the different phases of the menstrual cycle in human females. (3)

43. Describe the role of microbes in industrial products.

44. a) Mention the three groups of insect pests that are susceptible to Bt toxins with an example for each. (3)
b) Give any two example for molecular diagnostic tools used in early diagnosis. (2)

Section-II

Answer any <u>ONE</u> of the following questions in about 200 – 250 words each wherever applicable: 1 x 5 = 5

45. "A health camp was organized in the village to conduct routine check-ups for the villagers. Five patients with the following symptoms were recorded, and preventive medicines were prescribed." Identify the diseases from which they are suffering based onthe given symptoms.
a) High fever 39^0C to 40^0C
b) Chill and high fever recurring every three to four days
c) Bouts of fever and diarrhea
d) Nasal congestion and discharge
e) Lips and nails turned greyish to bluish in colour.

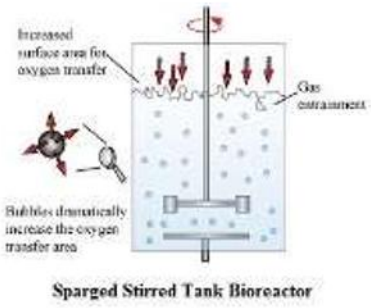
46. Study the following set of experiments scientists conducted. Fill in the blanks, A, B, C, D &E either with scientists or organisms as per the requirements with the help of clues provided in the table.

Scientists	Organisms	Experiments
Hershey and Chase	**A**	Unequivocal proof for DNA as genetic material
B	*Escherichia coli*	DNA that replicates semi-conservatively.
Taylor and colleagues	**C**	To prove that DNA in chromosomes also replicates semi-conservatively,
D	*Streptococcus pneumoniae*	To prove that DNA is the genetic material
Jacob & Monad	**E**	The elucidation of lac operon

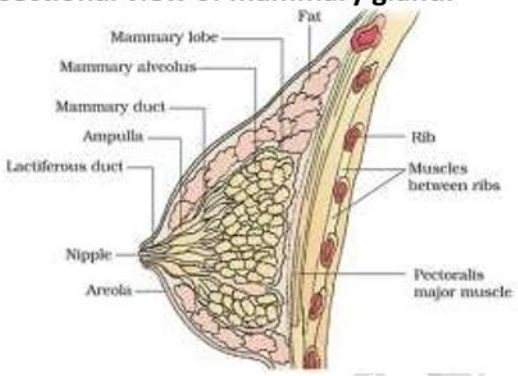
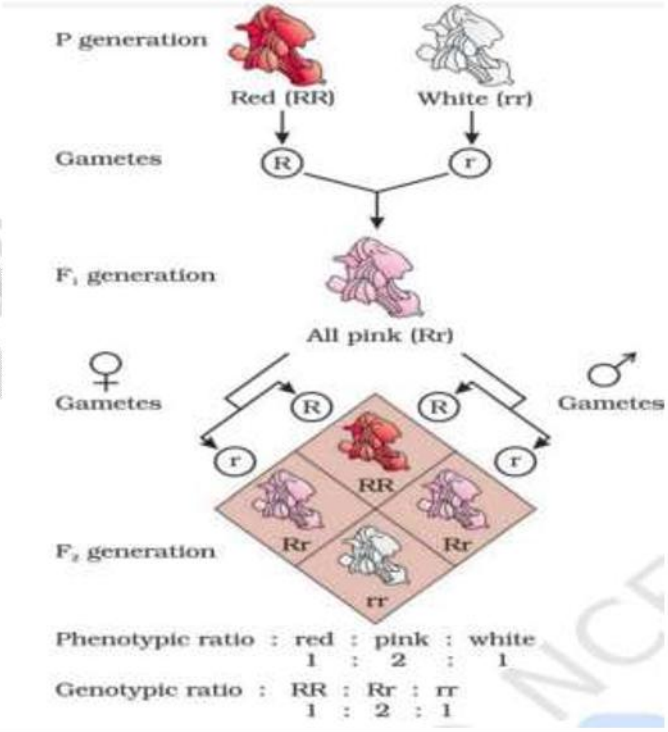
47. Give one reason for each of the following disorders.
a) Phenylketonuria b) Down's syndrome c) Turner's syndrome
d) Sickle cell anaemia e) β-thalassemia

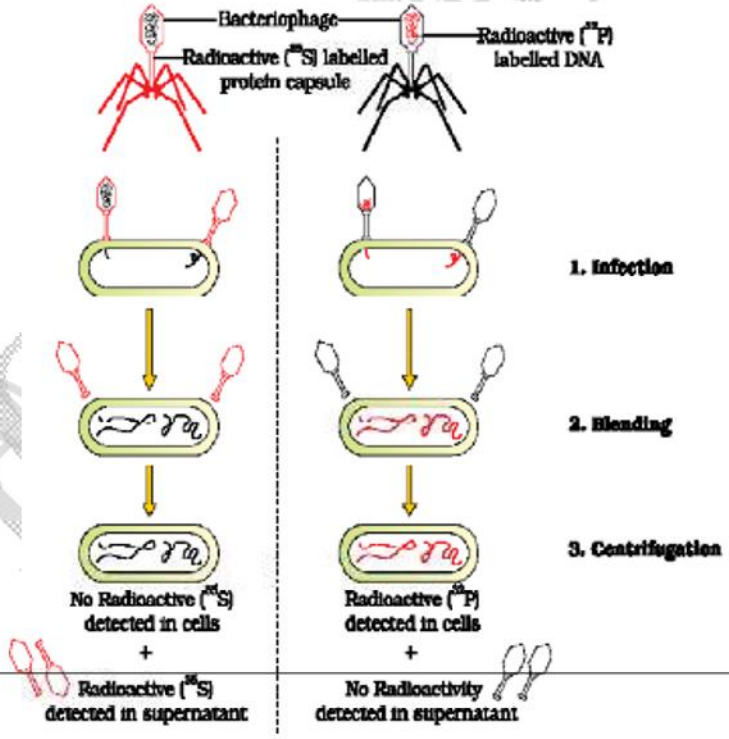
MARKING SCHEME MQP-1

Q.NO	ANSWERS/ VALUE POINTS	Marks
I	**PART- A**	**15 x 1 = 15**
1	b) Epidermis → Endothecium → Middle layers → Tapetum	1
2	c) Spermiogenesis	1
3	d) Intrauterine devices	1
4	b) ZW	1
5	b) Recessive parent	1
6	c) Both statement I and statement II are incorrect	1
7	b) Eye of octopus and mammals	1
8	b) Metastasis	1
9	c) Statins	1
10	c) 6 base pairs	1
11	c) Infection by viruses with DNA genomes	1
12	d) *Calotropis*	1
13	b) Detritus food chain	1
14	b) Tiger	1
15	c) Strict protection of these hotspots could reduce mass extinction by 40%	1
II	**Fill in the blanks**	**5 x 1 = 5**
16	*Agrobacterium tumifaciens*	1
17	*Meloidegyme incognitia*	1
18	Pacific salmon fish	1
19	*Gambusia*	1
20	*Clarius gariepinus*	1
III	**PART- B**	**5 x 2 = 10**
21	**What is artificial insemination? When is this technique suggested?** It is the technique, in which the semen collected either from the husband or a healthy donar is artificially introduced into the vagina. This technique is assisted for infertility cases caused due to inability of the male partner to inseminate the female or very low sperm counts in the ejaculation	2
22	**Define mycorrhiza. Mention its significance.** It is the symbiotic association of fungi with the roots of higher plants. Many members of the genus *Glomus* form mycorrhiza. The fungal symbiont in this association absorbs phosphorus from the soil and passes it the plant. It shown resistance to root borne pathogens, tolerance to salinity, drought and overall increase in plant growth and development.	1 1

23	**Draw a labelled sketch of stirred tank bioreactor.**  Sparged Stirred Tank Bioreactor **Diagram with any 4 labelling**	4 x ½ = 2
24	**What is logistic growth? Write its equation**. A population growth which is limited by natural responses. $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$ Where N= Population density at time t r = Intrinsic rate of natural increase K= Carrying capacity	1 1
25	**Distinguish between primary productivity and secondary productivity.** Primary productivity: It is the amount of biomass or organic matter produced per unit area over a time by plants during photosynthesis Secondary productivity: It is the rate of formation of new organic matter by consumers.	2
26	**Name the "evil quartet of biodiversity losses" in a given habitat.** Habitat loss and fragmentation Overexploitation Alien species invasions Co extinctions	4 x ½ = 2
27	**Forelimbs in vertebrates represent homology. Justify.** All mammals share similarities in the pattern of bones of forelimbs such as humerus, radius, ulna, carpals, metacarpals and phalanges and perform different functions.	2
28	**Schematically represent the grazing food chain.** **Grass → Goat → Man** (Producer) (Primary consumer) (Secondary consumer)	2
IV	**PART- C**	**5 x 3 = 15**
29	**Mention the different categories of intrauterine devices with an example for each.** Non medicated IUDs**. Example**: Lippes loop Copper releasing IUDs. **Example:** CU-T, CU-7, multiload-375 Hormone releasing IUDs. **Example:** LNG-20 & Progestasert	1 1 1
30	**Mention the steps of DNA fingerprinting.** **1.** Isolation of DNA. **2.** Digestion of DNA by restriction endonucleases. **3.** Separation of DNA fragments by electrophoresis. **4.** Transferring (blotting) of separated DNA fragments to synthetic membranes, such as nitrocellulose or nylon.	6 x ½ = 3

	5. Hybridization using labelled VNTR probe. **6.** Detection of hybridized DNA fragments by autoradiography.	
31	**a) State Hardy-Weinberg principle.** Hardy-Weinberg principle states that allele frequencies in a population are stable and are constant from generation to generation. **b)** **i) Genepool** The total genes and their alleles in a population **ii) Genetic equilibrium** The gene pool remains a constant from generation to generation. This is called genetic equilibrium.	1 1 1
32	**Name the sources of the following drugs:** **a) Opiods** - *Papaver somniferum* **b) Cannabinoids** - *Cannabis sativa* **c) Coca alkaloids** - *Erythroxylum coca*	 1 1 1
33	**Name the pathogen and any two symptoms of filariasis.** **Pathogen:** *Wuchereria bancrofti or Wuchereria malayi* **Symptoms:** Chronic inflammation of the lymphatic vessels of the lower limbs. The genital organs is also often affected, resulting in gross deformities.	 1 2
34	**Describe the nomenclature of Restriction enzymes with a suitable example.** The first letter of the name comes from the genus and the second two letters come from the species of the prokaryotic cell from which they were isolated. **Example:** *EcoRI* comes from *Escherichia coli* RY 13. In *EcoRI,* the letter 'R' is derived from the name of strain. Roman numbers following the names indicate the order in which the enzymes were isolated from that strain of bacteria	1 1 1
35	**Describe sex determination in birds.** The sex determination in birds is ZW method. In birds the total number of chromosome is same in both males and females. But two different types of gametes in terms of the sex chromosomes are produced by females, i.e., female heterogamety. The two different sex chromosomes of a female bird have been designated to be the Z and W chromosomes. In these organisms the females have one Z and one W chromosome, whereas males have a pair of Z-chromosomes besides the autosomes.	 3
36	**Write short notes on commensalism.** This is the interaction in which one species benefits and the other is neither harmed nor benefited. **Examples:** An orchid growing as an epiphyte on a mango branch, and barnacles growing on the back of a whale benefit while neither the mango tree nor the whale derives any apparent benefit. The cattle egret and grazing cattle in close association, a sight you are most likely to catch if you live in farmed rural areas, is a classic example of commensalism. The egrets always forage close to where the cattle are grazing because	 1 1 1

	the cattle, as they move, stir up and flush out insects from the vegetation that otherwise might be difficult for the egrets to find and catch. Another example of commensalism is the interaction between sea anemone that has stinging tentacles and the clown fish that lives among them. The fish gets protection from predators which stay away from the stinging tentacles. The anemone does not appear to derive any benefit by hosting the clown fish.	1 1
V	**PART – D (Section - I)**	**4 x 5 = 20**
37	**Schematically represent the development of a female gametophyte in angiosperms.** Refer to fig (1.8) for schematic representation	
38	**Draw a labelled sectional view of mammary gland.**  ***Diagram with any 10 labeling***	10 x ½ = 5
39	**In incomplete dominance, the F_1 hybrid did not resemble either of the two parents. Justify the statement by explaining the flower colour inheritance in *Snapdragon* with a schematic representation.**  	1 1 1 1 1

40	**Explain an experiment that provides unequivocal proof that DNA is the genetic material.** The unequivocal proof that DNA is the genetic material came from the experiments of Alfred Hershey and Martha Chase (1952). They worked with viruses that infect bacteria called bacteriophages. They grew some viruses on a medium that contained radioactive phosphorus and some others on medium that contained radioactive sulfur. Viruses grown in the presence of radioactive phosphorus contained radioactive DNA but not radioactive protein because DNA contains phosphorus but protein does not. Similarly, viruses grown on radioactive sulfur contained radioactive protein but not radioactive DNA because DNA does not contain sulfur. Radioactive phages were allowed to attach to E. coli bacteria. Then, as the infection proceeded, the viral coats were removed from the bacteria by agitating them in a blender. The virus particles were separated from the bacteria by spinning them in a centrifuge. Bacteria which were infected with viruses that had radioactive DNA were radioactive,indicating that DNA was the material that passed from the virus to the bacteria. Bacteria that were infected with viruses that had radioactive proteins were not radioactive. This indicates that proteins did not enter the bacteria from the viruses. DNA is therefore the genetic material that is passed from virus to bacteria.  	4 5
41	**a) Mention the requirements for pollination by insect in plants.** Majority of insect-pollinated flowers are large, colourful, fragrant and rich in nectar. When the flowers are small, a number of flowers are clustered into an inflorescence to make them conspicuous. Animals are attracted to flowers by colour and/or fragrance.	

	The flowers pollinated by flies and beetles secrete foul odours to attract these animals. To sustain animal visits, the flowers have to provide floral rewards to the animals such as nectar and pollen grains. **b) How does pollination occur in *Vallisneria* and Zostera*?*** In *Vallisneria,* the female flower reaches the surface of water by the long stalk and the male flowers or pollen grains are released on to the surface of water. They are carried passively by water currents; some of them eventually reach the female flowers and the stigma. In sea grasses, female flowers remain submerged in water and the pollen grains are released inside the water. Pollen grains in many such species are long, ribbon like and they are carried passively inside the water;some of them reach the stigma and achieve pollination.	Any 2 points 2M 1½ 1½
42	The first menstruation begins at puberty and is called menarche while menstrual cycles ceases around 50 years of age and is termed as menopause **Phases of menstrual cycle:** **Menstrual phase**: During this phase menstrual flow occurs and it lasts for 3-5 days. The menstrual flow results due to breakdown of endometrial lining of the uterus and its blood vessels which forms liquid that comes out through vagina. **Follicular phase:** During this phase, the primary follicles in the ovarygrow to become a fully mature Graafian follicle and simultaneously the endometrium of uterus regenerates through proliferation. The secretion of gonadotropins (LH and FSH) increases gradually during the follicular phase, and stimulates follicular development as well as secretion of estrogens by the growing follicles. Both LH and FSH attain a peak level in the middle of cycle (about 14th day). LH surge induces rupture of Graafian follicle and thereby the release of ovum (ovulation). **Luteal phase:** During which the remaining parts of the Graafian follicle transform as the corpus luteum. It secretes large amounts of progesterone which is essential for maintenance of the endometrium for implantation of the fertilized ovum and other events of pregnancy.	2 1 1 1
43	**Describe the role of microbes in industrial products.** **Production of Fermented beverages.** Example: Wine,beer, whisky , rum etc. by *Saccharomyces cerevisise* **Production of antibiotics.** Example: Penicillin *by Penicillium notatum* **Production of organic acids**. Example: *Aspergillus niger* for production of citric acid **Production of enzymes.** Example: Lipases for removing oily stains from the laundry **Production of bioactive molecules.** Example: Statins by *Monascus purpureus*	 1 1 1 1 1
44	a) Mention the three types of insect pests that are susceptible to Bt toxins with an example for each. **Lepidopterans.** Examples: tobacco budworm, armyworm **Coleopterans.** Examples: beetles and	 1 1

	Dipterans. Example: flies, mosquitoes **b) Give any two example for molecular diagnostic tools used in early diagnosis.** 1. PCR 2. ELISA 3. r-DNA technology **4.** Autoradiography **Any two**	1 2 x 1=2
VI	**Section- II**	**1 x 5 = 5**
45	**a) High fever 39^0C to 40^0C** Typhoid **b) Chill and high fever recurring every three to four days** Malaria **c) Bouts of fever and diarrhoea** AIDS **d) Nasal congestion and discharge** Common cold **e) Lips and nails turned greyish to bluish in colour.** Pneumonia	 1 1 1 1 1
46	**A**- Viruses **B**-Meselson & Stahl **C**- *Vicia faba* **D-** Frederick Griffith **E-** *Lactobacillus*	1 1 1 1 1
47	**Give one reason for each of the following disorders.** **a) Phenylketonuria** Lack of enzymes that converts the amino acid phenyl alanine into tyrosine **b) Down's syndrome** Due to the presence of an extra chromosome to chromosome to 21(21st trisomy) **c) Turner's syndrome** Due to the absence of one of the X chromosomes in females **d) Sickle cell anaemia** Due to the replacement of an amino acid glutamine by valine at the sixth position of β haemoglobin chain **e) β-thalassemia** Due to the mutations of one or both the genes (HBB) located on chromosome 11 of each parent	 1 1 1 1 1

II PU MODEL QUESTION PAPER-2
SUBJECT – BIOLOGY (36)

Time: 3hrs 15 Minutes **Max. Marks: 70**

General instructions

1. This question paper consists of four parts A, B, C, and D.
2. Part A consists of I and II and Part D consists of two sections V and VI.
3. All the parts are compulsory.
4. Draw diagrams wherever necessary. Unlabeled diagrams do not carry any marks.

PART – A

I. Select the correct alternative from the choices given: **15 x 1 = 15**

1. Even in the absence of pollinating agents, seed setting is assured in
   (a) *Cucurbita* (b) Papaya (c) *Commelina* (d) Maize
2. From the statements given below choose the option that is **true** for a typical female gametophyte of a flowering plant:
   (A) It is 8-nucleate and 7-celled at maturity
   (B) It is free-nuclear during the development
   (C) It is situated inside the integument but outside the nucellus
   (D) It has an egg apparatus situated at the chalazal end
   (a) (A) and (D) (b) (B) and (C) (c) (A) and (B) (d) (B) and (D)
3. Which one of the following is not a male accessory gland?
   (a) Seminal vesicle (b) Ampulla (c) Prostate (d) Bulbourethral gland
4. Morula is a developmental stage
   (a) Between the zygote and blastocyst (b) Between the blastocyst and gastrula
   (c) After the implantation (d) Between implantation and parturition
5. Select the option including all sexually transmitted diseases.
   (a) Gonorrhoea, Syphilis, Genital herpes (b) Gonorrhoea, Malaria, Genital herpes
   (c) AIDS, Malaria, Filariasis (d) Cancer, AIDS, Syphilis
6. Sterilisation procedure in human male is called
   (a) Vasectomy (b) Tubectomy (c) Coitus interruptus (d) Lactational amenorrhea
7. Occasionally, a single gene may express more than one effect. The phenomenon is called
   (a) Multiple allelism (b) Pleiotropy (c) Polygenic inheritance (d) Codominance
8. Which one of the following conditions of the zygotic cell would lead to the birth of a normal human female child?
   (a) Two X chromosomes (b) Only one Y chromosome
   (c) Only one X chromosome (d) One X and one Y chromosome
9. Which was the last human chromosome to be completely sequenced?
   (a) Chromosome 11 (b) Chromosome 21 (c) Chromosome 1 (d) Chromosome X
10. The most accepted line of descent in human evolution is:
    (a) *Australopithecus→ Ramapithecus→ Homo sapiens → Homo habilis*
    (b) *Homo erectus → Homo habilis→ Homo sapiens*
    (c) *Ramapithecus → Homo habilis→ Homo erectus → Homo sapiens*
    (d) *Australopithecus→ Ramapithecus→ Homo erectus → Homo habilis→ Homo sapiens*
11. Cocaine is obtained from
    (a) *Atropa belladona* (b) *Cannabis sativa* (c) *Papaver somniferum* (d) *Erythroxylum coca*
12. Bottled fruit juices from market are clearer than that at home because of
    (a) Antibiotics (b) Hormones (c) Enzymes (d) Filtration
13. Which one of the following statements cannot be connected to predation?
    (a) It is necessitated by nature to maintain the ecological balance

(b) It helps in maintaining species diversity in a community
(c) It might lead to extinction of a species
(d) Both the interacting species are negatively impacted

14. What is the percentage of photosynthetically active radiation (PAR) captured by plants for photosynthesis?
(a) 1% – 5 % (b) 2% - 10% (c) 10% - 20% (d) 50%

15. In the following sets a conservation approach and an example of method of conservation are given. Select the option with **correct** match of approach and method.
(A) *In situ* conservation – Biosphere Reserve
(B) *Ex situ* conservation – Sacred groves
(C) *In situ* conservation – Seed bank
(D) *Ex situ* conservation – Cryopreservation
(a) (A) and (B) (b) (A) and (C) (c) (A) and (D) (d) (B) and (D)

II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket. 5 x 1 = 5
(Menopause, Sexual deceit, Pollen grain, Vector, Menarche, Branching descent)

16. Embryo sac is to ovule as _____ is to an anther.
17. The first menstruation begins at puberty is called_____.
18. _____ and natural selection are the two key concepts of Darwinian theory evolution.
19. The DNA molecule to which the gene of interest is integrated for cloning is called _____.
20. The Mediterranean orchid *Ophrys* employs _____ to get pollination done by a species of bee.

PART – B

III. Answer any <u>FIVE</u> of the following questions in 3-5 sentences each, wherever applicable: 5 x 2 = 10

21. How do copper releasing IUDs prevent conception?
22. List any four assisted reproductive technologies.
23. Can a child have blood group 'O' if his parents have blood group 'A' and 'B'? Explain.
24. What is Adaptive Radiation? Give an example.
25. List the different innate immunity barriers.
26. What is the mode of action of statins and cyclosporine A in the human body?
27. How can DNA segments separated by gel electrophoresis be visualised and isolated?
28. Define the following:
(a) Decomposition (b) Standing crop

PART – C

IV. Answer any <u>FIVE</u> of the following questions in 40-80 words each, wherever applicable: 5 x 3 =15

29. Draw a neat labelled diagram of L.S. of grass embryo.
30. Write the functions of placenta.
31. List the salient features of genetic code.
32. The evolutionary story of moths in England during industrialization reveals that 'evolution is apparently reversible'. Explain.
33. Tobacco plants are damaged severely when infested with *Meloidogyne incognita*. Name and explain the strategy that is adopted to stop this infestation.
34. How did an American Company Eli Lilly use the knowledge of *r*DNA technology to produce human insulin?
35. Write the diagrammatic representation of an ideal pyramid of energy.

36. 'Tropical region has greater biodiversity than temperate region'. Justify.

PART- D
(Section - I)

V. Answer any <u>FOUR</u> of the following questions in 200-250 words each, wherever applicable: 4x5= 20

37. Draw a neat labelled diagram of sectional view of the female reproductive system.
38. Schematically represent two gene inheritance by taking colour and shape of seeds in pea plants as an example.
39. List out the salient features of double helix model of DNA.
40. Give a brief account on steps involved in DNA fingerprinting technique.
41. Name the disease caused by following organisms:
    a) Rhinovirus b) *Salmonella typhi* c) *Plasmodium vivax* d) *Wuchereria malayi* e) *Trichophyton*
42. Explain the role of microbes as biocontrol agents.
43. Write the use of the following in biotechnology.
    (a) Chilled ethanol (b) Microinjection (c) Bioreactor (d) Plasmid (e) PCR
44. Mention the population interactions exist among the following:
    (a) Abingdon tortoise and goats
    (b) Cuckoo lays eggs in crow's nest
    (c) Sea-anemone and clown fish
    (d) Wasp laying eggs in fig fruit
    (e) *Cuscuta* growing on hedge plant

Section - II

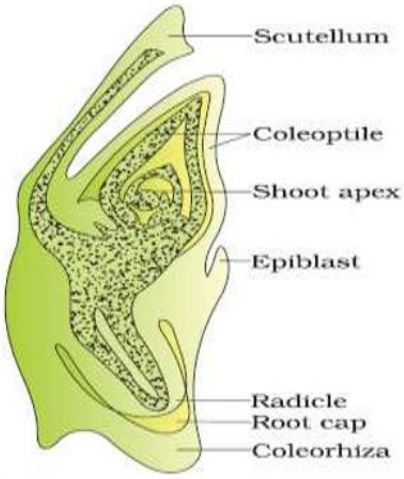
VI. Answer any <u>ONE</u> of the following questions in 200-250 words each, wherever applicable: 1 x 5 = 5

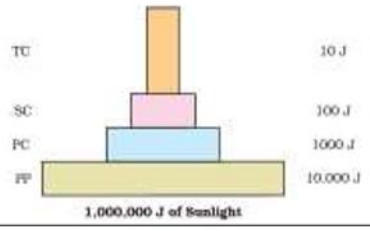
45. How aneuploidy is different from polyploidy? Describe the individuals having following chromosomal abnormalities.
    a) Trisomy of 21st chromosome
    b) XXY
    c) XO
46. Answer the following:
    a) Double fertilization is a unique event taking place in flowering plants. Briefly describe this process. (3M)
    b) Arrange the following terms in the correct developmental sequence:
    Pollen grain, Sporogenous tissue, Microspore tetrad, Pollen mother cell, Male gametes. (2M)
47. A person shows strong unusual hypersensitive reactions when exposed to certain substances present in the air. Identify the condition and name the chemicals released from mast cells during such reactions. What precaution should be taken to avoid such reactions?

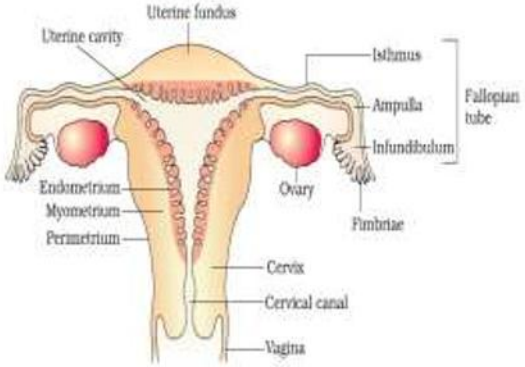
MARKING SCHEME-MQP-2

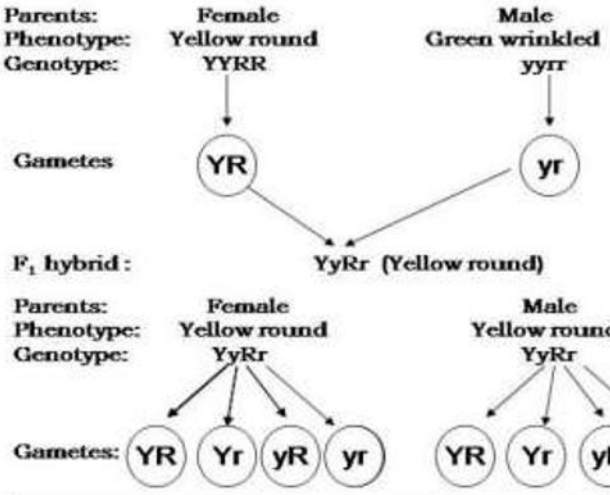
Q. NO.	ANSWERS/VALUE POINTS	MARKS
I	**Select the correct alternative from the choices given:**	**15 x 1 = 15**
1	Even in the absence of pollinating agents, seed setting is assured in ANS: (c) *Commelina*	1
2	From the statements given below choose the option that are **true** for a typical female gametophyte of a flowering plant: A. It is 8-nucleate and 7-celled at maturity B. It is free-nuclear during the development C. It is situated inside the integument but outside the nucellus D. It has an egg apparatus situated at the chalazal end ANS: (c) (A) and (B)	1
3	Which one of the following is not a male accessory gland? ANS: (b) Ampulla	1
4	Morula is a developmental stage ANS: (a) Between the zygote and blastocyst	1
5	Select the option including all sexually transmitted diseases. ANS: (a) Gonorrhoea, Syphilis, Genital herpes	1
6	Sterilisation procedure in human male is called ANS: (a) Vasectomy	1
7	Occassionally, a single gene may express more than one effect. The phenomenon is called ANS: (b) Pleiotropy	1
8	Which one of the following conditions of the zygotic cell would lead to the birth of a normal human female child? ANS: (a) Two X chromosomes	1
9	Which was the last human chromosome to be completely sequenced? ANS: (c) Chromosome 1	1
10	The most accepted line of descent in human evolution is: ANS: (c) *Ramapithecus → Homo habilis→ Homo erectus → Homo sapiens*	1
11	Cocaine is obtained from ANS: (d) *Erythroxylum coca*	1
12	Bottled fruit juices from market are clearer than that at home because of ANS: (c) Enzymes	1
13	Which one of the following statements cannot be connected to predation? ANS: d) Both the interacting species are negatively impacted	1
14	What is the percentage of photosynthetically active radiation (PAR) captured by plants for photosynthesis? ANS: (b) 2% - 10%	1
15	In the following sets a conservation approach and an example of method of conservation are given. Select the option with **correct** match of approach and method. (A) *In situ* conservation – Biosphere Reserve	

	(B) *Ex situ* conservation – Sacred groves (C) *In situ* conservation – Seed bank (D) *Ex situ* conservation – Cryopreservation ANS: (C) (A) and (D)	1
II	**Fill in the blanks by choosing the appropriate word/words from those given in the bracket.**	**5 x 1 = 5**
16	Pollen grain	1
17	Menarche	1
18	Branching descent	1
19	Vector	1
20	Sexual deceit	1
III	**Answer any <u>FIVE</u> of the following questions in 3-5 sentences each, wherever applicable:**	**5 x 2 = 10**
21	How do copper releasing IUDs prevent conception? ANS: The Cu ions released suppress sperm motility and the fertilizing capacity of sperms.	2
22	List any four assisted reproductive technologies. ANS: • In vitro fertilization-Embryo transfer (IVF-ET) • Zygote intra fallopian transfer (ZIFT) • Gamete intra fallopian transfer (GIFT) • Intra uterine transfer (IUT) • Intra cytoplasmic sperm injection (ICSI) • Artificial insemination (AI) (Any four) 4 x ½ =	2
23	Can a child have blood group 'O' if his parents have blood group 'A' and 'B'? Explain. ANS: Yes, a child can have blood group 'O' if his parents have blood group 'A' and 'B'. The gene *I* control ABO blood grouping in humans. I^A, I^B, and *i* are the three alleles of the gene (*I*). Blood group 'A' has the genotype $I^A I^A$ or $I^A i$, blood group 'B' has the genotype $I^B I^B$ or $I^B i$ and the blood group 'O' has the genotype *ii*. If a child receives allele *i* (recessive) each from the parents having blood group 'A' and 'B', then child will have 'O' blood group.	2
24	What is Adaptive Radiation? Give an example. ANS: It is the process of evolution of different species in a given geographical area starting from a common point and radiating to other geographical areas (habitats). Examples: Darwin's finches/placental mammals or marsupials of Australia. (Any one example)	1 1
25	List the different innate immunity barriers. ANS: Physical barriers, Physiological barriers, Cellular barriers and Cytokine barriers. (4 x ½) =	2
26	What is the mode of action of statins and cyclosporine A in the human body? ANS: Statins act by competitively inhibiting the enzyme responsible for the synthesis of cholesterol.	1

	Cyclosporin A suppresses the immune reactions in organ-transplant patients and thereby it acts as an immunosuppressive agent.	1
27	How can DNA segments separated by gel electrophoresis be visualized and isolated? ANS: The separated DNA molecules are visualized only after staining DNA with ethidium bromide followed by exposure to UV radiation. They appear as bright orange coloured bands. The separated bands of DNA (on the gel) are cut from the agarose gel and extracted from the gel piece. This process is called elution.	2
28	Define the following: (a) Decomposition (b) Standing crop ANS: (a) The process of breaking down complex organic matter into inorganic substances like CO_2, water and nutrients is called decomposition. (b) Each trophic level has a certain mass of living material at a particular time is called standing crop	1 1
IV	**Answer any <u>FIVE</u> of the following questions in 40-80 words each, wherever applicable:**	**5 x 3 =15**
29	Draw a neat labelled diagram of L.S. of grass embryo. ANS:  (Any six labeling) (6 x ½) =	3
30	Write the functions of placenta. ANS: 1. The placenta facilitates the supply of oxygen and nutrients to the embryo. 2. The placenta helps for removal of carbon dioxide and excretory/waste materials produced by the embryo. 3. The placenta is connected to the embryo through an umbilical cord which helps in the transport of substances to and from the embryo. 4. Placenta also acts as an endocrine tissue and produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens, etc. (Any 3 functions)	3

31	List the salient features of genetic code. ANS: 1. The codons are triplet. 2. Genetic code is unambiguous and specific. 3. Genetic code is degenerate. 4. Genetic code is commaless. 5. Genetic code is nearly universal. 6. AUG is a dual function codon. (6 x ½) =	3
32	The evolutionary story of moths in England during industrialization reveals that 'evolution is apparently reversible'. Explain. ANS: • In England, before industrialisation in 1850's, white-winged moths were more in number than dark-winged moths. • But after industrialisation in 1920's, dark-winged moths became more in number than whitewinged moths. • This is because during industrialisation, the tree trunks covered by white lichens became dark due to deposition of dust and coal particles (soot and smoke). • As a result, white-winged moths could be easily picked up by predators from the dark background and dark-winged moths survived. • In mixed population, those that can better adapt survived and there was increase in their population size. • This example clearly showed that 'evolution is apparently reversible'	3
33	Tobacco plants are damaged severely when infested with *Meloidogyne incognita*. Name and explain the strategy that is adopted to stop this infestation. ANS: Gene expression can be controlled by using RNA molecule and this technology is called RNA interference or RNAi or gene silencing.	1
	During this process nematode specific gene is introduced into host plant (using *Agrobacterium*) which produces *ds*RNA. This silences specific *m*RNA of the nematode and parasite dies.	2
34	How did an American Company Eli Lilly use the knowledge of *r*DNA technology to produce human insulin? ANS: Two chains of DNA sequence corresponding to A and B chains of human insulin were prepared. They introduced them into plasmids of *E. coli* to produce separate A and B chains. The A and B chains extracted were then combined by creating disulphide bonds and form human insulin.	3
35	Write the diagrammatic representation of an ideal pyramid of energy. ANS:  	

		3
36	'Tropical region has greater biodiversity than temperate region'. Justify. ANS: • Temperate regions have been subjected to frequent glaciations in the past, whereas, tropical latitudes have remained relatively undisturbed for millions of years. Therefore, tropical regions had a long evolutionary time for species diversification. • Tropical environments are less seasonal, relatively more constant and predictable. Such constant environments promote niche specialization and lead to a greater species diversity. • There is more solar energy available in the tropics, which contributes to higher productivity. This in turn might contribute indirectly to greater diversity.	1 1 1
V	**Answer any <u>FOUR</u> of the following questions in 200-250 words each, wherever applicable:**	**4 x 5 = 20**
37	Draw a neat labelled diagram of sectional view of the female reproductive system. ANS:  Any ten labeling (10 x ½)=	5
38	Schematically represent two gene inheritance by taking colour and shape of seeds in pea plants as an example. ANS:	



♀ / ♂	YR	Yr	yR	yr
YR	YYRR Yellow round	YYRr Yellow round	YyRR Yellow round	YyRr Yellow round
Yr	YYRr Yellow round	YYrr Yellow wrinkled	YyRr Yellow round	Yyrr Yellow wrinkled
yR	YyRR Yellow round	YyRr Yellow round	yyRR Green round	yyRr Green round
yr	YyRr Yellow round	Yyrr Yellow wrinkled	yyRr Green round	yyrr Green wrinkled

Phenotypic ratio=Yellow round : Yellow wrinkled : Green round : Green wrinkled = 9:3:3:1

5

39 List out the salient features of double helix model of DNA.

ANS:

Salient features of double helix model of DNA:

1. The double helical structure of DNA was proposed by the J. D. Watson and F. Crick.
2. DNA molecule consists of two polynucleotide chains helically coiled around each other to form double helix structure.
3. Backbone of the DNA is made up of repeating units of deoxyribose and phosphate.
4. At the center base pairs are present, Adenine is always bound to Thymine by two hydrogen bonds (A=T) while guanine is always bound to Cytosine by three hydrogen bonds (G≡C).
5. Thus both strands are said to be complementary. Base paring is always complementary, (A=T, G≡C). Because of this is the sequence of bases on one strand is known, the sequence of bases on the other strand can be predicted.
6. There are 10 base pairs in one helix, arranged at a distance of 0.34 nm or 3.4 Aº, length of one helix is 3.4 nm or 34 Aº. Thus one full turn of the helix is of 360º has 10 base pairs.
7. Both the strands are arranged in are anti-parallel to each other. It means one chain is in 3'---5' direction and another one in 5'----3' direction. (any 5 features)

5

40	Give a brief account on steps involved in DNA fingerprinting technique. ANS: • DNA is isolated (Extracted) from samples (skin, hair, bone, saliva, blood etc). • The DNA is digested using restriction endonucleases to produce small fragments. • The DNA fragments are separated according to their size by electrophoresis, • The separated DNA fragments are transferred to nitrocellulose or nylon membrane by Southern blotting. • The DNA fragments on the membrane are hybridized with labelled VNTR probe. • Hybridized DNA fragments are detected by autoradiography (characteristic band pattern is obtained on the x-ray sheet).	5
41	Name the disease caused by following organisms: (b) Rhinovirus b) *Salmonella typhi* c) *Plasmodium vivax* d) *Wuchereria malayi* e) *Trichophyton* ANS: (a) Common cold (b) Typhoid fever (c) Malaria (d) Filariasis/Elephantiasis (e) Ringworm	 1 1 1 1 1
42	Explain the role of microbes as biocontrol agents. ANS: Biocontrol is defined as controlling plant diseases and pests using biological methods. Some examples of microbial biocontrol agents are: (a) The bacteria *Bacillus thuringiensis* (Bt) are used to control butterfly caterpillars. Dried spores of Bt are mixed with water and sprayed on plants such as brassicas and fruit trees. Insect larvae, after eating these are killed by the toxin released in their gut. *B. thuringiensis* toxin genes have been introduced into plants to provide resistance to pests. For example, Bt cotton. (b) *Trichoderma* species are free-living fungi and present in root ecosystems where they act against several plant pathogens. (c) Baculoviruses are pathogens that attack insects and other arthropods. Most of these biocontrol agents belong to the genus *Nucleopolyhedrovirus*. These are species-specific, narrow spectrum insecticides. They do not harm plants, mammals, birds, fish and other non-target insects. Baculoviruses are helpful in integrated pest management (IPM) programme, in which beneficial insects are conserved and there is no negative impact on plant mammals, birds, fish or non-target insects. (Any two examples)	 1 2 2
43	Write the use of the following in biotechnology. (a) Chilled ethanol (b) Microinjection (c) Bioreactor (d) Plasmid (e) PCR ANS: (a) It is added to precipitate the purified DNA to isolate it. (b) It is used to inject the foreign gene into a host cell, directly.	 1 1

20

	(c) It is the set up to culture large volumes of transgenic bacteria to get large quantities of the product protein. (d) It is the vector to transform a foreign gene. (e) PCR stands for Polymerase Chain Reaction, which is used for amplification of small segments of DNA.	1 1 1
44	Mention the population interactions exist among the following: (a) Abingdon tortoise and goats (b) Cuckoo lays eggs in crow's nest (c) Sea-anemone and clown fish (d) Wasp laying eggs in fig fruit (e) *Cuscuta* growing on hedge plant ANS: (a) Competition (b) Brood parasitism (c) Commensalism (d) Mutualism (e) Parasitism	 1 1 1 1 1
VI	**Answer any <u>ONE</u> of the following questions in 200-250 words each, wherever applicable:**	**1 x 5 = 5**
45	How aneuploidy is different from polyploidy? Describe the individuals having following chromosomal abnormalities. a) Trisomy of 21st chromosome b) XXY c) XO ANS: Sometimes the chromatids fail to segregate during cell division, resulting in gain or loss of a chromosome is called aneuploidy. Where as in polyploidy failure of cytokinesis after telophase stage of cell division results in an increase in whole set of chromosomes in an organism. a) Trisomy of 21st chromosome- This chromosomal abnormality in an individual is termed as Down's syndrome. It is caused due to the presence of an additional copy of chromosome number 21. b) XXY- This chromosomal abnormality in an individual is termed as Klinefelter's syndrome. It is caused due to the presence of an additional copy of the X-chromosome resulting into a karyotype of 47, XXY. c) XO- This chromosomal abnormality in an individual is termed as Turner's syndrome. It is caused due to the absence of one of the X- chromosome resulting into a karyotype of 45, XO.	 2 1 1 1
46	Answer the following: a) Double fertilization is a unique event taking place in flowering plants. Briefly describe this process. (3M) b) Arrange the following terms in the correct developmental sequence: Pollen grain, sporogenous tissue, microspore tetrad, pollen mother cell, male gametes. (2M) ANS:	

	a) On reaching the embryo sac, pollen tube releases the two male gametes into cytoplasm of synergid. One of the male gamete fuses with egg nucleus to form a diploid cell called zygote. This event is called syngamy. Other male gamete fuses with polar nuclei at the centre to produce a triploid primary endosperm nucleus (PEN). This is termed as triple fusion. Since the two types of fusions, syngamy and triple fusion takes place in an embryo sac the phenomenon is termed as double fertilization. It is a unique event taking place in flowering plants. b) Sporogenous tissue →Pollen mother cell →Microspore tetrad→ Pollen grain → Male gametes.	3 2
47	A person shows strong unusual hypersensitive reactions when exposed to certain substances present in the air. Identify the condition and name the chemicals released from mast cells during such reactions. What precaution should be taken to avoid such reactions? ANS: The condition is called allergy. Chemicals like histamine and serotonin are released from mast cells during such reactions. To avoid such reactions following precautions must be taken. (i) Use of drugs like antihistamine, adrenaline and steroids quickly reduces the symptoms. (ii) Avoid contact with substances to which a person is hypersensitive.	1 2 2

II PU MODEL QUESTION PAPER-3
SUBJECT – BIOLOGY (36)

Time: 3hrs 15 Minutes **Max. Marks: 70**

General instructions

1. This question paper consists of four parts A, B, C, and D.
2. Part A consists of I and II and Part D consists of two sections V and VI.
3. All the parts are compulsory.
4. Draw diagrams wherever necessary. Unlabeled diagrams do not carry any marks.

PART A

I. Select the correct alternative from the choices given below: **15 x 1 = 15**

1. Select the incorrect statement with respective to vegetative cell of pollen grain.
   a. bigger than generative cell.
   b. has abundant food reserve
   c. has a large irregularly shaped nucleus
   d. floats in the cytoplasm of generative cell
2. Identify the correct sequence of arrangement of cells in the mature embryosac from the micropylar end.
   a. Synergids ------- Egg Cell ------- Central Cell ------- Antipodals
   b. Antipodals ------- Central Cell ------- Egg Cell ------- Synergids
   c. Synergids ------- Central Cell ------- Egg Cell ------- Antipodals
   d. Antipodals ------- Egg Cell ------- Central Cell ------- Synergids
3. The cells that secrete testicular hormones (androgens) is _____.
   a. Sertoli cells b. Leydig cells c. germ cells d. Spermatogonia
4. Statement 1: Statutory ban on amniocentesis is for sex determination to legally check increasing menace of female foeticide.
   Statement 2: Amniocentesis is a procedure used to test for the presence of certain genetic disorders.
   a. Both statement 1 and 2 are true
   b. Both statement 1 and 2 are false
   c. Statement 1 is true and statement 2 is false
   d. Statement 1 is false and statement 2 is true
5. Who noted that the behaviour of chromosomes was parallel to the behaviour of genes.
   a. Walter Sutton & Theodore Boveri b. Correns & von Tschermark
   c. de Vries & Correns d. de Vries& von Tschermark
6. Human chromosome with most number of genes is _____.
   a. Chromosome 21 b. X Chromosome c. Y Chromosome d. Chromosome 1
7. Embryological support for evolution was proposed by _____.
   a. Charles Darwin b. Thomas Malthus c. Ernst Heckel d. Karl Ernst von Baer
8. The letter 'R' in EcoRI is derived from the name of _____.
   a. genus b. species c. strain d. order of isolation
9. The corn borer are controlled by proteins encoded by _____ genes.
   a. Cry IAb b. Cry IAc c. Cry II Ab d. Cry II Ac
10. In a growing population of a country,
    a. reproductive and pre reproductive individuals are equal in number
    b. reproductive individuals are less than post reproductive individuals
    c. pre reproductive individuals are more than reproductive individuals
    d. pre reproductive individuals are less than the reproductive individuals.
11. What is the net increase in the population if the average natality is 300, mortality 250, immigration 20 and emigration 70.
    a. 10 b. 0 c. 20 d. 30
12. Which of the following is not a function of an ecosystem?

a. Stratification b. Productivity c. Energy flow d. Decomposition

13.In a particular climatic condition, decomposition is slower if detritus is rich in

a. nitrogen b. water soluble substances c. lignin & chitin d. sugar

14. Species area relationship was proposed by _____

a. Robert May b. Alexander von Humboldt c. Edward Wilson d. Paul Ehrlich

15.The species extinct in the recent past in Australia was _____

a. Dodo b. quagga c. Steller's sea cow d. Thylacine

II. Fill in the blanks by choosing the appropriate word/words from those given below: 5 x 1 = 5

(bioprospecting, rheumatoid arthritis, biopharming, pedigree, apomixis, saltation)

16.The mechanism to produce seeds without fertilisation is called _____.

17. Analysis of traits in several generations of a family is _____ analysis.

18. Single step large mutation leading to speciation is _____.

19. An example for auto immune disease is _____.

20. Exploring the molecular, genetic and species level of diversity for obtaining products of economic importance is called _____

PART - B

III. Answer any FIVE of the following questions in 3 – 5 sentences wherever applicable:

5 x 2 = 10

21. List the hormones secreted by the placenta.

22. A female with STI suffers from pelvic inflammatory disease. What may be the reason?

23. Schematically represent the sex determination in honey bees.

24. Identify the following,

a. First human like being the hominid with brain capacities between 650 –800cc.

b. Man with a brain size of 1400cc lived in east and central Asia between 100000 – 40000 years back.

25.Write a note on physical barriers of innate immunity.

26.Mention any two methods to introduce alien DNA into host cells.

27. With respect to tissue culture define,

a. Micropropagation b. Totipotency

28. Introduction of alien species causes biodiversity loss. Justify with two examples.

PART - C

IV. Answer any FIVE of the following questions in 40 – 80 words each wherever applicable:

5 x 3 = 15

29.Draw a labelled diagram of a monocot seed.

30. Schematically represent oogenesis.

31. Explain the natural methods of birth control.

32.Explain any three goals of human genome project

33. Write a diagrammatic representation of Miller's experiment.

34. Describe a typical biogas plant.

35.Transgenic animals play an important role in obtaining biological products. Substantiate.

36. Explain a detritus food chain.

PART – D Section - I

V. Answer any FOUR of the following questions in about 200 – 250 words each wherever applicable:

4 x 5 = 20

37.Flowering plants have developed devices to discourage selfpollination and encourage cross pollination. Justify.

38. a. Draw a labelled diagram of human sperm. (4M)

b.What is spermiation? (1M)

39. Explain the mendelian disorder Phenylketonuria.

40. The process of transcription in eukaryotes is highly complex. Substantiate.
41. Explain the measures useful for prevention and control of alcohol and drug abuse among adolescents.
42. Explain the role of microbes in household products.
43. a. Which are the two core techniques that enabled birth of modern biotechnology. (2M)
b. Draw a labelled diagram of pBR322. (3M)
44. a. Competition occurs when closely related species compete for the same resources that are limiting, but this is not entirely true. Justify with two reasons. (2M)
b. Assign the following examples to their respective type of population interactions. (3M)
i. Ticks on dogs
ii. Barnacles growing on the back of a whale
iii. Sparrow eating a seed

Section – II

VI. Answer any ONE of the following questions in about 200 – 250 words each wherever applicable:

1 x 5= 5

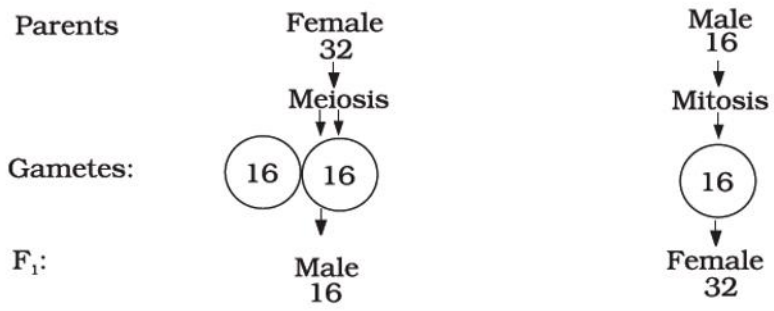
45.ABO blood group is a good example for multiple allelism. It is controlled by the gene 'I' which has three alleles I^A, I^B and i. With the given information,
a. Write the possible phenotypes and their genotypes. (4M)
b. Which blood group is an example for co-dominance? (1M)
46.Explain the work of Avery, MacLeod and McCarty to determine the biochemical nature of 'transforming principle' in Griffith's experiment.
47.A person complained of fever, chills, cough, headache, severe problems in respiration.On investigation it was found that his alveoli were filled with fluid.
a. What is the disease he is suffering from? (1M)
b. Name the two causative agents. (2M)
c. How can a healthy person acquire the infection? (2M)

*****

MARKING SCHEME-MQP-3

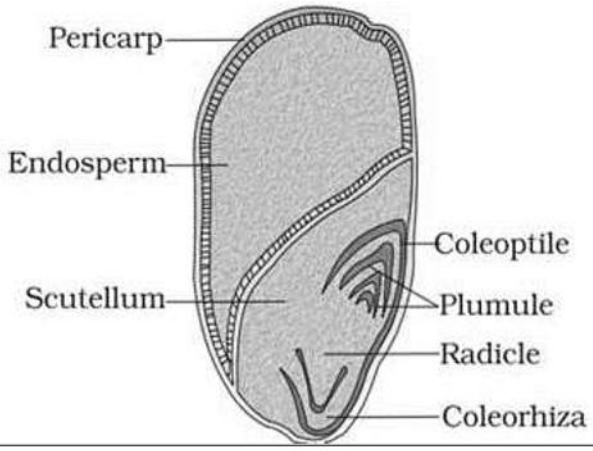
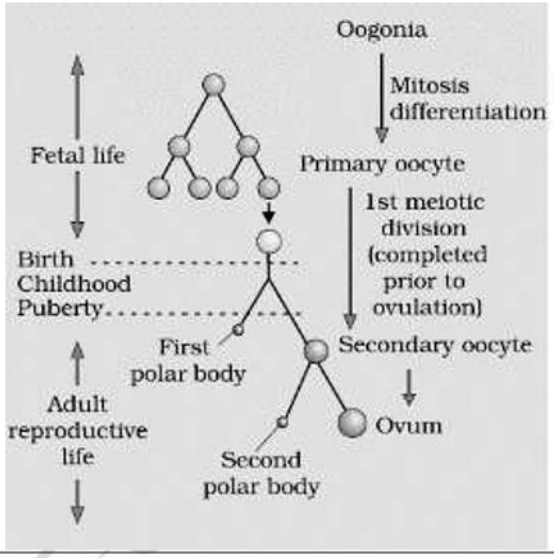
Q.NO	Answers / Value Points	Marks
	PART – A	
	I. Select the correct alternative from the choices given: 15 x 1 = 5	
1	**Select the incorrect statement with respective to vegetative cell of pollen grain.** **a. bigger than generative cell.** **b. has abundant food reserve** **c. has a large irregularly shaped nucleus** **d. floats in the cytoplasm of generative cell** Ans:d. floats in the cytoplasm of generative cell	1
2	**Identify the correct sequence of arrangement of cells in the mature embryo sac from the micropylar end.** **a. Synergids ------- Egg Cell ------- Central Cell ------- Antipodals** **b. Antipodals ------- Central Cell ------- Egg Cell ------- Synergids** **c. Synergids ------- Central Cell ------- Egg Cell ------- Antipodals** **d. Antipodals ------- Egg Cell ------- Central Cell ------- Synergids** Ans: a. Synergids ------- Egg Cell ------- Central Cell ------- Antipodals	1
3	**The cells that secrete testicular hormones (androgens) is _____.** **a. Sertoli cells b. Leydig cells c. germ cells d. Spermatogonia** Ans: b. Leydig cells	1
4	**Statement 1 : Statutory ban on amniocentesis is for sex determination to legally check increasing menace of female foeticide.** **Statement 2 : Amniocentesis is a procedure used to test for the presence of certain genetic disorders.** **a. Both statement 1 and 2 are true** **b. Both statement 1 and 2 are false** **c. Statement 1 is true and statement 2 is false** **d. Statement 1 is false and statement 2 is true** Ans: a. Both statement 1 and 2 are true	1
5	**Who noted that the behaviour of chromosomes was parallel to the behaviour of genes.** **a. Walter Sutton & Theodore Boveri b. Correns & von Tschermark** **c. de Vries & Correns d. de Vries& von Tschermark** Ans: a. Walter Sutton & Theodore Boveri	1
6	**Human chromosome with most number of genes is _____.** **a. Chromosome 21 b. X Chromosome c. Y Chromosome d. Chromosome 1** Ans: d. Chromosome 1	1
7	**Embryological support for evolution was proposed by _____.** **a. Charles Darwin b. Thomas Malthus c. Ernst Heckel d. Karl Ernst von Baer** Ans: c. Ernst Heckel	1
8	**The letter 'R' in EcoRI is derived from the name of _____.** **a. genus b. species c. strain d. order of isolation** Ans: c. strain	1
9	**The corn borer are controlled by proteins encoded by _____ genes.** **a. Cry IAb b. Cry IAc c. Cry II Ab d. Cry II Ac** Ans: a. Cry IAb	1
10	**In a growing population of a country,** **a. reproductive and pre reproductive individuals are equal in number** **b. reproductive individuals are less than post reproductive individuals**	1

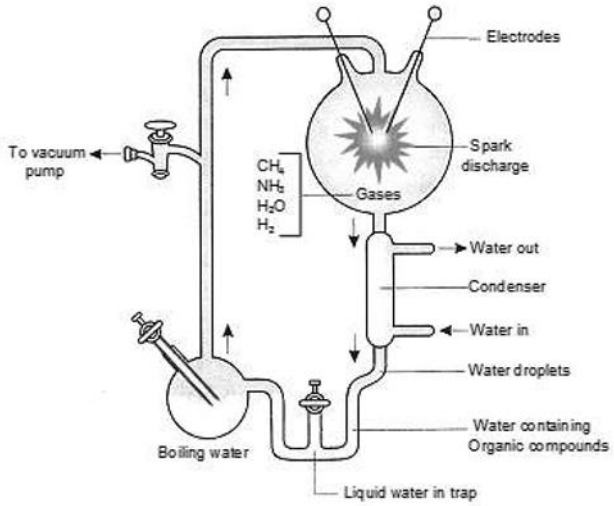
	c. pre reproductive individuals are more than reproductive individuals **d. pre reproductive individuals are less than the reproductive individuals.** Ans: c. pre reproductive individuals are more than reproductive individuals	
11	**What is the net increase in the population if the average natality is 300, mortality 250, immigration 20 and emigration 70.** **a. 10 b. 0 c. 20 d. 30** Ans: b. 0	1
12	**Which of the following is not a function of an ecosystem?** **a. Stratification b. Productivity c. Energy flow d. Decomposition** Ans: a. Stratification	1
13	**In a particular climatic condition, decomposition is slower if detritus is rich in** **a. nitrogen b. water soluble substances c. lignin & chitin d. sugar** Ans: c. lignin & chitin	1
14	**Species area relationship was proposed by _____** **a. Robert May b. Alexander von Humboldt c. Edward Wilson d. Paul Ehrlich** Ans: b. Alexander von Humboldt	1
15	**The species extinct in the recent past in Australia was _____** **a. Dodo b. quagga c. Steller's sea cow d. Thylacine** Ans: d. Thylacine	1
II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket. 5 x 1= 5		
16	**The mechanism to produce seeds without fertilization is called _____.** Ans: apomixis	1
17	**Analysis of traits in several generations of a family is _____ analysis.** Ans: pedigree	1
18	**Single step large mutation leading to speciation is _____.** Ans: saltation	1
19	**An example for auto immune disease is _____.** Ans: Rheumatoid arthritis	1
20	**Exploring the molecular, genetic and species level of diversity for obtaining products of economic importance is called _____** Ans: bioprospecting	1
PART – B **III. Answer any FIVE of the following questions in 3-5 sentences each, wherever applicable: 5 x 2 = 10**		
21	**List the hormones secreted by the placenta.** Ans: Human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens	½*4 = 2
22	**A female with STI suffers from pelvic inflammatory disease. What may be the reason?** Ans: Infected females may often be asymptomatic and hence, may remain undetected for long. Absence or less significant symptoms in the early stages of infection and the social stigma attached to the STIs, deter the infected persons from going for timely detection and proper treatment.	2
23	**Schematically represent the sex determination in honey bees.** Ans:	

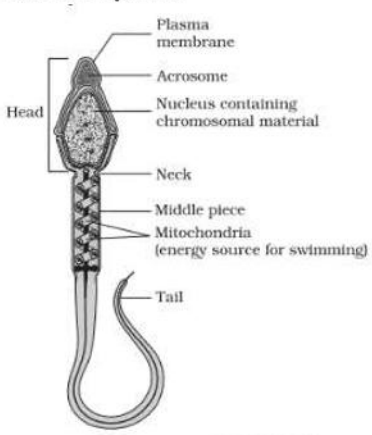
		2
24	**Identify the following,** **a. First human like being the hominid with brain capacities between 650 – 800cc.** Ans: *Homo habilis* **b. Man with a brain size of 1400cc lived in east and central Asia between 100000 – 40000 years back.** Ans: Neanderthal man	1 1
25	**Write a note on physical barriers of innate immunity.** Ans: Skin on our body is the main physical barrier which prevents entry of the micro-organisms. Mucus coating of the epithelium lining the respiratory, gastrointestinal and urogenital tracts also help in trapping microbes entering our body	1 1
26	**Mention any two methods to introduce alien DNA into host cells.** Ans: i. Treating with a specific concentration of a divalent cation, such as calcium ii. Heat shock iii. Micro-injection iv. Biolistics or gene gun.	Any 2 1x2=2
27	**With respect to tissue culture define,** **a. Micropropagation** Ans: Method of producing thousands of plants through tissue culture **b. Totipotency** Ans: Capacity to generate a whole plant from any cell/explant	1 1
28	**Introduction of alien species causes biodiversity loss. Justify with two examples.** Ans: The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake. The environmental damage caused and threat posed to our native species by invasive weed species like carrot grass (Parthenium), Lantana and water hyacinth (*Eicchornia*). The recent illegal introduction of the African catfish *Clariasgariepinus* for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.	Any 2 1x2=2

PART – C

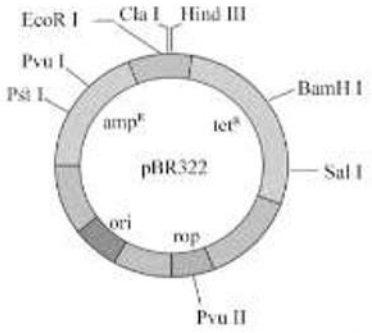
IV. Answer any THREE of the following questions in 40-80 words each, wherever applicable: 5 x 3=15

29	**Draw a labelled diagram of a monocot seed.** Ans:  	½x6 = 3
30	**Schematically represent oogenesis.** Ans:  	3
31	**Explain the natural methods of birth control.** Ans: Periodic abstinence is one such method in which the couples avoid or abstain from coitus when ovulation could be expected. Withdrawal or coitus interruptus is another method in which the male partner withdraws his penis from the vagina just before ejaculation so as to avoid insemination. Lactational amenorrhea (absence of menstruation) method is based on the fact that ovulation and therefore the cycle do not occur during the period of intense lactation following parturition.	1 1 1
32	**Explain any three goals of human genome project** Ans: (i) Identify all the approximately 20,000-25,000 genes in human DNA (ii) Determine the sequences of the 3 billion chemical base pairs that make up human DNA (iii) Store this information in databases (iv) Improve tools for data analysis (v) Transfer related technologies to other sectors, such as industries (vi) Address the ethical, legal, and social issues (ELSI) that may arise from the project.	Any 3 1x3=3

33	**Write a diagrammatic representation of Miller's experiment.**  	½x6=3
34	**Describe a typical biogas plant.** Ans: The biogas plant consists of a concrete tank (10-15 feet deep) in which bio-wastes are collected and a slurry of dung is fed. A floating cover is placed over the slurry, which keeps on rising as the gas is produced in the tank due to the microbial activity. The biogas plant has an outlet, which is connected to a pipe to supply biogas to nearby houses. The spent slurry is removed through another outlet and may be used as fertilizer.	
35	**Transgenic animals play an important role in obtaining biological products. Substantiate.** Ans: Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema. Similar attempts are being made for treatment of phenylketonuria (PKU) and cystic fibrosis. In 1997, the first transgenic cow, Rosie, produced human protein-enriched milk (2.4 grams per litre). The milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than natural cow-milk	1 1 1
36	**Explain a detritus food chain.** Ans: The detritus food chain (DFC) begins with dead organic matter. It is made up of decomposers which are heterotrophic organisms, mainly fungi and bacteria. They meet their energy and nutrient requirements by degrading dead organic matter or detritus. These are also known as saprotrophs. Decomposers secrete digestive enzymes that breakdown dead and waste materials into simple, inorganic materials, which are subsequently absorbed by them	1 1 1
	PART- D Section I **V. Answer any FOUR of the following questions in 200-250 words each, wherever applicable: 4 x 5 = 20**	
37	**Flowering plants have developed devices to discourage self-pollination and encourage cross pollination. Justify.** Ans: In some species, pollen release and stigma receptivity are not synchronised. Either the pollen is released before the stigma becomes receptive or stigma becomes receptive much before the release of pollen. In some other species, the anther and stigma are placed at different positions so that the pollen cannot come in contact with the stigma of the same flower.	1 1

	The third device to prevent inbreeding is self-incompatibility. This is a genetic mechanism and prevents self-pollen (from the same flower or other flowers of the same plant) from fertilising the ovules by inhibiting pollen germination or pollen tube growth in the pistil. Another device to prevent self-pollination is the production of unisexual flowers. If both male and female flowers are present on the same plant such as castor and maize (monoecious), it prevents autogamy but not geitonogamy. In several species such as papaya, male and female flowers are present on different plants, that is each plant is either male or female (dioecy). This condition prevents both autogamy and geitonogamy.	1 1 1
38	**a. Draw a labelled diagram of human sperm**  **b. What is spermiation?** Ans: Release of sperms from seminiferous tubules	½x8=4 1
39	**Explain the mendelian disorder Phenylketonuria.** Ans: This inborn error of metabolism is also inherited as the autosomal recessive trait. The affected individual lacks an enzyme that converts the amino acid phenylalanine into tyrosine. As a result of this phenylalanine is accumulated and converted into phenylpyruvic acid and other derivatives. Accumulation of these in brain results in mental retardation. These are also excreted through urine because of its poor absorption by kidney.	5
40	**The process of transcription in eukaryotes is highly complex. Substantiate.** Ans: There are at least three RNA polymerases in the nucleus (in addition to the RNA polymerase found in the organelles). There is a clear cut division of labour. The RNA polymerase I transcribes rRNAs (28S, 18S, and 5.8S), whereas the RNA polymerase III is responsible for transcription of tRNA, 5srRNA, and snRNAs (small nuclear RNAs). The RNA polymerase II transcribes precursor of mRNA, the heterogeneous nuclear RNA (hnRNA). The second complexity is that the primary transcripts 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 undergoes 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	2 3

41	**Explain the measures useful for prevention and control of alcohol and drug abuse among adolescents.** Ans: (i) Avoid undue peer pressure - Every child has his/her own choice and personality, which should be respected and nurtured. A child should not be pushed unduly to perform beyond his/her threshold limits; be it studies, sports or other activities. (ii) Education and counselling - Educating and counselling him/ her to face problems and stresses, and to accept disappointments and failures as a part of life. It would also be worthwhile to channelize the child's energy into healthy pursuits like sports, reading, music, yoga and other extracurricular activities. (iii) Seeking help from parents and peers - Help from parents and peers should be sought immediately so that they can guide appropriately. Help may even be sought from close and trusted friends. Besides getting proper advise to sort out their problems, this would help young to vent their feelings of anxiety and guilt. (iv) Looking for danger signs - Alert parents and teachers need to look for and identify the danger signs discussed above. Even friends, if they find someone using drugs or alcohol, should not hesitate to bring this to the notice of parents or teacher in the best interests of the person concerned. Appropriate measures would then be required to diagnose the malady and the underlying causes. This would help in initiating proper remedial steps or treatment. (v) Seeking professional and medical help - A lot of help is available in the form of highly qualified psychologists, psychiatrists, and deaddiction and rehabilitation programmes to help individuals who have unfortunately got in the quagmire of drug/alcohol abuse. With such help, the affected individual with sufficient efforts and will power, can get rid of the problem completely and lead a perfectly normal and healthy life.	5
42	**Explain the role of microbes in household products.** Ans: Micro-organisms such as Lactobacillus and others commonly called lactic acid bacteria (LAB) grow in milk and convert it to curd. converting milk to curd, which also improves its nutritional quality by increasing vitamin B12. The dough, which is used for making foods such as dosa and idli is also fermented by bacteria. The puffed-up appearance of dough is due to the production of CO2 gas. Similarly, the dough, which is used for making bread, is fermented using baker's yeast (Saccharomyces cerevisiae). A number of traditional drinks and foods are also made by fermentation by the microbes. 'Toddy', a traditional drink of some parts of southern India is made by fermenting sap from palms. Microbes are also used to ferment fish, soya bean and bamboo shoots to make foods. Cheese, is one of the oldest food items in which microbes were used. Different varieties of cheese are known by their characteristic texture, flavor and taste, the specificity coming from the microbes used. For example, the large holes in 'Swiss cheese' are due to production of a large amount of CO2 by a bacterium named *Propionibacterium sharmanii.* The 'Roquefort cheese' are ripened by growing a specific fungi on them, which gives them a particular flavor.	5

43	**a. Which are the two core techniques that enabled birth of modern biotechnology.** Ans: (i) Genetic engineering: Techniques to alter the chemistry of genetic material (DNA and RNA), to introduce these into host organisms and thus change the phenotype of the host organism. (ii) Bioprocess engineering: Maintenance of sterile (microbial contamination-free) ambience in chemical engineering processes to enable growth of only the desired microbe/eukaryotic cell in large quantities for the manufacture of biotechnological products like antibiotics, vaccines, enzymes, etc **b. Draw a labelled diagram of pBR322.** Ans:  	2 3
44	**a. Competition occurs when closely related species compete for the same resources that are limiting, but this is not entirely true. Justify with two reasons.** Ans: i. Totally unrelated species could also compete for the same resource. For instance, in some shallow South American lakes, visiting flamingos and resident fishes compete for their common food, the zooplankton in the lake. ii. Resources need not be limiting for competition to occur; in interference competition, the feeding efficiency of one species might be reduced due to the interfering and inhibitory presence of the other species, even if resources (food and space) are abundant. **b. Assign the following examples to their respective type of population interactions.** Ans: **i. Ticks on dogs** Parasitism / Ecto-parasitism **ii. Barnacles growing on the back of a whale** Commensalism **iii. Sparrow eating a seed** Predation	1 1 1 1 1
Section II **VI. Answer any ONE of the following questions in 200-250 words each, wherever applicable: 1 x 5= 5**		
45	**ABO blood group is a good example for multiple allelism. It is controlled by the gene 'I' which has three alleles I^A, I^B and i. With the given information,** **a. Write the possible phenotypes and their genotypes.**	4

	Ans: Phenotype / Genotype A / I^AI^A / I^Ai B / I^BI^B / I^Bi AB / I^AI^B O / ii **b. Which blood group is an example for co-dominance?** Ans: AB	1
46	**Explain the work of Avery, MacLeod and McCarty to determine the biochemical nature of 'transforming principle' in Griffith's experiment.** Ans: Oswald Avery, Colin MacLeod and Maclyn McCarty worked to determine the biochemical nature of 'transforming principle' in Griffith's experiment. They purified biochemicals (proteins, DNA, RNA, etc.) from the heat-killed S cells to see which ones could transform live R cells into S cells. They discovered that DNA alone from S bacteria caused R bacteria to become transformed. They also discovered that protein-digesting enzymes (proteases) and RNA-digesting enzymes (RNases) did not affect transformation, so the transforming substance was not a protein or RNA. Digestion with DNase did inhibit transformation, suggesting that the DNA caused the transformation. They concluded that DNA is the hereditary material.	5
47	**A person complained of fever, chills, cough, headache, severe problems in respiration. On investigation it was found that his alveoli were filled with fluid.** **a. What is the disease he is suffering from?** Ans:Pneumonia **b. Name the two causative agents.** Ans: *Streptococcus pneumoniae* and *Haemophilus influenzae* **c. How can a healthy person acquire the infection?** Ans: A healthy person acquires the infection by inhaling the droplets/aerosols released by an infected person or even by sharing glasses and utensils with an infected person	1 2 2

II PU MODEL QUESTION PAPER-4
SUBJECT – BIOLOGY (36)

Time: 3hrs 15 Minutes **Max. Marks: 70**

General instructions

1. This question paper consists of four parts A, B, C, and D.
2. Part A consists of I and II and Part D consists of two sections V and VI.
3. All the parts are compulsory.
4. Draw diagrams wherever necessary. Unlabeled diagrams do not carry any marks.

PART – A

I. Select the correct alternative from the choices given below. **15 × 1= 15**

1. Which of the following is not a correct statement?
   A) Placenta is located outside the ovarian cavity.
   B) Central cell develops into PEC after fertilization.
   C) Orchids contain more than one ovule in an ovary.
   D) Egg apparatus consists of one egg cell and two synergid cells.
2. Diploid number of chromosomes in a primary spermatocyte is 46. What is the total number of chromatids in each of its secondary spermatocyte?
   A) 46 B) 23 C) 92 D) 69
3. In which of the following ART, early embryos with up to 8 blastomeres are transferred into the fallopian tube to overcome infertility?
   A) GIFT B) ZIFT C) IUI D) ICSI
4. Sickle cell anaemia is caused due to
   A) Replacement of valine by glutamic acid.
   B) Replacement of glutamic acid by valine.
   C) Replacement f glutamine by valine.
   D) Replacement of valine by glutamine.
5. The total number of triplet codon which has same bases are
   A) 6 B) 4 C) 8 D) 16
6. One of the pre-historic cave art can be seen in India at Bhimbetka rock shelter is located in
   A) Ranthambore of Rajasthan B) Raisen of Madhya Pradesh
   C) Ellora of Maharashtra D) Amarnath of Jammu and Kashmir
7. Alexander Fleming discovered penicillin while working on
   A) *Staphylococci* B) *Streptococcus*
   C) *E. coli* D) *Salmonella*
8. Typhoid Mary who is mentioned in context of widal test was a
   A) Scientist who developed procedure of widal test.
   B) First person who suffered from typhoid.
   C) Cook who spread the disease for several years through food she prepared.
   D) Doctor in-charge of the hospital where treatment for typhoid was given.
9. Which of the following is not a feature of plasmids?
   A) Extra chromosomal B) Circular structure
   C) Single stranded D) Independent replication
10. Age pyramid with broad base indicates
    A) High percentage of old individuals. B) Low percentage of young individuals.
    C) High percentage of young individuals. D) Low percentage of old individuals.
11. The mobile genetic elements are called
    A) Transcripts B) Transposons
    C) Transforms D) Transgenes

12. Secondary productivity is the rate of formation of new organic matter by
    A) Producers B) Consumers
    C) Decomposers D) Parasites
13. If a man having blood group B marries a woman of blood group AB, the progeny of which blood group indicates that man is heterozygous?
    A) O B) B C) A D) AB
14. Diacetylmorphine is a
    A) Cannabinoid B) Opioid C) Coca alkaloid D) Hallucinogen
15. Species area relationship curve was proposed by
    A) Edward Wilson B) Paul Ehrlich C) Von Humboldt D) David Tilman

II. Fill in the blanks by choosing the appropriate word/ words from those given below. 5 × 1= 5

(Darwin, Gambusia, Jawless fish, de Vries, Passenger pigeon, *Clarias gariepinus*)

16. _____ became extinct in last 500 years due to overexploitation.
17. _____ probably evolved around 350 mya.
18. _____ showed how even a slow growing animal like elephant could reach enormous number in the absence of checks.
19. _____ believed mutation caused speciation.
20. Regular cleaning of water bodies such as pond can be done by introducing fishes like _____.

PART – B

III. Answer any FIVE of the following questions in 3 – 5 sentences each wherever applicable. 5 × 2= 10

21. Mention any two rewards offered y insect pollinated flowers to their pollinators.
22. Name the cells which synthesize the androgen. Mention the hormone which stimulates the cells to produce androgen.
23. Mention any two measures taken by the government to control population explosion.
24. How chromosomal aberrations lead to mutation? Name the cells which commonly exhibit aberrations.
25. Arrange the following in the order of evolution.
    i) Homo habilis ii) Australopithecines iii) Homo sapiens iv) Dryopithecus v) Homo erectus
26. Describe the role of any two bacteria as biofertilizer.
27. Define palindromic sequence. Mention the recognition site of EcoR1.
28. What is gene therapy? Name the disorder to which the first gene therapy was carried out.

PART – C

IV. Answer any FIVE of the following questions in about 40 - 80 words each wherever applicable. 5×3= 15

29. a) What is pollen viability?
    b) Write any two commercial uses of pollen grains.
30. Foetal ejection reflex helps in parturition, explain.
31. Conception could be prevented without any contraceptives and surgery, explain.
32. What are monocistronic and polycistronic units? Where they found?
33. Draw a neat labeled diagram of experimental set up to support the theory of chemical evolution.
34. a) Differentiate between somaclones and somatic hybrids.
    b)Define micropropagation.
35. Explain any three factors which affect rate of decomposition.
36. Why biodiversity should be conserved, according to different categories of arguments?

PART – D SECTION – I

V. Answer any FOUR of the following questions in about 200-250 words each wherever applicable.

4×5= 20

37. Sketch the diagrammatic view of male reproductive system and label the parts.
38. With reference to stem height of pea plant, explain one gene inheritance.
39. Explain the role of microbes in sewage treatment plant.
40. HGP is an exploration project. Substantiate the statement.
41. a) Explain the types of parasitism with suitable examples.
    b) List any four parasitic adaptations in animals.
42. Write the diagrammatic representation of replication of HIV in a host cell.
43. Explain the process of amplification of gene using PCR.
44. a) Describe haplodiploidy type of sex determination. (3)
    b) What is pleiotropy? Give an example. (2)

SECTION – II

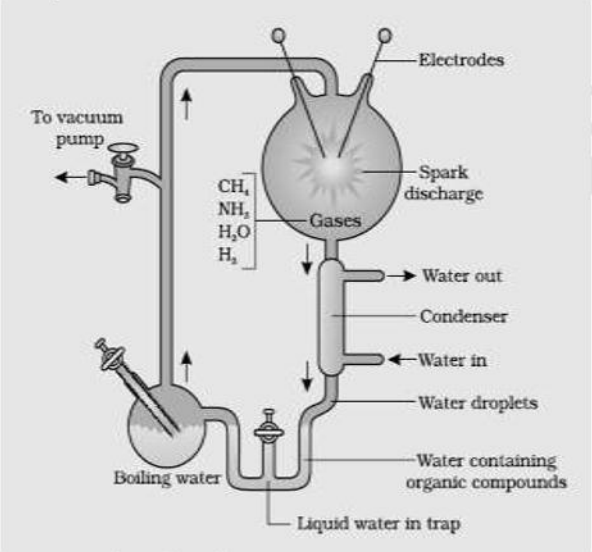
VI. Answer any ONE of the following questions in about 200-250 words each wherever applicable.1×5= 5

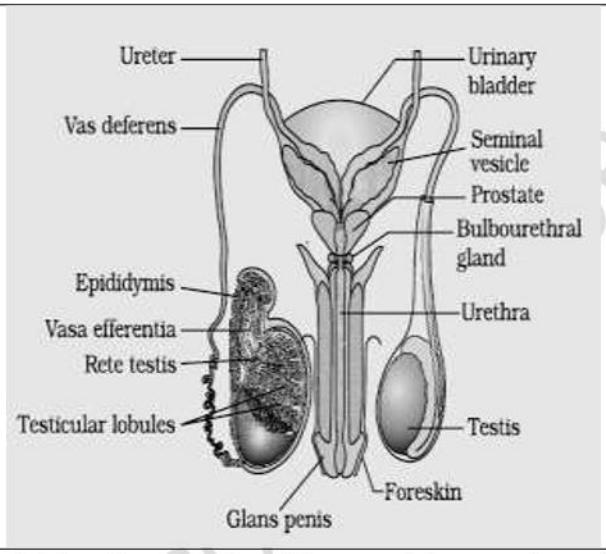
45. a) Using standard pedigree symbols construct a pedigree chart of inheritance of X- linked recessive disorder for the following.
    Given, the normal male parent has four children. Out of the four children only one male and one female carries the gene for the disorder. The affected son marries normal woman. They got 3 children, out of which one is male and one is female.
    b) Derive any two conclusions from the pedigree chart drawn.
46. a) Explain different types of pollination based on the source of pollen.
    b) Differentiate between chasmogamous and cleistogamous flowers.
47. Human body has a special mechanism of protecting itself against a range of pathogens. Different types of cells are involved in this process in different ways.
    a) What is the stimulus for the generation of acquired immunity?
    b) Name the type of cells involved in following type of immunity.
        i) Cell mediated immunity
        ii) Antibody mediated immunity
        iii) Cytokine barriers
        iv) Phagocytosis

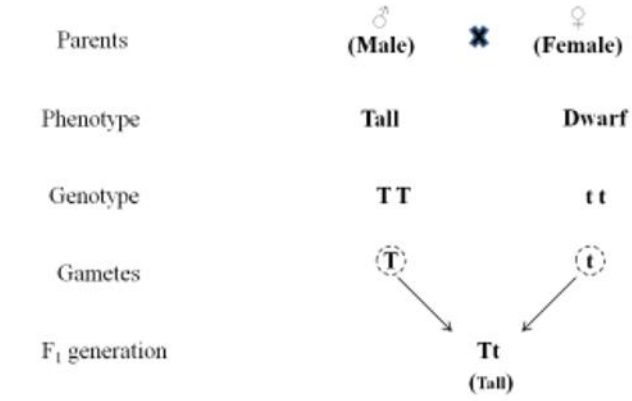
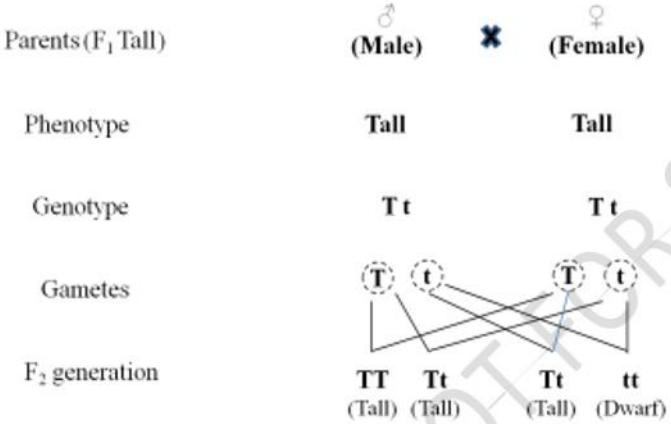
MARKING SCHEME -MQP-4

Q. NO.	ANSWERS/ VALUE POINTS	MARKS
I	PART- A	**15× 1= 15**
1.	Which of the following is not a correct statement? Ans:- A) Placenta is located outside the ovarian cavity.	1
2.	Diploid number of chromosomes in a primary spermatocyte is 46. What is the total number of chromatids in each of its secondary spermatocyte? Ans: - A) 46	1
3.	In which of the following ART, early embryos with up to 8 blastomeres are transferred into the fallopian tube to overcome infertility? Ans: - B) ZIFT	1
4.	Sickle cell anaemia is caused due to Ans:- A) Replacement of valine by glutamic acid	1
5.	The total number of triplet codon which has same bases are Ans:- B) 4	1
6.	One of the pre-historic cave art can be seen in India at Bhimbetka rock shelter is located in Ans:- B) Raisen of Madhya Pradesh	1
7.	Alexander Fleming discovered penicillin while working on Ans:- A) Staphylococci	1
8.	Typhoid Mary who is mentioned in context of widal test was a Ans:- C) Cook who spread the disease for several years through food she prepared.	1
9.	Which of the following is not a feature of plasmids? Ans:- C) Single stranded	1
10.	Age pyramid with broad base indicates Ans:- C) High percentage of young individuals.	1
11.	The mobile genetic elements are called Ans:- B) Transposons	1
12.	Secondary productivity is the rate of formation of new organic matter by Ans:- B) Consumers	1
13.	If a man having blood group B marries a woman of blood group AB, the progeny of which blood group indicates that man is heterozygous? Ans:- C) A	1
14.	Diacetylmorphine is a Ans:- B) Opioid	1
15.	Species area relationship curve was proposed by Ans:- C) Von Humboldt	1
II		**5× 1= 5**
16.	Passenger pigeon	1
17.	Jawless fish	1
18.	Darwin	1
19.	de Vries	1
20.	Gambusia	1

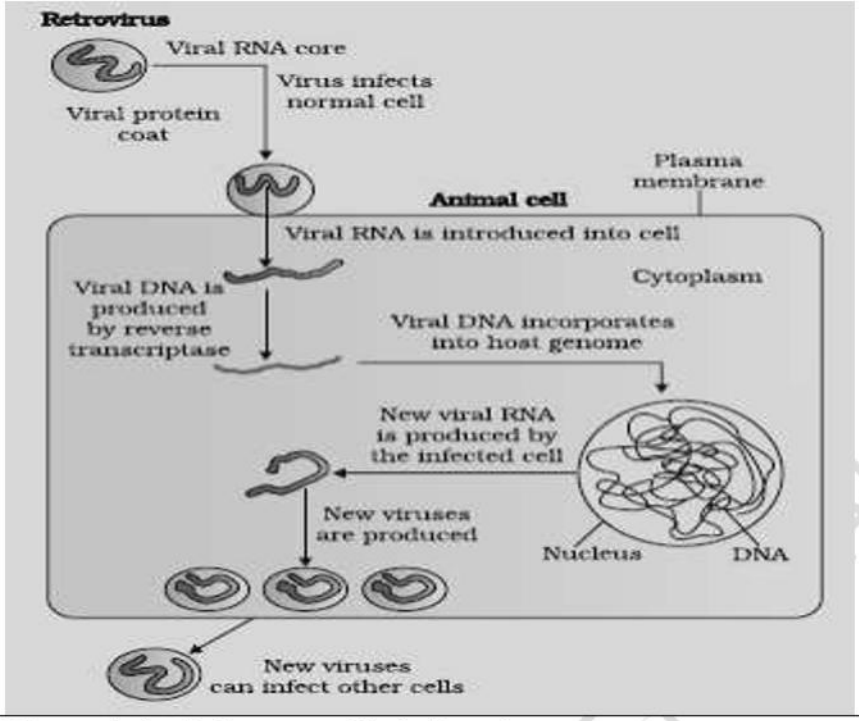
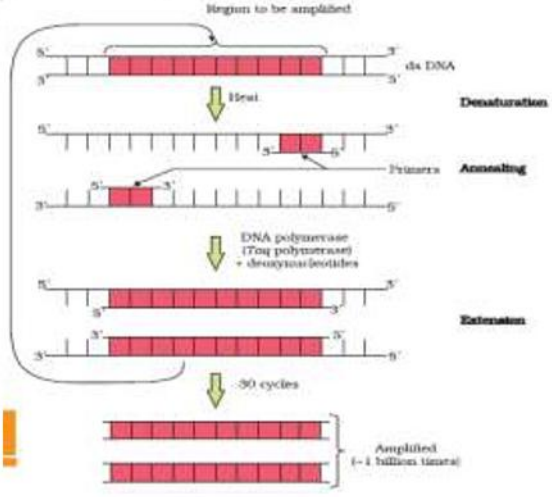
	PART - B	5× 2= 10
21.	i) Provides nector. ii) Provides safe places to lay eggs.	2
22.	Leydig cells LH (Luteinising hormone)	2
23.	i) Motivating smaller families by using various contraceptive methods. ii) Statutory raising of marriageable age of the female to 18 years and that of male to 21 years. iii) Incentives given to couples with small families. (Any 2)	2
24.	Loss or gain of a segment of DNA, result in alteration in chromosomes leads to mutation. Chromosomal aberrations are commonly observed in cancer cells.	2
25.	Dryopithecus Australopithecines Homo habilis Homo erectus Homo sapiens	2
26.	i) Rhizobium- Forms symbiotic association between roots of leguminous plants, fixes atmospheric nitrogen into organic forms. ii) Azospirillum and Azotobacter- Free living soil bacteria, enriches nitrogen content in soil.	1 1
27.	Palindromic sequence- Sequence of base pairs that reads same on the two strands when orientation of reading is kept the same. Recognition site of EcoR1  	1 1
28.	Gene therapy- Collection of methods that allows correction of a gene defect that has been diagnosed in a child/ embryo. ADA deficiency.	1 1
	PART - C	**5× 3= 15**
29.	a) Pollen viability- It is the period for which the pollen grain retain the ability to produce pollen tube. b) Commercial uses; i) Pollen tablets are used as food supplements. ii) Used to increase the performance of athletes and race horses.	1 2
30.	The fully developed fetus and the placenta produces signals, which induces mild uterine contraction called fetal ejection reflex. This triggers the release of oxytocin from the maternal pituitary. Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which further stimulates the secretion of oxytocin. This leads to the stronger uterine contraction, causes expulsion of baby out of the uterus through birth canal.	3
31.	Conception can be avoided by natural methods.	

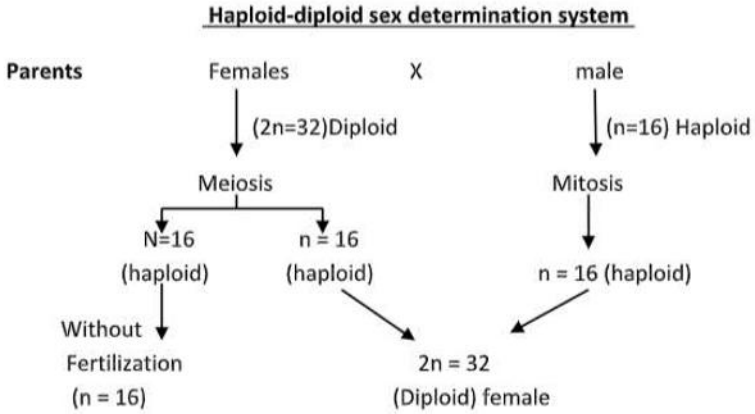
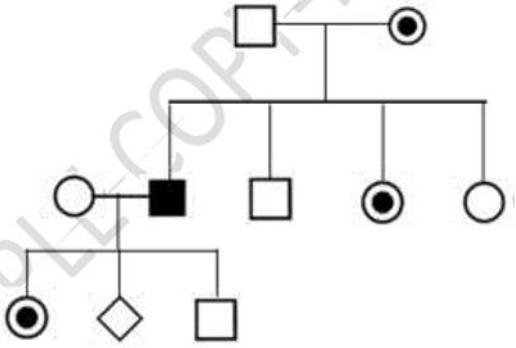
	i) Periodic abstinence- avoiding coitus from day 10 to 17 of the menstrual cycle. ii) Withdrawal or *Coitus interruptus*- Male partner withdraws his penis from the vagina just before ejaculation. iii) Lactational amenorrhea- absence of ovulation during the period intense lactation following parturition.	3
32.	Monocistronic:- Structural genes interrupted by coding and non-coding sequences. Found in Eukaryotes. Polycistronic: - Continuous structural genes without non-coding sequences. Found in Prokaryotes.	3
33.		3
34.	a) Somaclones:- The plants which are genetically identical to the original plants from which they were grown. Somatic hybrids: - The hybrids obtained by the fusion of protoplasts of two different varieties of plants. b) Micropropagation: - The method of producing thousands of plants through tissue culture.	2 1
35.	i) Chemical composition of the detritus- Decomposition rate is slower if detritus is rich in lignin and chitin and quicker, if detritus is rich in nitrogen and water soluble substances like sugar. ii)Temperature- Warm temperature favour decomposition whereas low temperature inhibit decomposition. iii) Soil moisture- Moist environment favor decomposition whereas dry environment inhibit decomposition. iv) Air:- Decomposition is largely an oxygen requiring process and anaerobiosis inhibit decomposition. (Any 3)	3

36.	<u>Broadly utilitarian argument</u>- Biodiversity plays a major role in many ecosystem services that nature provides (Recycling of gases, nutrients, pollination etc.,) <u>Narrowly utilitarian argument</u>- Biodiversity provides countless direct economic benefits from nature- food, firewood, fibre, construction material, industrial products, products of medicinal importance. <u>Ethical argument</u>- Philosophically or spiritually, we need to realize that every species has an intrinsic value, even if it may not be of current or any economic value to us. We have a moral duty to care for their well-being and pass on our biological legacy in good order to future generations.	3
	PART – D SECTION – I	**4×5= 20**
37.		10 labels- 5 marks
38.	The hybrid obtained by a cross with respect to <u>one character</u> is called monohybrid cross/ inheritance of one gene. A pair of plants with contrasting characters namely tall and dwarf plants with respect to height was selected. The tall and dwarf plants are the parents. The pure tall plant has a pair of dominant genes (alleles/factors) represented as "TT". The pure dwarf plant has a pair of recessive genes represented as "tt". When a tall and dwarf plants are crossed, the offsprings obtained are all tall. These are referred as first filial generation or F1 generation. When these F1 tall plants were self-crossed, the offsprings of the second generations are obtained, which were called second filial generation or F2 generation. The offsprings formed in the F2 generation are tall and dwarf and they occur in the ratio of 3:1 respectively.	5 marks

	 When F_1 tall plants are inbred  **Phenotypic ratio: - 3 : 1 (Tall : Dwarf)** **Genotypic ratio: - 1 : 2 : 1.**	
39.	✓ Primary effluent is passed into large aeration tanks with constant mechanical agitation and air supply. ✓ Useful aerobic microbes grow rapidly and form flocs (Flocs are masses of bacteria associated with fungal filaments to form mesh like structures). ✓ The growing microbes consume organic matter and thus reduce the Biological Oxygen Demand (BOD). (BOD refers to the amount of the oxygen that would be consumed if all the organic matter in one liter of water were oxidized by bacteria). ✓ BOD indicates the uptake of oxygen by microorganisms for aerobic degradation of organic matter present in sewage. ✓ The effluent containing bacterial flocs from secondary treatment plant is allowed to sediment, this is called activated sludge. ✓ A part of activated sludge is pumped back into the large tank to serve as inoculums and the rest is pumped into the large tank called anaerobic sludge digesters, here anaerobic bacteria digest the aerobic bacteria and fungi in the sludge. ✓ Bacteria also produce a mixture of gases such as methane, H_2S and CO_2.	5 marks

	✓ The effluent from secondary treatment plant is generally released into natural water bodies like rivers and streams.	
40.	The knowledge explored through HGP are, • Identified nearly 30,000 genes of human DNA. • Identified 3164.7 million nitrogen bases in the human genome. • Identified the size and number of bases in genes. An average gene has 3000 bases and the largest human gene dystrophin has 2.4 million bases. • Identified the fact that all human beings are 99.0% identical with each other and 0.1 is different. • Identified that the chromosome-1 has maximum number of genes i.e., 2968 and Y-chromosome with lowest number of genes i.e., 231. • Identified that only 2% of the genome code for protein and remaining 98% DNA remain functionless. This non-functional DNA is called Junk DNA. (Any 5)	5 marks
41.	a) **Endoparasitism:-**Parasitism in which parasites which live inside the host's body at different sites like liver, kidney, lungs etc., for food and shelter. Ex:- Tapeworm, Liver fluke, Plasmodium. **Ectoparasitism:-** Parasitism in which parasites which feed on the external surface of the host organism for food and shelter. Ex:- Lice on humans, ticks on dogs, cuscuta. b**) Adaptation of parasite** i) The parasite has evolved to be host specific in such a manner that both host and parasite tend to co-evolve. ii) Loss of unnecessary sense organs. iii) Presence of adhesive organs or suckers. iv) Loss of digestive system. v) High reproductive capacity. (Any 4)	3 marks 2 marks

42.		5 marks
43.	PCR stands for **Polymerase Chain Reaction**. In this reaction, multiple copies of the gene (or DNA) of interest is synthesised *in vitro* using two sets of primers and the enzyme DNA polymerase. The enzyme extends the primers using the nucleotides and the genomic DNA as template. If the process of replication of DNA is repeated many times, the segment of DNA can be amplified billion times. Repeated amplification is achieved by the use of a thermostable DNA polymerase, which remain active during the high temperature induced denaturation of double stranded DNA. The amplified fragment if desired can now be used to ligate with a vector for further cloning 	5 marks
44.	a) Haplodiploidy type of sex determination is observed in Honey bee. Here, sex determination is based on the number of sets of	3 marks

	chromosomes in the individual. An offspring formed from the union of a sperm and an egg develops into female (Queen or worker) an unfertilized egg develops as a male (drone).  b) Pleiotropy- Single gene controlling multiple phenotypic expression. Ex:- In human, mutation in the gene that codes for enzyme phenyl alanine hydroxylase causes the disease phenylketonuria. It also causes mental retardation and reduction in hair and skin pigmentation.	2 marks
	SECTION II	**1×5= 5**
45.	a) 	3 marks
	b) i) Since male parent is normal, female should be carrier for the transmission of the disorder. ii) In first generation, since one male is normal, another male is affected and one female is normal, hence another female is carrier. iii) In second generation, out of 3 children one is male and one is female. The sex of the 3rd child is unspecified. (Any 2)	2 marks
46.	**a) Autogamy:-** Transfer of pollen grains from the anther to the stigma of the same flower. In this method pollination achieved within the same flower. **Geitonogamy:-** Transfer of pollen grains from the anther of one flower to the stigma of another flower of the same plant. Genetically it is similar to autogamy.	3 marks

	Xenogamy:- Transfer of pollen grains from the anther of one flower to the stigma of another flower of different plants. **b) Chasmogamous flowers:-** These are the ordinary types of flowers, which exposes the anther and stigma to the external environment. **Cleistogamous flowers:-** These are the flowers which do not open at all and do not expose the anthers and stigma to the external environment.	2 marks
47.	a) Body encountering a pathogen or Presence of an antigen in the body. b) i) T-lymphocytes ii) B- lymphocytes iii) Virus infected cells iv) Monocytes/ Macrophages	1 mark 4 marks

II PU MODEL QUESTION PAPER-5
SUBJECT – BIOLOGY (36)

Time: 3hrs 15 Minutes **Max. Marks: 70**

General instructions

1. This question paper consists of four parts A, B, C, and D.
2. Part A consists of I and II and Part D consists of two sections V and VI.
3. All the parts are compulsory.
4. Draw diagrams wherever necessary. Unlabeled diagrams do not carry any marks.

PART – A

I. Select the correct alternative from the choices given below: **15x1 = 15**

1. The pollination involving two flowers of the same plant is
   a) Xenogamy b) Autogamy c) Geitonogamy d) Cleistogamy
2. In a monocot embryo, shoot apex and leaf primordia are enclosed in a hollow foliar structure called
   a) Pericarp b) Coleoptile c) Endosperm d) Coleorrhiza
3. A student squeezed an orange seed while doing an experimental procedure and was astonished to see many embryos in it. Those embryos were
   a) Products of syngamy c) of different size and shapes
   b) haploids d) developed from secondary nucleus
4. Which of the following statements is TRUE?
   a) LH surge induces menstruation
   b) Regression of corpus luteum increases progesterone
   c) Diploid egg is formed after second meiotic division
   d) Embryo differentiates from the inner cell mass of blastocyst
5. Scrotum helps in maintaining the temperature of testes which is A lower than the normal body temperature. Each testis has about B compartments and measures C cm in length. Select the option that fills the blanks correctly.

	A	B	C
a)	1-3° C	250	4-6
b)	2-2.5° C	250	4-5
c)	3-3.5° C	300	2-3
d)	2-2.5° C	250	2-3

6. What would be the distance between base pairs of a DNA, whose pitch is 38 A° and there are roughly 10 bp in each turn?
   a) 0.38 nm b) 0.38 A° c) 3.8 nm d) 38.0 nm
7. Which of these sexually transmitted infections is curable, if detected early?
   a) Hepatitis B b) Genital herpes c) Genital warts d) HIV infection
8. In Pea plants, 64 F_2 progenies were obtained from a typical dihybrid cross. The number of progenies showing non-parental traits
   a) 36 b) 12 c) 24 d) 4
9. The Big bang theory attempts to explain
   a) Origin of life c) Origin of earth
   b) Organic evolution d) Origin of universe
10. Normal cells do not show uncontrolled cell growth and division. Because, normal cells show a property called
    a) Metastasis b) Oncogenesis c) Contact inhibition d) Proliferation

11. Identify the correct match with respect to various stages in the life cycle of *Plasmodium*.

	Liver cells	Red blood cells
a)	Sexual stage	Asexual stage
b)	Asexual stage	Asexual stage
c)	Asexual stage	Sexual stage
d)	Sexual stage	Sexual stage

12. A novel strategy applied to develop tobacco plants resistant to *Meloidegyne* nematode is
    a) RNA interference b) DNA hybridization c) DNA interference d) Gene cloning
13. Miller's experiment simulated
    a) Earth's condition during organic evolution c) Conditions of Galapagos islands
    b) Pre-biotic earth's condition d) Big bang explosion
14. Darwinian fitness refers to
    a) Reproductive fitness c) Interaction fitness
    b) Predation fitness d) Mortality fitness
15. The nature of interaction between Statins and the enzyme responsible for cholesterol synthesis is
    a) Antigen-Antibody reaction c) Competitive inhibition
    b) Non-competitive inhibition d) Enzyme denaturation

II. Fill in the blanks by choosing the appropriate word/Words from those given below: 5x1 = 5

(Conduits, Retrovirus, Transformation, Parturition, Restriction enzymes)

16. The process of delivery of the foetus is called _____.
17. Frederick Griffith witnessed a miraculous _____ in bacteria.
18. HIV is a member of a group of viruses called _____.
19. Cutting of DNA at specific locations can be done using _____.
20. Predators act as _____ for energy transfer across trophic levels.

PART - B

III. Answer any FIVE of the following questions in 3 – 5 sentences wherever applicable: 5x2 = 10

21. What are polygenic traits? Give an example for such traits in humans.
22. Sketch and label a nucleosome.
23. Write any two differences between S strain and R strain of *Streptococcus pneumoniae*.
24. What is Natural selection? What do you mean by disruptive selection?
25. Draw a schematic representation showing structure of an antibody molecule.
26. 'Discovery of antibiotic Penicillin was a chance event'. Justify.
27. Which two processes are collectively referred to as downstream processing?
28. List any two important features of Detritus food chain.

PART - C

IV. Answer any FIVE of the following questions in 40 – 80 words each wherever applicable: 5x3= 15

29. In the context of Artificial hybridization, explain the following terms
    i. Emasculation ii. Bagging iii. Contamination
30. Explain the organization of glandular tissue in a breast of human females.
31. State 'Law of dominance'.
32. Why did T.H.Morgan select *Drosophila melanogaster* for his genetic experiments?
33. Which were the two methodological approaches used in HGP? Name the two cloning vectors used to amplify DNA fragments to be sequenced.
34. Define Hardy-Weinberg principle. Mention any four factors that affect Hardy Weinberg equilibrium.
35. What is active immunity? Mention any two ways to induce active immune response.

36. Define the following terms with reference to ecosystem.
    a. Stratification b. Primary production c. Standing crop

PART – D Section – I

V. Answer any FOUR of the following questions in about 200– 250 words each wherever applicable: 4 x 5 = 20

37. a. Draw a neat-labeled diagram showing enlarged view of one microsporangium. (3M)
    b. Mention the two wall layers of pollen grains along with their chemical composition. (2M)
38. Draw a diagrammatic view to show reproductive system of a human male.
39. a. What are the complications of STIs in later stages? (2M)
    b. List out the simple principles to be followed to avoid STIs. (3M)
40. Write the genetic nature, cause and symptoms of Hemophilia and Sickle cell anaemia.
41. What are the adverse effects of drug and alcohol abuse? List the side-effects of use of anabolic steroids in females.
42. What are biofertilizers? Justify the statement 'Microbes can be used as biofertilizers' with suitable examples.
43. Mention the different ways by which GM plants have been found useful.
44. Define species diversity. Explain the analogy given by Paul Ehrlich highlighting the importance of species diversity in an ecosystem.

Section – II

VI. Answer any ONE of the following questions in about 200–250 words each wherever applicable: 1x5= 5

45. Read the following information about gene regulation.

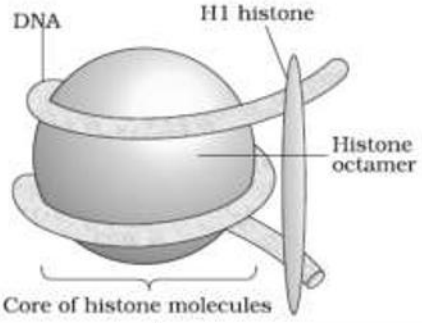
Parameters	Variants
Level of regulation	Transcriptional level/Processing level/ Transport of mRNA to the cytoplasm/Translational level
Switch off mode	Presence of inducer/Absence of inducer
Regulating conditions	Metabolic/Physiological/Environmental
Repressor interacts with	Regulator/Promotor/Operator
Type of regulation	Positive/Negative/Both

    Identify and write the variants applicable to *Lac*-Operon for all five parameters.

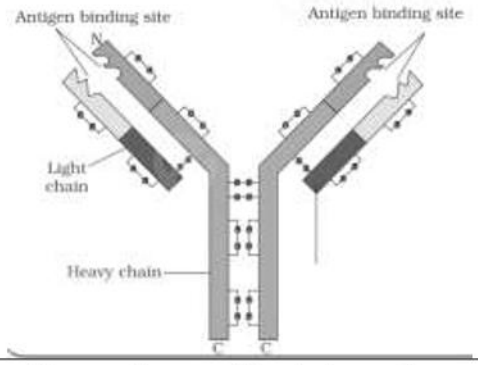
46. a) What is the use of Gel electrophoresis in Genetic engineering? (1M)
    b) What is the principle behind separation of DNA fragments on the gel slab? (2M)
    c) Give reasons for the following statements. (2M)
    i. Smaller DNA fragments move farther in a gel slab.
    ii. Separated DNA fragments can be visualized only on staining followed by exposure to UV light.
47. 'Mutualistic interaction confers benefits on both the interacting species'. Substantiate the statement with any four suitable examples.

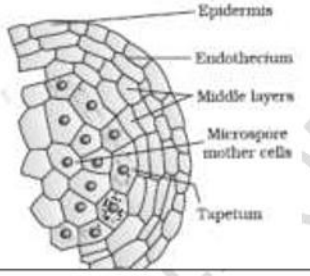
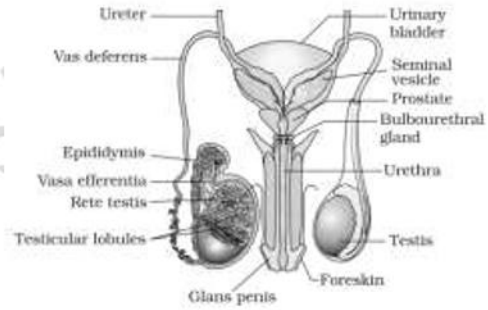
****

MARKING SCHEME-MQP-5

<table>
<tr><th>Q.NO.</th><th>ANSWERS/ VALUE POINTS</th><th>Marks</th></tr>
<tr><td>1</td><td>c) Geitonogamy</td><td>1</td></tr>
<tr><td>2</td><td>b) Coleoptile</td><td>1</td></tr>
<tr><td>3</td><td>c) different size and shapes</td><td>1</td></tr>
<tr><td>4</td><td>d) Embryo differentiates from the inner cell mass of blastocyst</td><td>1</td></tr>
<tr><td>5</td><td>b)2-2.5° C 250 4-5</td><td>1</td></tr>
<tr><td>6</td><td>a) 0.38 nm</td><td>1</td></tr>
<tr><td>7</td><td>c) Genital warts</td><td>1</td></tr>
<tr><td>8</td><td>c) 24</td><td>1</td></tr>
<tr><td>9</td><td>d) Origin of universe</td><td>1</td></tr>
<tr><td>10</td><td>c) Contact inhibition</td><td>1</td></tr>
<tr><td>11</td><td>c) Asexual stage Sexual stage</td><td>1</td></tr>
<tr><td>12</td><td>a) RNA interference</td><td>1</td></tr>
<tr><td>13</td><td>b) Pre-biotic earth’s condition</td><td>1</td></tr>
<tr><td>14</td><td>a) Reproductive fitness</td><td>1</td></tr>
<tr><td>15</td><td>c) Competitive inhibition</td><td>1</td></tr>
<tr><td>16</td><td>Parturition</td><td>1</td></tr>
<tr><td>17</td><td>transformation</td><td>1</td></tr>
<tr><td>18</td><td>Retrovirus</td><td>1</td></tr>
<tr><td>19</td><td>Restriction enzymes</td><td>1</td></tr>
<tr><td>20</td><td>conduits</td><td>1</td></tr>
<tr><td>21</td><td>• Traits controlled by three or more genes are called polygenic traits.
• Height in humans/Skin colour in humans</td><td>1
1</td></tr>
<tr><td>22</td><td> 
</td><td>4 label x
½ marks</td></tr>
<tr><td>23</td><td><table>
<tr><th>S strain</th><th>R strain</th></tr>
<tr><td>Produce smooth shiny colonies</td><td>Produce rough colonies</td></tr>
<tr><td>Has a mucous coat</td><td>Does not have mucous coat</td></tr>
<tr><td>Virulent</td><td>Avirulent</td></tr>
</table></td><td>Any 2 x 1m</td></tr>
<tr><td>24</td><td>It is a process in which heritable variations enabling better survival are enabled to reproduce and leave greater number of progeny.
In disruptive selection, more individuals acquire peripheral character value at both ends of the distribution curve.</td><td>1

1</td></tr>
</table>

25		½ m x 4 labels
26	Alexander Fleming while working on *Staphylococci*, once observed a mould growing in one of his unwanted culture plates around which *Staphylococci* could not grow. Later he found that it was due to a chemical produced by mould and he named it Penicillin.	2
27	Separation and Purification	2
28	• DFC begins with dead organic matter. • It is made up of decomposers which are heterotrophs. • They meet their energy and nutrient requirements by degrading detritus. • Decomposers secrete digestive enzymes that breakdown dead and waste materials into simple, inorganic materials.	Any 2 x 1m
29	i. In bisexual flowers of a female parent, anthers are removed from the flower bud before dehiscence of anther. ii. Emasculated flowers are covered with a bag of suitable size to prevent contamination of its stigma with unwanted pollen. iii. Pollination of emasculated flowers with unwanted stigma.	1 1 1
30	• Each breast has 15-20 mammary lobes which contain milk secreting cluster of cells called alveoli. • The alveoli open into mammary tubules. The tubules of each lobe join to form a mammary duct. • Several mammary ducts join to form mammary ampulla. It is connected to lactiferous duct through which milk is sucked out.	1 1 1
31	• Characters are controlled by discrete units called factors. • Factors occur in pairs. • In a dissimilar pair of factors one member of the pair dominates (dominant) the other (recessive).	1 1 1
32	• They could be grown on simple synthetic medium in the laboratory. • They complete their life cycle in about two weeks. • A single mating could produce a large number of progeny flies. • There was clear differentiation of the sexes. • It has many types of hereditary variations that can be seen with low power microscopes.	Any 3 x 1m
33	• Expressed Sequence tags, Sequence annotation • Bacterial artificial chromosome • Yeast artificial chromosome	1 1 1

34	The genes and genotypic frequencies in a population remain constant generation after generation, if there is no selection, mutation, migration or random drift. • Mutation • Natural selection • Genetic drift • Gene flow • Genetic recombination	1 Any 4 x ½ m
35	Active immunity is, when a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. Two ways of inducing active immune response are: • Injecting the microbes deliberately during immunization. • Infectious organisms gaining access into body during natural infection.	1 1 1
36	a. Stratification: Vertical distribution of different species occupying different levels is called stratification. b. Primary production: It is the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis. c. Standing crop: Each trophic level has a certain mass of living material at a particular time called as the standing crop.	1 1 1
37	a. 	3 m
	b. Exine- Sporopollenin Intine – Cellulose and Pectin	1 1
38		10 labels x ½ m
39	a. Later complications of STIs - Pelvic inflammatory diseases (PID) - Abortion - Still births - Ectopic pregnancies - Infertility - Cancer of the reproductive tract	Any 4 x ½ m

	b. Following are the simple principles to be free from such infections. • Avoid sex with unknown partners/multiple partners • Always use condoms during coitus • In case of doubt, one should go to a qualified doctor for early detection and get complete treatment if diagnosed with disease	3 x 1m
40	**Haemophilia:** *Genetic nature*: Sex linked recessive *Cause*: A single protein that is a part of the cascade of the proteins involved in the blood clotting is affected. *Symptom*: In an affected individual, a simple cut will result in non-stop bleeding. **Sickle cell anemia:** *Genetic nature*: Autosomal recessive *Cause:* Substitution of Glutamic acid by Valine at the sixth position of the beta globin chain of the haemoglobin molecule. *Symptom*: Mutant haemoglobin molecule undergoes polymerization under low oxygen tension causing the change in the shape of the RBC from biconcave disc to elongated sickle like structure.	½ m 1 1 ½ m 1 1
41	**Effects of Alcohol/ Drug Abuse** • Immediate effect – Vandalism, violence, and reckless behaviour • Drop in academic performance, lack of interest in personal hygiene, rebellious behaviour, and change in eating and sleeping patterns, weight and appetite fluctuations • Mental, psychological, and financial loss not only to the user, but also to his family • Those who take drugs intravenously have a high risk of acquiring deadly diseases such as AIDS and hepatitis B. • Damage to nervous system and liver (cirrhosis) • Ultimately, prolonged use of alcohol/drugs leads to coma and death. ***Side effects of anabolic steroids in females:*** ○ Increase of masculinity, aggressiveness, depression, abnormal menstrual cycle, facial hair growth, enlargement of clitoris, and deepening of voice	Any 3 x 1 m Any 4 x ½ m
42	Biofertilizers are organisms that enrich the nutrient quality of the soil. Microbes as biofertilizers: • *Rhizobium*- This is a very common bacterium which forms root nodules in leguminous plants. These bacteria fix atmospheric nitrogen into soil, which can be absorbed by the plants. • *Azospirillum* and *Azotobacter* - These are free living soil bacteria which can also perform biological nitrogen fixation. • Mycorrhiza- It is the symbiotic association between fungi and roots of plants. These fungi help the plants by absorbing phosphorus from soil and also by giving resistance against root borne	1 1 1 1

	pathogens and also the conditions like salinity and drought. Ex: Glomus • Cyanobacteria or Blue green algae like *Anabaena, Nostoc, Oscillatoria* - These increase soil fertility by the process of nitrogen fixation. These are abundantly found in the paddy fields.	1
43	GM plants have been useful in many ways. Genetic modification has: (i) made crops more tolerant to abiotic stresses (cold, drought, salt, heat). (ii) reduced reliance on chemical pesticides (pest-resistant crops). (iii) helped to reduce post-harvest losses. (iv) increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil). (v) enhanced nutritional value of food, e.g., Vitamin 'A' enriched rice.	1 1 1 1 1
44	Diversity at the species level is called as Species diversity. Analogy given Paul Ehrlich is known as 'Rivet popper hypothesis': In an airplane (ecosystem) all parts are joined together using thousands of rivets (species). If every passenger travelling in it starts popping a rivet to take home (causing a species to become extinct), it may not affect flight safety (proper functioning of the ecosystem) initially, but as more and more rivets are removed, the plane becomes dangerously weak over a period of time. Furthermore, which rivet is removed may also be critical. Loss of rivets on the wings (key species that drive major ecosystem functions) is obviously a more serious threat to flight safety than loss of a few rivets on the seats or windows inside the plane.	1 4
45		

Parameters	Variants
Level of regulation	Transcriptional level
Switch off mode	Absence of inducer
Regulating conditions	Metabolic
Repressor interacts with	Operator
Type of regulation	Both

		1 1 1 1 1
46	a. Separation of DNA fragments created by the action of restriction endonuclease on DNA molecule. b. Since DNA fragments are negatively charged molecules they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. c. i. The DNA fragments separate according to their size through sieving effect provided by the agarose gel. ii. Because pure DNA fragments cannot be seen without staining and in the visible light.	1 2 1 1

47	• Lichens represent an intimate mutualistic relationship between a fungus and photosynthesizing algae or cyanobacteria. • The mycorrhizae are associations between fungi and the roots of higher plants. The fungi help the plant in the absorption of essential nutrients from the soil while the plant in turn provides the fungi with energy-yielding carbohydrates. • Another fascinating example of mutualism is found in plant-animal relationships. Plants need the help of animals for pollinating their flowers and dispersing their seeds. Plants offer rewards or fees in the form of pollen and nectar for pollinators and juicy and nutritious fruits for seed dispersers. • In many species of fig trees, there is a tight one-to-one relationship with the pollinator species of wasp. It means that a given fig species can be pollinated only by its 'partner' wasp species and no other species. The female wasp uses the fruit not only as an oviposition (egg-laying) site but uses the developing seeds within the fruit for nourishing its larvae. • Orchids show a bewildering diversity of floral patterns many of which have evolved to attract the right pollinator insect (bees and bumblebees) and ensure guaranteed pollination by it.	1 1 1 1 1

II PU MODEL QUESTION PAPER-6
SUBJECT – BIOLOGY (36)

Time: 3hrs 15 Minutes **Max. Marks: 70**

General instructions

1. This question paper consists of four parts A, B, C, and D.
2. Part A consists of I and II and Part D consists of two sections V and VI.
3. All the parts are compulsory.
4. Draw diagrams wherever necessary. Unlabeled diagrams do not carry any marks.

PART – A

I. Select the correct alternatives from the choices given below: 15x1=15

1."Pollen grains can be stored for several years in liquid nitrogen having a temperature of
(a) –120°C
(b) –80°C
(c) –196°C
(d) –160°C"

2. Statement I: In *Viola*, both autogamy and geitonogamy is prevented.
Statement II: Geitonogamy is similar to autogamy since pollen grains comes from the same plant.
a) Both Statement I and statement II are correct.
b) Both Statement I and statement II are incorrect.
c) Statement I is correct and Statement II is incorrect
d) Statement I is incorrect and Statement II is correct

3.Perisperm differs from endosperm in
(a) Being a diploid tissue
(b) Its formation by fusion of secondary nucleus with several sperms
(c) Being a haploid tissue
(d) Having no reserve food.

4.In a fertilized embryo sac, the haploid, diploid and triploid structures are-
(a) Synergid, zygote and primary endosperm nucleus
(b) Synergid, antipodal and polar nuclei
(c) Antipodal, synergid and primary endosperm nucleus
(d) Synergid, polar nuclei and zygote

5.Which of the following cannot be detected in a developing fetus by amniocentesis?
(a) Down's s Syndrome
(b) Jaundice
(c) Klinefelter's syndrome
(d) Sex of the foetus

6.Thalassemia and sickle cell anaemia are caused due to a problem in globin molecule synthesis. Select the *correct* statement.
(a) Both are due to a quantitative defect in globin chain synthesis.
(b) Thalassemia is due to less synthesis of globin molecules.
(c) Sickle cell anaemia is due to a quantitative problem of globin molecules.
(d) Both are due to a qualitative defect in globin chain synthesis.

7.The genotypes of a husband and wife are I^AI^B and I^Ai.Among the blood types of their children, how many different genotypes and phenotypes are possible?
(a) 3 genotypes; 4 phenotypes
(b) 4 genotypes; 3 phenotypes
(c) 4 genotypes; 4 phenotypes
(d) 3 genotypes; 3 phenotypes

8.Select the correct statement from the ones given below with respect to dihybrid cross.

(a) Tightly linked genes on the same chromosomes show higher recombinations.
(b) Genes far apart on the same chromosome show very few recombinations.
(c) Genes loosely linked on the same chromosome show similar recombinations.
(d) Tightly linked genes on the same chromosome show very few recombinations

9.Which of the following characteristics represent 'inheritance of blood groups' in humans?

(i) Dominance (ii) Co-dominance (iii)Multiple allele (iv) Incomplete dominance (v) Polygenic inheritance
(a) (ii), (iii) and (v)
(b) (i), (ii) and (iii)
(c) (ii), (iv) and (v)
(d) (i), (iii) and (v)

10. In sea urchin DNA, which is double stranded, 17% of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are

(a) G 17%, A 33%, T 33%
(b) G 8.5%, A 50%, T 24.5%
(c) G 34%, A 24.5%, T 24.5%
(d) G 17%, A 16.5%, T 32.5%

11. The unequivocal proof of DNA as the genetic material came from the studies on a

(a) Bacterium
(b) Fungus
(c) Viroid
(d) Bacterial virus

12. Among the following sets of examples for divergent evolution, select the *incorrect* option.

(a) Forelimbs of man, bat and cheetah
(b) Heart of bat, man and cheetah
(c) Brain of bat, man and cheetah
(d) Eye of octopus, bat and man

13. The domestic sewage in large cities

(a) has a high BOD as it contains both aerobic and anaerobic bacteria
(b) is processed by aerobic and then anaerobic bacteria in the secondary treatment in Sewage Treatment Plants (STPs)
(c) when treated in STPs does not really require the aeration step as the sewage contains adequate oxygen
(d) has very high amount of suspended solids and dissolved salts.

14. What triggers activation of protoxin to active toxin of *Bacillus thuringiensis* in bollworm?

(a) Acidic pH of stomach
(b) Body temperature
(c) Moist surface of midgut
(d) Alkaline pH of gut

15. Gause's principle of competitive exclusion states that

(a) No two species can occupy the same niche indefinitely for the same limiting resources
(b) Larger organisms exclude smaller ones through competition
(c) More abundant species will exclude the less abundant species through competition
(d) Competition for the same resources exclude species having different food preferences.

II. Fill in the blanks by choosing the appropriate word/words from those given below: 5x1=5
(Placenta, *Azotobacter,Saccharomyces*, Parasitism, Net primary productivity, *Anabena*)

16.Several hormones like hCG, hPL, estrogen and progesterone are produced by…….
17.An example for non-symbiotic biofertilizer is……
18. The microbe which is used to manufacture ethanol from starch is……

19. If '+'sign is assigned to beneficial interaction, '–'sign to detrimental and 'O' sign to neutral interaction, then the population interaction represented by '+' '–' refers to……

20. The biomass available for consumption by the herbivores and the decomposers is called……

PART – B

III. Answer any FIVE of the following questions in 3-5 sentences wherever applicable: 5×2=10

21. "The flowering plants have evolved strategies to prevent self-pollination". Justify by giving two reasons.
22. Discuss how hormones are being used in contraception.
23. Draw a labelled schematic sketch of replication fork of DNA.
24. Write one primary and one secondary lymphoid organ.
25. Baculoviruses are excellent candidates for integrated pest management. Justify by giving two reasons.
26. Differentiate between restriction endonuclease and exonuclease.
27. What are detrivores? Give one example.
28. List out the limitations of ecological pyramids.

PART – C

IV. Answer any FIVE of the following questions in 40-80 words each wherever applicable: 5×3=15

29. After a brief medical examination a healthy couple came to know that both of them are unable to produce functional gametes and should look for an 'ART' (Assisted Reproductive Technique). Name the 'ART' and the procedure involved that you can suggest to them to help them bear a child.
30. a) State the significance of *Coelacanth* in evolution
    b) Name the common ancestor of great apes and man
    c)When does a species becomes founder species to cause founder effect?
31. Differentiate between Darwinian views and de Vries views on evolution.
32. Identify a, b and c in the following table.

Sl no	Name of the human disease	Name of the causal bacteria/ virus	Specific organ or part affected
I	**a**	*Salmonella typhii*	**b**
ii	Common Cold	**c**	Alveoli or Lungs

33. Name the blank spaces a, b and c in the table given below:

Sl no	Name of the drug	Plant source	Organ system affected
I	***a***	Poppy Plant	***b***
Ii	Marijuana	***c***	Cardiovascular system

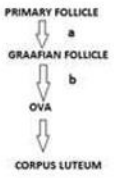
34. Give the scientific names of microbes from which cyclosporin A and Statin and citric acid are extracted.
35. Sketch and label a simple stirred tank bioreactor.
36. How is DNA isolated in purified form from a bacterial cell?

PART – D

Section -I

V. Answer any FOUR of the following questions about 200-250 words each wherever applicable: 4×5=20

37. Explain the characteristic features of wind pollinated flowers.
38. a) Sketch and label the sectional view of a seminiferous tubule. (3)
    b) given below is a flow chart showing ovarian changes during menstrual cycle. Fill in the spaces with the hormonal factor/s for the events shown. (2)



39. Trace the development of oocytes till ovulation in human female reproductive system (in menstrual cycle).

40.A plant of *Antirrhinum majus* with red flowers was crossed with another plant of the same species with white flowers. The plants of the F_1 generation bore pink flowers. Schematically represent the cross up to F_2 generation and mention phenotypic and genotypic ratios.

41. a) List the differences between mendelian disorders and chromosomal disorders. (2)
    b) Write a note on sex determination in grasshopper. (3)

42. Describe the mechanism of switching on and switching off of *lac* operon.

43. Schematically represent the simplified life cycle of *Plasmodium*.

44. What is gene therapy? Explain the steps involved in gene therapy for ADA deficiency.

Section -II

VI. Answer any ONE of the following questions about 200-250 words each wherever applicable:

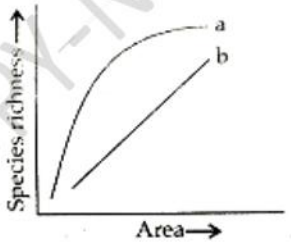
1×5=5

45. When we think of predator and prey, most probably it is the tiger and the deer that readily come to our mind, but a sparrow eating any seed is no less a predator" In this context, explain why is predation required in a community of different organisms.

46. a) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below.

b) Write the RNA strand transcribed from the above transcription unit along with polarity.

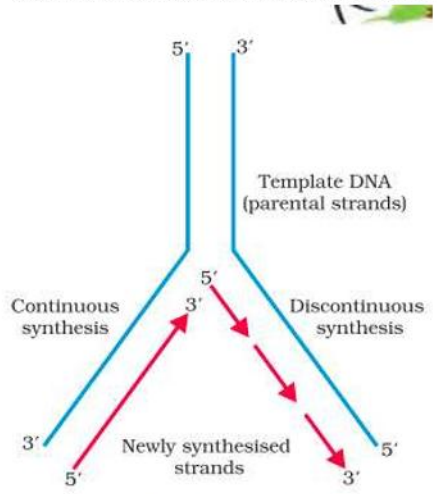
47. The graph given below shows species-area relationships. Answer the questions that follows:



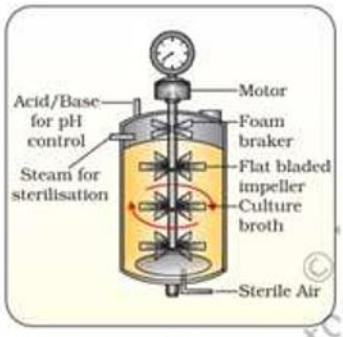
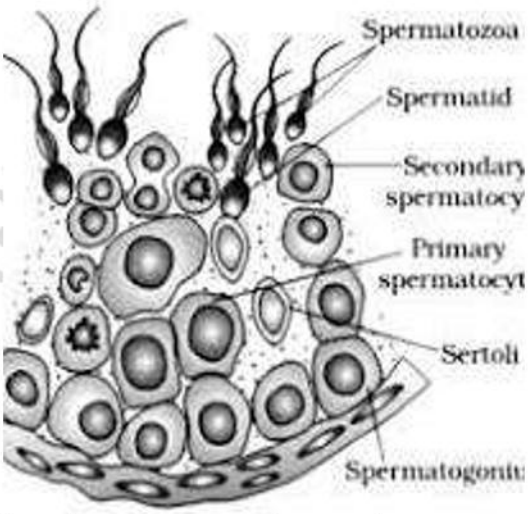
a) Write the equation of the curve.(1)
b) According to species area curve, what it the feature of species richness within a region? (1)
c) What does "Z" stand for? (1)
d) Write the situations as discovered by the ecologists when the value of "Z" lies between
   i) 0.1 and 0.2 and ii) 0.6 and 1.2 (2)

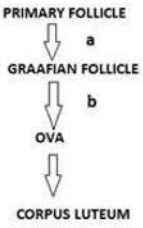
MARKING SCHEME-MQP-6

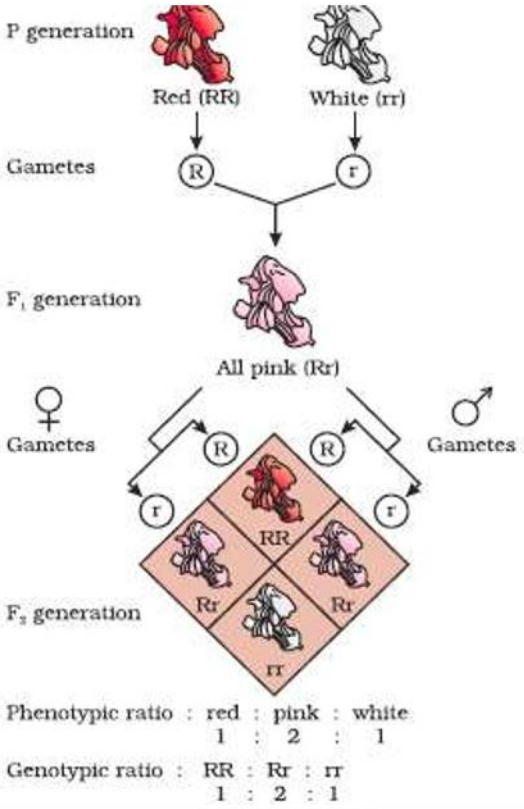
Q. NO	ANSWERS/ VALUE POINTS	MARKS
I. I	Select the correct alternatives from the choices given below:	1×15=15
1.	Pollen grains can be stored for several years in liquid nitrogen having a temperature of ANS:(c) –196°C	1
2.	Statement I: In *Viola*, both autogamy and geitonogamy is prevented. Statement II: Geitonogamy is similar to autogamy since pollen grains comes from the same plant. ANS: d) Statement I is incorrect and Statement II is correct	1
3.	Perisperm differs from endosperm in ANS:(a) being a diploid tissue	1
4.	In a fertilized embryo sac, the haploid, diploid and triploid structures are- ANS:(d) Synergid, polar nuclei and zygote	1
5.	Which of the following cannot be detected in a developing foetus by amniocentesis? (b) Jaundice	1
6.	Thalassemia and sickle cell anaemia are caused due to a problem in globin molecule synthesis. Select the correct statement. ANS: (b) Thalassemia is due to less synthesis of globin molecules.	1
7.	The genotypes of a husband and wife are IAIB and IAi. Among the blood types of their children, how many different genotypes and phenotypes are possible? ANS: (b) 4 genotypes; 3 phenotypes	1
8.	Select the correct statement from the ones given below with respect to dihybrid cross. ANS: (d) Tightly linked genes on the same chromosome show very few recombinations.	1
9.	Which of the following characteristics represent 'inheritance of blood groups' in humans? ANS: (i) Dominance (ii) Co-dominance (iii)Multiple allele (iv) Incomplete dominance (v) Polygenic inheritance (b) (i), (ii) and (iii)	1
10.	In sea urchin DNA, which is double stranded, 17% of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are ANS: (a) G 17%, A 33%, T 33%	1
11	The unequivocal proof of DNA as the genetic material came from the studies on a (d) bacterial virus	1
12.	Among the following sets of examples for divergent evolution, select the incorrect option. ANS: (d) Eye of octopus, bat and man	1
13.	The domestic sewage in large cities ANS: (b) is processed by aerobic and then anaerobic bacteria in the secondary treatment in Sewage Treatment Plants (STPs)	1
14.	What triggers activation of protoxin to active toxin of Bacillus thuringiensis in bollworm? ANS: (d) Alkaline pH of gut	1
15.	Gause's principle of competitive exclusion states that ANS: (d) Competition for the same resources exclude species having different food preferences.	1
II	Fill in the blanks by choosing the appropriate word/words from those given below:	1×5=5
16.	Placenta	1
17.	*Azotobacter*	1
18.	*Saccharomyces*	1
19.	Parasitism	1
20.	Net primary productivity	1
III	PART – B Answer any FIVE of the following questions in 3-5 sentences wherever applicable:	2×5=10

21.	The flowering plants have evolved strategies to prevent self-pollination". Justify by giving two reasons. ANS: Sometimes, the stamens and stigma of a bisexual flower mature at different times to prevent autogamy. Self-incompatibility being genetic mechanism prevents self-pollination.	2
22.	Discuss how hormones are being used in contraception. ANS: Progestogens or progestogen-Estrogen combinations play an important role in contraception, they are used in the form of tablets or pills. They are also used by females as injections or implants under the skin. Their mode of action is similar to that of pills but their effective periods are longer.	2
23.	Draw a labelled schematic sketch of replication fork of DNA.  **Figure 6.8** Replicating Fork	2
24.	Write one primary and one secondary lymphoid organ. ANS: Primary lymphoid organ: Thymus, bone marrow Secondary Lymphoid organ- spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix.	2
25.	Baculoviruses are excellent candidates for integrated pest management. Justify by giving two reasons. ANS: Baculoviruses are biological control agents which are excellent candidates for species-specific, narrow spectrum insecticidal applications. They have no negative impacts on plants, mammals or even non-target organisms.	2
26.	Differentiate between restriction endonuclease and exonuclease. ANS: Exonucleases remove nucleotides from the ends of the DNA whereas, restriction endonucleases make cuts at specific positions within the DNA.	2
27.	What are detrivores? Give one example. ANS: They are organisms which feed on detritus and breakdown them into smaller particles. Eg., Earthworm	2
28.	List out the limitations of ecological pyramids. ANS: Limitations of ecological pyramids: 1. The ecological pyramids do not take into account, the same species belonging to more than one trophic level. 2. It assumes a simple food chain that almost never exists in nature. It does not explain food webs. 3. Saprophytes are not given a place in ecological pyramids even though they play a vital role in the ecosystem.	2
IV	PART – C Answer any FIVE of the following questions in 40-80 words each wherever applicable:	3×5=15

<table>
<tr><td>29.</td><td>After a brief medical examination, a healthy couple came to know that both of them are unable to produce functional gametes and should look for an ‘ART’ (Assisted Reproductive Technique). Name the ‘ART’ and the procedure involved that you can suggest to them to help them bear a child.
ANS: The ART that would help the couple to bear a child is IVF (In Vitro Fertilization) or Test tube baby programme. In this process, ova from wife/donor female and sperms from the husband/donor male are collected and fused to form zygote in the laboratory under same conditions as in the body. This is in vitro fertilization (fertilisation outside the body).
Zygote or early embryo is transferred into Fallopian tube or uterus for further development. This is called Embryo Transfer (ET). It can be Zygote Intra Fallopian Transfer (ZIFT) or Intra Uterine Transfer (IUT)</td><td>3</td></tr>
<tr><td>30.</td><td>a) State the significance of Coelacanth in evolution.
ANS: It is an ancestor of amphibians
b) Name the common ancestor of great apes and man
ANS: Dryopothecus/Ramapithecus
c) When does a species becomes founder species to cause founder effect?
ANS: Sometimes the change in allele frequency is so different in the new sample of population that they become a different species. The original drifted population becomes founders and the effect is called founder effect.</td><td>3</td></tr>
<tr><td>31.</td><td>Differentiate between Darwinian views and Devries views on evolution.
ANS:
<table>
<tr><td>Darwin’s views on Evolution</td><td>de Vries’ views on evolution</td></tr>
<tr><td>According to Darwin, evolution was gradual (stepwise)</td><td>According to de Vries, evolution occurred in a single step(saltation)</td></tr>
<tr><td>Variations and natural selection occur through a number of generations and are responsible for speciation.</td><td>Single step mutation caused speciation</td></tr>
<tr><td>Darwin’ variations are small and directional</td><td>De Vries’ mutations are random and directionless.</td></tr>
</table></td><td>3</td></tr>
<tr><td>32.</td><td>Identify a, b and c in the following table:
ANS: a=Typhoid, b=Small Intestine, c= Rhino virus</td><td>3</td></tr>
<tr><td>33.</td><td>Name the blank spaces a, b and c in the table given below:
ANS: a=Morphine, b=Central Nervous system, c=Cannabis sativa</td><td>3</td></tr>
<tr><td>34.</td><td>Give the scientific names of microbes from which cyclosporin A and Statin and citric acid are extracted respectively.
ANS: Trichoderma polysporum, Monascuspurpureus, Aspergillus niger</td><td>3</td></tr>
<tr><td>35.</td><td>Sketch and label a simple stirred tank bioreactor.
ANS:</td><td>3</td></tr>
</table>

	 (a) **Figure 11.7** (a) Simple stirred-tank bioreactor;	
36.	How is DNA isolated in purified form from a bacterial cell? ANS: DNA, a genetic material is isolated in purified form by treating the bacterial cells with enzymes such as lysozyme to remove the cell wall. The RNA thus released can be removed by treating them with ribonuclease and enzyme proteases is added to remove proteins. Finally, chilled ethanol is added to precipitate the purified DNA.	3
V	PART – D Section - I Answer any FOUR of the following questions about 200-250 words each wherever applicable:	5×4=20
37.	Explain the characteristic features of wind pollinated flowers. ANS: Wind pollinated flowers have light weight, non-sticky, dry and winged pollens. The well-exposed stamens help in easy dispersal of pollen grains. The stigma is sticky, large and feathery to trap pollen grains floating in the air. Numerous flowers are packed together to form inflorescence.	5
38.	a) Sketch and label the sectional view of a seminiferous tubule. (3) ANS:  b)given below is a flow chart showing ovarian changes during menstrual cycle. Fill in the spaces with the hormonal factor/s for the events shown. (2)	5

	 ANS: a=FSH and Estrogen, b=LH	
39	Trace the development of oocytes till ovulation in human female reproductive system (in menstrual cycle). ANS: Each primary oocyte gets surrounded by a single layer of granulosa cells known as primary follicles. Primary follicles get surrounded by more layers of granulose cells and a new theca and form secondary follicles. A secondary follicle transforms into tertiary follicle characterised by a fluid filled space, then antrum. Primary oocyte undergoes first meiotic division and produces two unequal haploid cells- a large haploid secondary nucleus and a tiny polar body. The tertiary follicle further changes into the mature Graafian follicle. The secondary oocyte forms a new membrane called zona pellucida around it.	5
40.	A plant of *Antirrhinum majus* with red flowers was crossed with another plant of the same species with white flowers. The plants of the F_1 generation bore pink flowers. Schematically represent the cross up to F_2 generation and mention phenotypic and genotypic ratios. ANS:	5



41. a) List the differences between mendelian disorders and chromosomal disorders. (2) — 5

ANS:

Mendelian Disorders	Chromosomal Disorders
The disorder is mainly due to alteration or mutation in the single gene	The disorder is caused due to absence or excess or abnormal arrangement of one or more chromosomes.
This follows Mendel's principles of inheritance	This does not follow Mendel's principles of inheritance.
This may be recessive or dominant in nature	This is always dominant in nature.
For example: Haemophilia, Sickle cell anaemia	For example: Turner's syndrome.

b) b) Write a note on sex determination in grasshopper. (3)

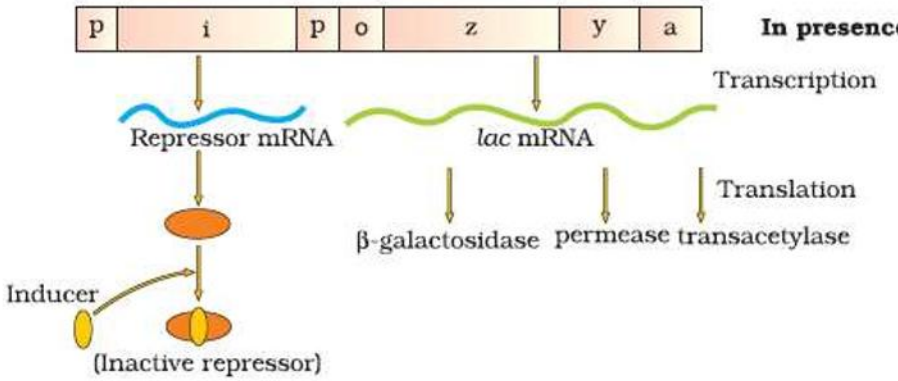
ANS:

XX-XO type of sex determination: E.g., Grasshopper, Round worm, Cockroach

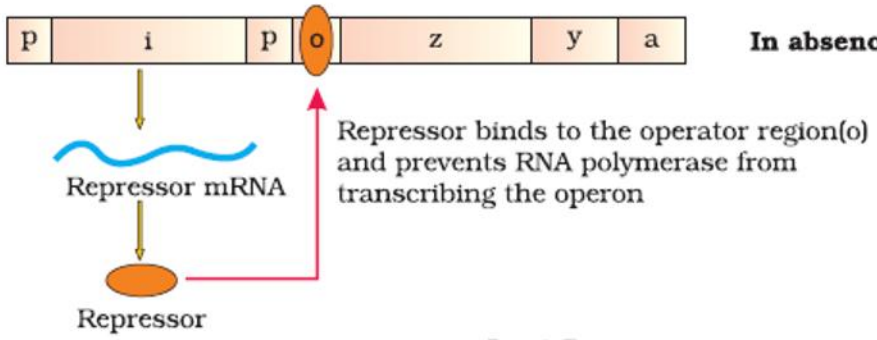
In this type, the females are homogametic (XX) and produce only one type of egg carrying 'X' chromosomes. The males are heterogametic (XO) and produce two types of sperms. 50% of the sperms carry 'X' chromosome and other 50% of the sperms do not carry any sex chromosome.

42. Describe the mechanism of switching on and switching off of lac operon. — 5

Induction / Switching on Lac operon



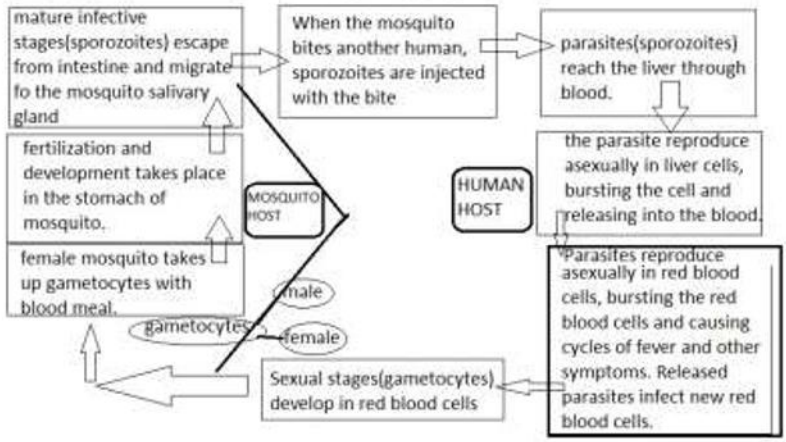
The *i* gene constitutively produces repressor protein. In the culture medium Lactose acts as an inducer. In the presence of Inducer, the repressor interacts with inducer.
This allows binding of RNA polymerase to operator gene and the transcription of structural genes takes place immediately. The mRNA synthesized by these genes, synthesizes enzymes required for lactose catabolism. Now the Lac operon is said to be induced.
Repression / Switching off Lac operon:



In the absence of Inducer (Lactose) in the medium, repressor protein binds with the operator gene and prevents the transcription of structural genes (Lac Z, Lac Y and Lac A). Now the Lac operon is said to be repressed.

43. Schematically represent the simplified life cycle of Plasmodium. 5

ANS:



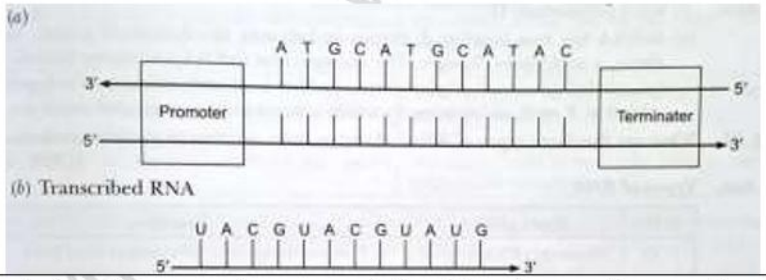
44. What is gene therapy? Explain the steps involved in gene therapy for ADA deficiency. 5

ANS: Gene Therapy

o Gene therapy is a collection of methods that allows correction of a gene defect that has been diagnosed in a child/embryo.

o The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency.

o This enzyme is crucial for the immune system to function. The disorder is caused due to the deletion of the gene for adenosine deaminase.

	o In some children ADA deficiency can be cured by bone marrow transplantation; in others it can be treated by enzyme replacement therapy, in which functional ADA is given to the patient by injection. o But the problem with both of these approaches that they are not completely curative. o As a first step towards gene therapy, lymphocytes from the blood of the patient are grown in a culture outside the body. o A functional ADA cDNA (using a retroviral vector) is then introduced into these lymphocytes, which are subsequently returned to the patient. o However, as these cells are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes. o However, if the gene isolate from marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.	
VI	Section -II Answer any ONE of the following questions about 200-250 words each wherever applicable:	5×1x5=5
45.	When we think of predator and prey, most probably it is the tiger and the deer that readily come to our mind, but a sparrow eating any seed is no less a predator" In this context, explain why is predation required in a community of different organisms. ANS: Even the herbivores are not very different from predator. Predator acts as a passage for transfer of energy across trophic level. Predators keep prey populations under control. Predators also help in maintaining species diversity in a community, by reducing the intensity of competition among competing prey species. (Pisaster starfish field experiment). Biological control mechanism used in agriculture (pest control) is also a type of predator-prey relationship and is based on the ability of the predator to regulate prey populations.	5
46.	a) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below. (3) b) Write the RNA strand transcribed from the above transcription unit along with polarity. (2) 	5
47.	The graph given below shows species-area relationships. Answer the questions that follows: a) Write the equation of the curve. ANS: Log S = log C + Z log A b) According to species area curve, what it the feature of species richness within a region? ANS: During his explorations in South American forests, Alexander von Humboldt observed that within a region species richness increased with increasing explored area but only up to a limit. c) What does "Z" stand for? ANS: Z = slope of the line (regression coefficient) d) Write the situations as discovered by the ecologists when the value of "Z" (lies between i) 0.1 and 0.2 and ii) 0.6 and 1.2 ANS: It has been noted that regardless of the taxonomic group or region the value of the Z are amazingly similar (in the range of 0.1 to 0.2). However, for a very large area like the entire continent the slope of the line is steeper (Z value is in the range of 0.6-1.2).	5

SUBJECT: BIOLOGY-36 **BLUE PRINT** **CLASS – II P U**

Question Paper Part	Question type	Number of questions	Marks
PART – A I	MCQ	15	15
PART – A II	FILL IN THE BLANKS	05	05
PART – B III	SHORT ANSWERS (2 MARKS)	08	16
PART – C IV	SHORT ANSWERS (3 MARKS)	08	24
PART – D V	LONG ANSWERS (5 MARKS)	08	40
PART – D VI	LONG ANSWERS (5 MARKS)	03	15
	TOTAL	**47**	**115**

Chapter	No. of periods	Marks	Remember				Understand				Application				HOTS		
			MCQ	SA2	SA3	LA	MCQ	SA2	SA3	LA	MCQ	SA2	SA3	LA	MCQ	SA	LA
1. Sexual reproduction in flowering plants	12	11	1	*		*	1		1	*	1	*	*	*	*	*	1
2. Human reproduction	11	11			1	*	1	*		1	1	*	*	*	1	*	
3. Reproductive health	7	6	1	1		*	*	1		*	1	*		*	*	*	*
4. Principles of Inheritance	15	14	*	1		*	1	*		1	*	*		*	1	*	1
5. Molecular basis of Inheritance	15	14	*		1	1		*		1	*	*		*	1	*	*
6. Evolution	8	7	1	1		*	1	*	1	*	*	*		*	*	*	*
7. Human health and disease	13	13		1		1	*	*		*	*	*		*	1	*	1
8. Microbes in Human welfare	8	8	1	1		*	*	*		1	*	*		*	*	*	*
9. Biotechnology: Principles and Processes	8	8		*		*	*	1		*	*	*		1	1	*	*
10. Biotechnology and its applications	7	6	*		1	*	*		1	*	*	*		*	*	*	*
11. Organism and population	6	7	1	*		1	1	*		*	*	*		*	*	*	*
12. Ecosystem	5	5	1	1		*	*	1		*	*	*		*	*	*	*
13. Biodiversity and Conservation	5	5	1	1		*	*	*		*	*	*		*	*	*	*
Total	120	115	07	07	03	03	05	03	03	04	03	00		01	05	00	03

II P U QUESTION PAPER PATTERN

1. The Question paper consists of Four parts; A, B, C and D
2. Part A - I consists of 15 Multiple choice questions, Part A – II consists of 5 fill up the blanks questions
3. All the questions of Part A – I and II are to be answered compulsorily
4. Part B consists of 8 short answer type questions carrying 2 marks each, out of which 5 questions to be answered
5. Part C consists of 8 short answer type questions carrying 3 marks each, out of which 5 questions to be answered
6. Part – D consists of V and VI. Part D – V consists of 8 long answer type questions carrying 5 marks each, out of which 4 questions to be answered. Part D – VI consists of 3 long answer type questions carrying 5 marks each, out of which 1 question to be answered.

GENERAL GUIDELINES FOR SETTING THE QUESTION PAPER

1. The questions should be simpleand unambiguous
2. The answers for the questions should be available in the prescribed text book or can be derived from the concepts of text book for application/reasoning/analytical/HOT questions
3. In part D, section VI only questions of Higher Order Thinking Skills to be framed.
4. The question paper should be prepared on the individual blue print on the basis of weightage of marks fixed for each chapter and units
5. At least one question carrying 1mark, 2 marks, 3 marks and 5 marks have to be derived from each chapter wherever possible
6. When a question carrying 3 or 5 marks is split the sub questions should be derived from the same concept or different concepts of same chapter
7. Please avoid questions like explain with a neat labelled diagram. Frame questions only to expect neat labelled diagram
8. A variation of 1% weightage per objective of questions is allowed
9. Variation of 1 mark in each chapter or unit weightage is permitted while preparing the blue print and the total marks should not exceed 115.

II PU MODEL QUESTION PAPER 2023-2024

SUBJECT – BIOLOGY (36)

Duration: 3hr 15 Min **Max. Marks: 70**

- **General Instructions**

  This Question paper consists of four parts A, B, C, D.
- Part – A consists of I and II and Part D consists of two parts, section –V and – VI
- All the parts are compulsory
- Draw diagrams wherever necessary. Unlabeled diagrams do not carry any marks

PART – A

I. Select the correct alternative from the choices given below: **1 x 15 = 15**

1. Haploid conditionis not observed in which of the following cells
   a) Synergids and Egg b) Zygote and PEN
   c) Antipodal and Egg d) Antipodal and Synergids
2. Statement I: Formation of fruit without fertilization is called apomixis
   Statement II: In some species of Asteraceae and grasses seeds are formed without fertilization
   a) Both Statement I and Statement II are correct
   b) Both Statement I and Statement II are incorrect
   c) Statement I is correct and Statement II is incorrect
   d) Statement I is incorrect and Statement II is correct
3. During gestation the foetus develops limbs and digits by the end
   a) First month b) Second month c) Third month d) Fifth month
4. The secondary oocyte after ovulation is covered by a non-cellular layer of
   a) Cumulus oophorus b) Corona radiata
   c) Zona pellucida d) Cortical layer
5. An example of hormone releasing IUD among the following
   a) Cu – 7 b) Lippes loop c) LNG – 20 d) Multiload 375
6. Which of the following is a foetal sex determination test?
   a) ZIFT b) GIFT c) MTP d) Amniocentesis
7. Which of the following Mendelian gene disorder is the representation of allosomal recessive trait?
   a) Hemophilia b) Thalassemia c) Sickle cell anemia d) Myotonic dystrophy
8. The process of removal of introns and joining of exons in a defined order in a primary transcripts occurs in
   a) Prokaryotes b) Eukaryotes
   c) Prokaryotes and Eukaryotes d) Prokaryotes and Protista
9. A type of Natural selection in which more individuals acquire mean character value is called
   a) Stabilizing selection b) Disruptive selection
   c) Directional selection d) Dominant selection
10. Drug called "Heroin is synthesized by
    a) Methylation of Morphine b) demethylation of Morphine
    c) Acetylation of Morphine d) deacytalation of Morphine
11. The fungus not used in the production of any Industrial product is
    a) *Penicillium* b) *Aspergillus* c) *Trichoderma polysporum* d) *Glomus*
12. Significance of Insertional inactivation method in Recombinant DNA technology is to
    a) Introduce the recombinants b) Isolate gene of Interest
    c) Select the recombinants d) Select the gene of interest

13. Which of the following organisms are studied by Cornell's in his elegant field experiments to study competition
    a) Warbler species b) Chathamalus and Balanus c) Cucko and Crow d) Cattle egret and grazing cattle
14. The correct sequence in the process of decomposition is
    a) Humification----Leaching----Catabolism---- Mineralisation ----Fragmentation
    b) Catabolism----Leaching----Fragmentation----Humification---- Mineralisation
    c) Leaching----Fragmentation ----Catabolism----Humification---- Mineralisation
    d) Fragmentation ----Leaching----Catabolism-----Humification----Mineralisation
15. Western Ghats have a greater diversity of
    a) Amphibians b) Reptiles c) Aves d) Mammals

II. Fill in the blanks by choosing the appropriate word/Words from those given below: 1 x 5 = 5

(Commensalism, Alveoli,Ammensalism, Panspermia, Codominance, Perisperm)

16. The residual, persistent nucellus is called-------
17. The cells of ----------secrete milk in the mammary glands.
18. AB blood group inheritance is an example for ----------
19. --------- is the theory that proposes that units of life called spores were transferred to different planets including earth
20. A population interaction in which one species is harmed and the other species is unaffected is ----------

PART - B

Answer any FIVE of the following questions in 3 – 5 sentences wherever applicable: 2 x 5 = 10

21. List any four complications a person suffers from untreated sexually transmitted infections?
22. State the two medical grounds on which a pregnancy can be terminated according to the amended Medical termination of pregnancy act 2017.
23. Give the phenotypes of the parental Drosophila that has produced 1.3% and 37.2% recombinants respectively in T. H. Morgan Dihybrid cross experiment.
24. Differentiate divergent evolution from convergent evolution.
25. List any two differences between active and passive immunity.
26. What are primary lymphoid organs? Give two examples
27. Baculoviruses are excellent biocontrol agents in Integrated Pest Management. Comment.
28. Ecological pyramids have limitations. Justify the statement with two reasons.

PART - C

Answer any FIVE of the following questions in 40 – 80 words each wherever applicable:3 x 5 = 15

29. a) Why is bagging of emasculated flowers essential during hybridization experiment?
    b) Mention the cells of the mature pollen grain.
    c) Give the scientific name of the plant that has the viability record of 10,000 years.
30. Explain the changes that occur in ovary and uterus during luteal phase of menstrual cycle.
31. Draw a diagrammatic sketch of the Lac operon when lactose is present in the medium
32. With respect to the evolution of man, name a, b, c, d, e, and f

Period	Places of origin	Type of man
2 million years ago	a	Australopithecines
b	Java	c
1,00,000 – 40,000 years	d	e

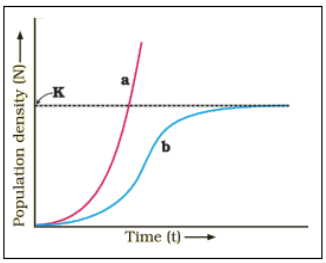
f	Africa	Homo sapiens

33. Mention the three critical areas of biotechnology
34. What is gene therapy? Explain the steps involved in curing ADA deficiency by gene therapy.
35. a) Co-extinctions lead to loss of biodiversity. Justify the statement with two examples.
    b) What are hot spots of biodiversity?
36. Describe the components of an aquatic ecosystem taking pond as an example

PART – DSection - I

Answer any FOUR of the following questions in about 200 – 250 words each wherever applicable: 5 x 4 = 20

37. Draw a neat labeled diagram of human male reproductive system.
38. Mention the chromosomal disorders that are due to trisomy, represent their karyotype and two symptoms each
39. With the help of schematic representation illustrate how an infected animal cell can survive while viruses are being replicated and released
40. With reference to DNA finger printing define the following terms: a) Repetitive DNA b) Satellite DNA c) DNA polymorphism d) VNTR e) Probe
41. What is genetic code? Explain any four salient features of genetic code
42. Describe the biological treatment of primary effluent.
43. a) Explain the process of Polymerase chain reaction in amplification of desired DNA
    b) Draw a labeled diagram of pBR^{322} vector.
44. a) Study the population growth curve given below and answer the questions that follows;



i)Identify the growth curves 'a' and 'b'

ii) Mention the conditions responsible for the curves 'a' and 'b' respectively.

b) Explain the mechanism of sexual deceit in relation to mutualism.

Section – II

Answer any ONE of the following questions in about 200 – 250 words each wherever applicable: 5x 1= 5

45. Double fertilization is the unique feature of angiosperms and the products of this double fertilization is zygote and PEN. In context of this when a hexaploid plant is pollinated by a tetraploid plant find out the ploidy of zygote and PEN through a schematic illustration.
46. ABO blood grouping provides a good example of multiple alleles and are controlled by the gene 'I'. This gene product is responsible for the production of a sugar polymer that protrudes from its surface. The 'I' gene has three alleles they all follow a specific pattern of in,
    a) What are the probable number ofphenotypes and genotypes for ABO blood group in human population
    b) Mention the genotypes of all the blood group phenotypes.
    c) Name the type of blood groups of the parental combination in which both their blood group is not inherited to their children

47. Five patients suffering from certain diseases visit a local primary health centre. The Doctor does a thorough check and prepares the report of the five patients and is indicated in the below given table. Analyse the table and diagnose the disease they are suffering from and causative agent of the diseases.

Patient 1	High fever, constipation, stomach ache, loss of appetite, headache
Patient 2	Chills and high fever recurring every 3 – 4 days
Patient 3	Constipation, mucous and blood clots in stool, abdominal pain and cramps
Patient 4	Internal bleeding, blockage in the internal passage, muscular pain, fever
Patient 5	Dry, scaly lesions on skin, nails and scalp

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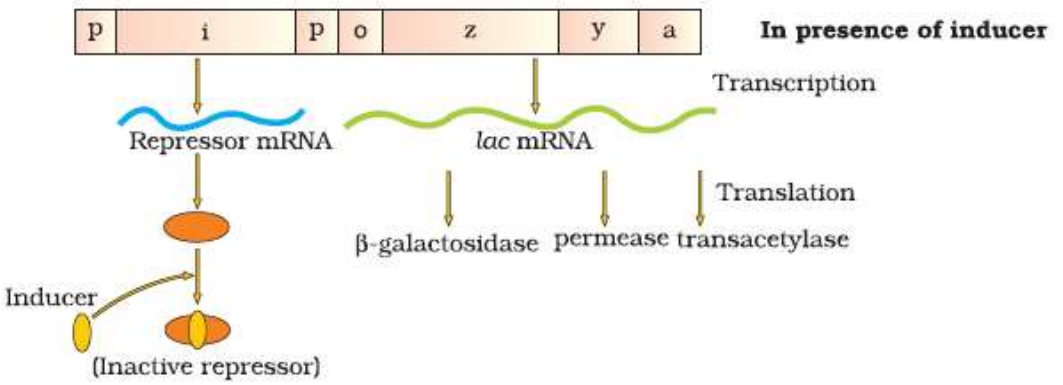
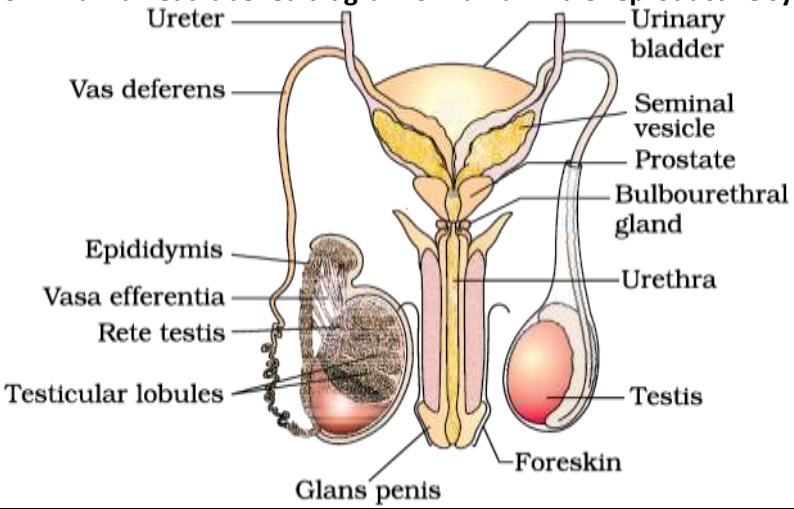
II PU MODEL QUESTION PAPER 2023-2024
SUBJECT – BIOLOGY (36)

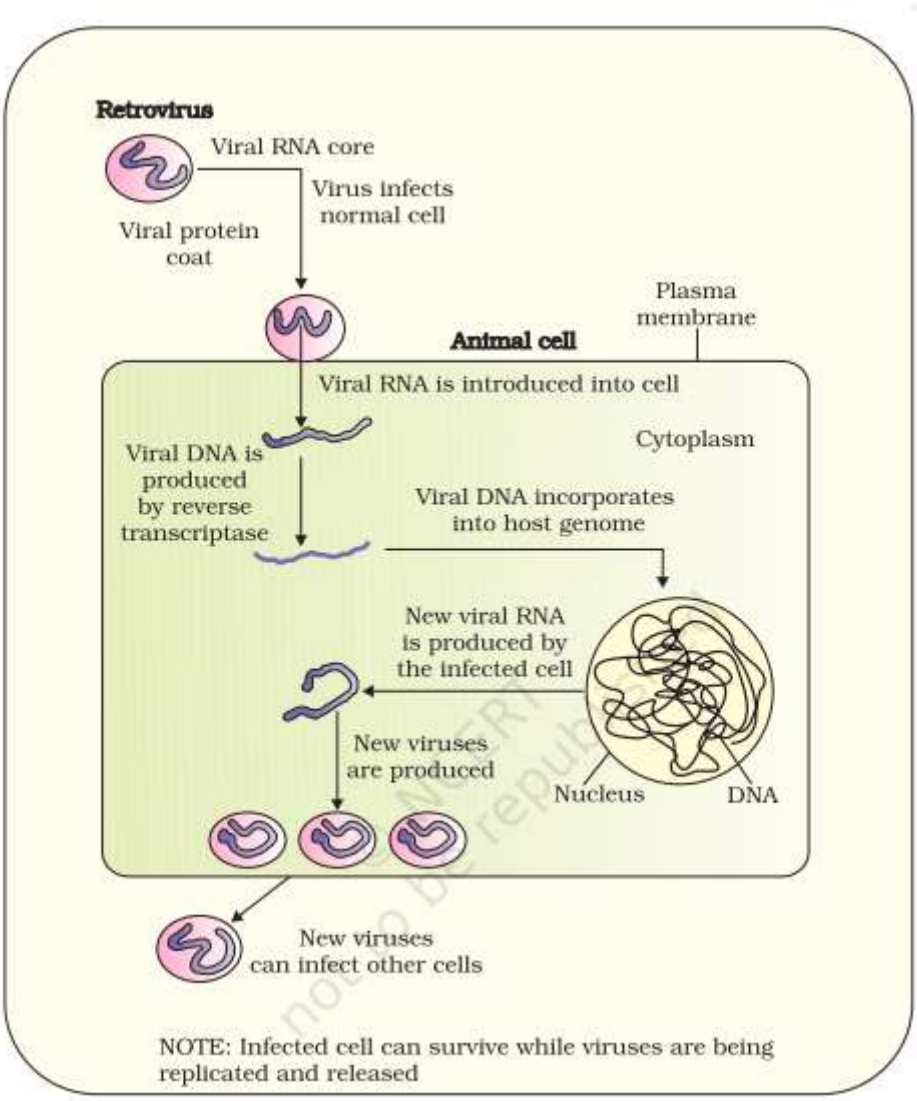
KSEAB PAPER

Sl No	Answers/Value Points	Marks
1	**01.Haploid condition is not observed in which of the following cells** b) Zygote and PEN	1
2	**02.Statement I: Formation of fruit without fertilization is called apomixis** **Statement II: In some species of Asteraceae and grasses seeds are formed without fertilization** d) Statement I is incorrect and Statement II is correct	1
3	**03.During gestation the foetus develops limbs and digits by the end** b) Second month	1
4	**04.The secondary oocyte after ovulation is covered by a non-cellular layer of** c) Zona pellucida	1
5	**05.An example of hormone releasing IUD among the following** c) LNG – 20	1
6	**06.Which of the following is a foetal sex determination test?** d) Amniocentesis	1
7	**07.Which of the following Mendelian gene disorder is the representation of allosomal recessive trait?** a) Haemophilia	1
8	**08.The process of removal of introns and joining of exons in a defined order in a primary transcript occurs in** b) Eukaryotes	1
9	**09.A type of Natural selection in which more individuals acquire mean character value is called** a) Stabilizing selection	1
10	**10. Drug called "Heroin is synthesized by** c) Acetylation of Morphine	1
11	**11.The fungus *not* used in the production of any Industrial product is** d) Glomus	1
12	**12. Significance of Insertional inactivation method in Recombinant DNA technology is to** c) Select the recombinants	1
13	**13. Which of the following organisms are studied by Cornell's in his elegant field experiments to study** **competition** b) *Chathamalus and Balanus*	1
14	**14. The correct sequence in the process of decomposition is** d) Fragmentation ----Leaching----Catabolism-----Humification----Mineralisation	1
15	**15. Western Ghats have a greater diversity of** a) Amphibians	1
II. Fill in the blanks by choosing the appropriate word/Words from those given below: 1 x 5 = 5 **(Commensalism, Alveoli, Amensalism, Panspermia, Codominance, Perisperm)**		
16	16. The residual, persistent nucellus is called-------**PERISPERM**	1
17	17. The cells of **ALVEOLI** secrete milk in the mammary glands.	1
18	18. AB blood group inheritance is an example for ---------- **CODOMINANCE**	1
19	19. **PANSPERMIA** is the theory that proposes that units of life called spores were transferred to different planets including earth	1
20	20. A population interaction in which one species is harmed and the other species is unaffected is **AMENSALISM**	1
PART - B **Answer any FIVE of the following questions in 3 – 5 sentences wherever applicable: 2 x 5 = 10**		
21	21. List any four complications a person suffers from untreated sexually transmitted infections? Itching, fluid discharge, slight pain, swelling in the genital region.	2

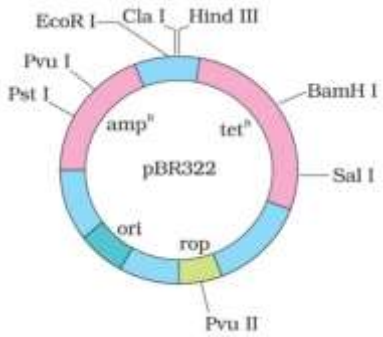
<table>
<tr><td>22</td><td>22. State the two medical grounds on which a pregnancy can be terminated according to the amended Medical termination of pregnancy act 2017.
According to the Medical Termination of Pregnancy (Amendment) Act, 2017 pregnancy may be terminated only below 12 weeks of maternal age with the opinion of a registered medical practitioner. After 12 weeks, abortions will only be carried out on the grounds of a serious risk to the health or the life of the mother. Also there is a list of guidelines setup by the medical termination act of 1971 which one has to follow while doing the same.</td><td>2</td></tr>
<tr><td>23</td><td>23. Give the phenotypes of the parental Drosophila that has produced 1.3% and 37.2% recombinants respectively in T. H. Morgan Dihybrid cross experiment.
The genes for white eye and yellow body were very tightly linked and showed only 1.3 per cent recombination while white eye and miniature wing showed 37.2 per cent recombination.</td><td>2</td></tr>
<tr><td>24</td><td>24. Differentiate divergent evolution from convergent evolution.
<table>
<tr><th>Divergent Evolution</th><th>Convergent Evolution</th></tr>
<tr><td>The same structure developed along different directions due to adaptation to different needs.</td><td>Living in similar habitats by different groups of organisms resulted in similar adaptive features but for same function. This is called convergent evolution</td></tr>
<tr><td>Examples for divergent evolution and homologous structures are:
1} Forelimbs of Whale, Bats, Cheetah and Humans
2} Thorns of Bougainvillea and tendrils of Cucurbita.</td><td>Examples for convergent evolution and analogous structures are:
1} Eye of octopus and eye of mammals.
2} Flippers of Penguins and Dolphins.
3} Sweat potato (root modification) and potato (stem modification).</td></tr>
</table></td><td>2</td></tr>
<tr><td>25</td><td>25. List any two differences between active and passive immunity.
<table>
<tr><th>ACTIVE IMMUNITY</th><th>PASSIVE IMMUNITY</th></tr>
<tr><td>When a host is exposed to antigens which may be in the form of living or dead microbes, antibodies are produced in the host body. This type of immunity is called active immunity.</td><td>When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity.</td></tr>
<tr><td>Effective after a lag period</td><td>This type of immunity is immediately effective after administration of antibodies</td></tr>
<tr><td>Memory cells are produced that can bring about a stronger secondary response</td><td>Memory cells are not produced and hence there is no secondary response</td></tr>
<tr><td>Ex: Infection, Vaccination</td><td>Ex: Colostrum produced in mother’s milk, antibodies received from mother by foetus through placenta, antitoxins given during snake bite, antibodies against tetanus toxoid etc.</td></tr>
</table></td><td>2</td></tr>
<tr><td>26</td><td>26. What are primary lymphoid organs? Give two examples.
These are the organs where origin and/or maturation and proliferation of lymphocytes occur.
The primary lymphoid organs are bone marrow and thymus.
Secondary lymphoid organs include spleen, lymph nodes, tonsils, peyer’s patches of small intestine and appendix.</td><td>2</td></tr>
<tr><td>27</td><td>27. Baculoviruses are excellent biocontrol agents in Integrated Pest Management. Comment.
Baculoviruses are pathogens attacks insects and arthropods. Nucleopolyhedrovirus are excellent biological control agents as they are species specific. They have shown no negative impacts on plants, mammals, birds, fish and even non-target insects.This is especially desirable when beneficial insects are being conserved to aid in an overall integrated pest Management (IPM).</td><td>2</td></tr>
<tr><td>28</td><td>28. Ecological pyramids have limitations. Justify the statement with two reasons.
Limitations of ecological pyramids:</td><td>2</td></tr>
</table>

	1. The ecological pyramids do not take into account the same species belonging to more than one trophic level. 2. It assumes a simple food chain that almost never exists in nature. It does not explain food webs. 3. Saprophytes are not given a place in ecological pyramids even though they play a vital role in the ecosystem.	
PART - C Answer any FIVE of the following questions in 40 – 80 words each wherever applicable:3 x 5 = 15		
29	**29. a) Why is bagging of emasculated flowers essential during hybridization experiment?** **b) Mention the cells of the mature pollen grain.** **c) Give the scientific name of the plant that has the viability record of 10,000 years.** a) To prevent the contamination with unwanted pollen. b) Vegetative cell and Generative cell c) *Lupinus arcticus*	3
30	**30. Explain the changes that occur in ovary and uterus during luteal phase of menstrual cycle.** Changes occur in ovary during luteal phase of menstrual cycle are: • Remaining part of graafian follicle transform as corpus luteum. • Progesterone is secreted by the corpus luteum. • Estrogen secretion become decrease. Changes occur in uterus during luteal phase of menstrual cycle are: • Regeneration of endometrium layer. • Endometrium becomes suitable for implantation. Prepares for next menstrual cycle.	4
31	**31. Draw a diagrammatic sketch of the Lac operon when lactose is present in the medium**  	3
32	**32. With respect to the evolution of man, name a, b, c, d, e, and f** a) East African grasslands b) 1.5 mya c) Homo erectus d) Near east and central Asia e) The Neanderthal man f) 75,000-10,000 years ago	3
33	**33. Mention the three critical areas of biotechnology.** (1) Providing the best catalyst in the form of the improved organisms usually a microbe or pure enzyme. (2) Create optimal conditions through engineering for a catalyst to act. (3) Downstream processing technologies to purify the protein or organic compound.	3
34	**34. What is gene therapy? Explain the steps involved in curing ADA deficiency by gene therapy.** **Gene Therapy** o Gene therapy is a collection of methods that allows correction of a gene defect that has been diagnosed in a child/embryo. o The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. o This enzyme is crucial for the immune system to function. The disorder is caused due to the deletion of the gene for adenosine deaminase.	3

	o In some children ADA deficiency can be cured by bone marrow transplantation; in others it can be treated by enzyme replacement therapy, in which functional ADA is given to the patient by injection. o But the problem with both of these approaches that they are not completely curative. o As a first step towards gene therapy, lymphocytes from the blood of the patient are grown in a culture outside the body. o A functional ADA cDNA (using a retroviral vector) is then introduced into these lymphocytes, which are subsequently returned to the patient. o However, as these cells are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes. o However, if the gene isolate from marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.	
35	**35. a) Co-extinctions lead to loss of biodiversity. Justify the statement with two examples.** **b) What are hot spots of biodiversity?** a) When a species becomes extinct, the plant and obligatory way also become extinct. Examples: 1. When a host fish becomes extinct, its unique assemblage of parasites also extinct. 2. Plant -pollinator mutualism where extinction of one invariably leads to the Extinction of the other. b) They are regions of high levels of species richness and high degree of endemism.	
36	**36. Describe the components of an aquatic ecosystem taking pond as an example**	
	PART – D Section - I **Answer any FOUR of the following questions in about 200 – 250 words each wherever applicable: 5 x 4 = 20**	
37	**37. Draw a neat labelled diagram of human male reproductive system.**  	5
38	**38. Mention the chromosomal disorders that are due to trisomy, represent their karyotype and two symptoms each.** 1) Down's syndrome Karyotype-47 (Trisomy of chromosome 21) Symptoms: The affected individual is short statured with small round head, furrowed tongue and partially open mouth. Palm is broad with characteristic palm crease. Physical, psychomotor and mental development is retarded. 2) Klinefelter's syndrome Karyotype-47, XXY or 44 + XXY Symptoms: Overall masculine development, but possess feminine characters like development of breasts (Gynaecomastia). Individuals are sterile.	5

39	**39. With the help of schematic representation illustrate how an infected animal cell can survive while viruses are being replicated and released.**  	5
40	**40. With reference to DNA finger printing define the following terms: a) Repetitive DNA b) Satellite DNA** **c) DNA polymorphism d) VNTR e) Probe** a) Repetitive sequences are stretches of DNA sequences that are repeated many times, sometimes hundred to thousand times. b) The bulk DNA forms a major peak and the other small peaks are referred to as **satellite DNA** c) DNA polymorphism means variation at genetic level arises due to mutations. d) Satellite DNA that shows very high degree of polymorphism are calledVariable Number of Tandem Repeats (VNTR). e) In DNA fingerprinting, a satellite DNA is used as probe that shows very high degree of polymorphism.	5
41	**41. What is genetic code? Explain any four salient features of genetic code** It is the sequence of nucleotides on RNA that directs the sequence of amino acids during synthesis of proteins. Salient features of genetic code: •Genetic code is triplet: Out of 64 codons, 61 code for amino acids and the other 3 codons are known as stop codons as they do not code for any amino acid and hence stop the process of translation. •Genetic code is specific and unambiguous: One codon codes for only one amino acid. •Genetic code is degenerate: Some amino acids are coded by more than one codon. •Genetic code has no punctuation: The codon is read in mRNA in a continuous fashion. •Genetic code is nearly universal: A codon codes for same amino acid in all organisms with the exception of some codons in mitochondria and some protozoans.	5

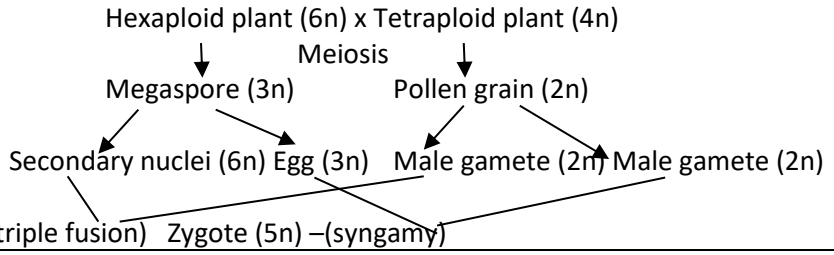
5

	•The codon AUG has dual functions. It acts as initiator codon and also codes for the amino acid methionine.	
42	**42. Describe the biological treatment of primary effluent.** Primary effluent is passed into large **aeration tanks** with constant mechanical agitation and air supply. • Useful aerobic microbes grow rapidly and form **flocs**. • **Flocs** are masses of bacteria associated with fungal filaments to form mesh-like structures. • The growing microbes consume organic matter and thus reduce the **biochemical oxygen demand (BOD).** • When BOD of sewage has reduced, the effluent is passed into **settling tank**. • Here, the bacterial flocs settle and the sediment is called **activated sludge**. • A small part of the sludge is used as an **inoculum** in the aeration tank and the remaining part is passed into large tanks called **anaerobic sludge digesters**. In the digesters, **heterotrophic microbes** anaerobically digest bacteria and fungi in sludge producing mixture of gases such as methane, hydrogen sulphide (H2S) and CO2, which form the biogas. Effluent is now released into rivers and streams.	5
43	**43. a) Explain the process of Polymerase chain reaction in amplification of desired DNA b) Draw a labelled diagram of pBR322 vector.** a) POLYMERASE CHAIN REACTION: • PCR stands for Polymerase Chain Reaction. In PCR, multiple copies of the gene (or DNA) of interest is synthesised in vitro. • In PCR two sets of primers and the enzyme DNA polymerase are used . • Primers are small chemically synthesised oligonucleotides that are complementary to the regions of DNA. • Each cycle of PCR includes three bascis steps; Denaturation, Annealing and Extension • During Denaturation Double stranded DNA uncoils into Single stranded DNA due to high temperature. • During Annealing Primers will binds to the respective part of DNA. • During Extension Special DNA polymerase synthesis new DNA. • The above steps of PCR cycle repeated for many times (30 cycles) approximately we can get , 1 billion copies of DNA. • Such repeated amplification is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, Thermus aquaticus), which remain active during the high temperature induced denaturation of double stranded DNA. • The amplified fragment if desired can now be used to ligate with a vector for further cloning. b) **pBR^{322} Vector**  	5
44	**44. a) Study the population growth curve given below and answer the questions that follows:** i) Identify the growth curves 'a' and 'b' ii) Mention the conditions responsible for the curves 'a' and 'b' respectively. b) Explain the mechanism of sexual deceit in relation to mutualism. a) i) Exponential growth curve and b) Logistic growth curve ii) When resources are not limiting the growth, plot is exponential.	5

When resources are limiting the growth, plot is logistic

b) Mediterranean orchid. *Ophrys muscifera* employs sexual deceit to get pollinated by bee species. One petal of flower resembles female bee in size, color and markings and male bee is attracted and pseudocopulates with it. During this process of pseudo-copulation, the pollen grains are dusted on the body of male bees. With such pollen dusts, male bee pseudocopulates to another flower of the same species and pollination takes place.

45. Double fertilization is the unique feature of angiosperms and the products of this double fertilization is zygote and PEN. In context of this when a hexaploid plant is pollinated by a tetraploid plant find out the ploidy of zygote and PEN through a schematic illustration.



5

46. ABO blood grouping provides a good example of multiple alleles and are controlled by the gene 'I'.

This gene product is responsible for the production of a sugar polymer that protrudes from its surface.

The 'I' gene has three alleles they all follow a specific pattern of in,

a) What are the probable number of phenotypes and genotypes for ABO blood group in human population

b) Mention the genotypes of all the blood group phenotypes.

c) Name the type of blood groups of the parental combination in which both their blood group is not inherited to their children.

ANS:

a) Four phenotypes and six genotypes are possible for ABO blood group in human population.

b)

Phenotypes	Genotypes
A	$I^A I^A$ and $I^A i$
B	$I^B I^B$ and $I^B i$
AB	$I^A I^B$
O	$i i$

c) AB & **O**

5

47.Five patients suffering from certain diseases visit a local primary health centre. The Doctor does a check and prepares the report of the five patients and is indicated in the below given table. Analyse the table and diagnose the disease they are suffering from and causative agent of the diseases.

Patient 1	**High fever, constipation, stomach ache, loss of appetite, headache**
Patient 2	**Chills and high fever recurring every 3 – 4 days**
Patient 3	**Constipation, mucous and blood clots in stool, abdominal pain and cramps**
Patient 4	**Internal bleeding, blockage in the internal passage, muscular pain, fever**
Patient 5	**Dry, scaly lesions on skin, nails and scalp**

		Disease	Causative agent
Patient 1	High fever, constipation, stomach ache, loss of appetite, headache	Typhoid fever	*Salmonella typhi*
Patient 2	Chills and high fever recurring every 3 – 4 days	Malaria	*P. vivax, P. malariae, P. ovale, P. falciparum*

5

		Patient 3	Constipation, mucous and blood clots in stool, abdominal pain and cramps	Amoebiasis/ Amoebic dysentery	*Entamoeba histolytica*	
		Patient 4	Internal bleeding, blockage in the internal passage, muscular pain, fever	Ascariasis	*Ascaris lumbricoides*	
		Patient 5	Dry, scaly lesions on skin, nails and scalp	Ringworms	*Microsporum/ Trychophyton/ Epidermophyton*	

GOVERNMENT OF KARNATAKA

DEPUTY DIRECTOR, DEPT. OF SCHOOL EDUCATION (PRE-UNIVERSITY)

PUC-II YEAR PREPARATORY EXAMINATION-2024

Time : 3 Hours 15 Minutes | SUBJECT : **BIOLOGY (36)** | MARKS : 70

Instructions : 1) The question paper consists of four parts A,B,C and D.
2) Part-A consists of I and II, Part-D consists of V and VI.
3) Only the first written answer's will be considered for the part-A.
4) All the parts are compulsory.
5) Draw diagrams wherever necessary. Unlabelled diagrams or illustrations do not attract any marks.

PART-A

I. **Select the correct alternative from the choices given below :** **15X1=15**

1) Identify the wrong statement regarding past-Fertilization development
   a) the ovary wall develops into pericarp
   b) The outer integument of ovule develops into tegmen
   c) The fusion of nucleus (Triple-fusion) develops into endosperm
   d) The ovule develops into seed

2) Even in the absence of pollinating agent seed setting is assured in
   a) Commelina b) Zostera c) Salvia d) Fig

3) An Embryo with eight to sixteen blastomere's is called
   a) Blastocyst b) Trophoblast c) Morula d) Zygote

4) Medical Termination of pregnancy was legalised in India in
   a) 1971 b) 1975 c) 1965 d) 1961

5) Which of the following is non-medicated Intrauterine device
   a) Cu-T b) Lippes loop c) LNG-20 d) Cu-7

6) Which of the following character was not chosen by mendel
   a) pod shape b) pod colour c) Location of flower d) Location of pod

7) Histone proteins are
   a) basic negatively charged b) basic positively charged
   c) Acidic negatively charged d) Acidic positively charged

8) The brain capacity of Homo-erectus was about
   a) 650 CC b) 900 CC c) 1500 CC d) 1400 CC

9) The primary treatment of waste water involves the removal of
   a) dissolved impurities b) stable particles
   c) Toxic substances d) Harmful bacteria

10) Vaccine against polio-virus is an example of
   a) Auto-immunisation b) Passive immunization
   c) Active Immunity d) Simple immunization

11) Bio-active molecules statins produced by
   a) Bacteria b) Yeast c) Virus d) Protozoa

12) The Inter-specific Interaction in which one partner is benefitted and the other is neutral is called
   a) Ammensalism b) Mutation c) Completion d) Communalism

13) The phenomenon of industrial melanism demonstrates
   a) Geographical isolation b) reproductive isolation
   c) natural selection d) Induced mutation

14) Which of the following has 23- chromosomes
   a) Spermatogonia b) Zygote c) Secondary oocyte d) Oogonia

15) Which group of vertebrates, comprises the highest number of endangered species
   a) Fishes b) Reptiles c) Birds d) Mammals

II. **Fill in the blanks by choosing the appropriate word/words from those given below :** 5X1=5

(Allen's rule, PCR, Corona radiata, Lichens, Auto Immune)

16) Rheumatoid arthritis is ..... disease.

17) Which of the following is a pioneer species in xeric succession .....

18) The technique that serves the purpose of early diagnosis is .....

19) Animals form colder climates generally have shorter limbs. This is called .....

20) Immediately after ovulation, the mammalian egg is covered by a membrane known as .....

PART-B

III. **Answer any FIVE of the following questions in 3-5 sentence each, wherever applicable :** 5X2=10

21) Name the techniques used in Artificial hybridization.

22) Distinguish between menstrual cycle and oestrous cycle.

23) Draw a neat labelled diagram of pollen grain.

24) What is point mutation ? Give an example.

25) Expand the terms ICSI and ZIFT.

26) What are the techniques used to detect cancer ?

27) Write any four symptoms of Down's syndrome.

28) What are Homologous organs ? Give an example.

PART-C

IV. **Answer ANY FIVE of the following questions in about 40 to 80 sentences each, wherever applicable :** 5X3=15

29) Briefly explain any three prevention and control measures of drug and alcohol abuse.

30) Draw a neat labelled diagram of L. S. of Flower.

31) Write the schematic structure of transcription unit and labelled the parts.

32) Schematically represents Oogenesis.

33) Name the organisms that produce citric acid, Acetic acid and butyric acid.

34) Mention any three examples of Ex-situ conservation.

35) Draw a neat labelled diagram of S. L. Miller's experiment.

36) What are Lymphoid organs ? Mention the types with one example each.

PART-D

V. **Answer any THREE of the following questions in about 200 to 250 words each wherever applicable :** 3X5=15

37) Explain the inheritance of one gene with respect to height in garden pea-plant.

38) Write the steps involved in DNA. Finger printing technique.

39) Explain the primary and secondary stages of sewage treatment.

40) Draw a labelled diagram of sectional view of female reproductive system.

41) Explain the life cycle of plasmodium vivax.

42) Enumerate the salient features of H.G.P.

Answer any TWO of the following questions in about 200 to 250 words each wherever applicable : 2X5=10

43) One of the application of Biotechnology is the production of Insect-resistant crop-Justify the statement with reference to Bt-cotton.

44) Explain the role of microbes in house hold products.

45) Describe lac-operon concept on carbohydrate metabolism.

46) a) Write any four tools used in Recombinant-DNA-technology.

b) Mention any two methods of introducing alien DNA into host-cells.

c) Name the stain used to visualise DNA fragments in Gel electrophoresis.

47) Name the diseases caused by the following organisms.

a) Entamoeba histolytica b) Rhino viruses c) Microsporum trichophyton

d) Plasmodium e) Salmonella typhi

KODAGU DISTRICT
SECOND PUC PREPARATORY EXAMINATION JANUARY-2024
SUBJECT : BIOLOGY (36)

TIME : 3Hrs 15 Min **Max Marks : 70**

General Instructions

1. **This question paper consists of 4 parts A,B,C,D.**
2. **Part – A consists of I and II and Part D consists of two parts, section –V and – VI.**
3. **All the parts are compulsory.**
4. **Draw diagrams wherever necessary. Unlablled diagrams do not carry any marks.**

PART-A

I. Select the correct alternative from the choices given below: **1x15=15**

1. A DNA sequence consisted of 20% adenine nucleotides. What would be the percentage of cytosine nucleotide in the same DNA sequence.

   a) 20% b) 30% c) 60% d) 80%

2. Which of the following fruit is parthenocarpic.

   a) Apple b) Jackfruit c) Banana d)Papaya

3. The vitamin whose content increases following the conversion of milk into curd by lactic acid bacteria is

   a) Vitamin C b) Vitamin D c) Vitamin B12 d) Vitamin E

4. Heterocromatin

   a) is transcriptionally active. b) is densly packed

   c) Replicated during early S-phase d) stains lightly

5. During spermatogenesis, meiosis occurs in

   a) primary spermatocyte b) secondary spermatocyte

   c) both a and b d) none of the above.

6. In which of the following types of pollination genetically different pollen grains are brought to the stigma.

   a) Geitonogamy b) Autogamy

   c) Xenogamy d) all of the above.

7. Which organism's species have greater diversity in the western ghats than eastern ghats

a) Reptiles b) fishes c) mammals d) Amphibians.

8. Sickle cell anemia disorder arises due to

a) duplication of a segment of DNA

b) substitution in a single base of DNA

c) Deletion of a segment of DNA

d) Duplication in a base pair of RNA

9. During embryonic development, which of the following organ is formed first

a) Skin b) Brain c) Neural tube d) Heart

10. Darwin finches are an excellent example of

a) adaptive radiation b) connecting link

c) natural selection d) seasonal migration

11. The integral form of exponential growth equation will be

a) $N_o=N_t e^{rt}$ b) $N_t = N_0 e^{rt}$

c) Nt-No= e^{rt} d) Nt/No = 1/ e^{rt}

12. Antibody present in the colostrums is

a) IgG type b)IgA type c) IgD type d) IgE type.

13. Permanent method of birth control in women is

a)Tubectomy b) IUD c) Vasectomy d) Copper –T

14. Harmone responsible for ovulation and development of corpus luteum is

a) FSH b)Prolactin c) Oxytocin d)LH

15. An example for harmone releasing IUD among the following is

a) Cu-7 b)Lippes loops c) LNG-20 d) Multiload 375

II. FILL IN THE BLANKS BY CHOOSING THE APPROPRIATE WORD/WORDS FROM THOSE GIVEN BELOW. 1x5=5

(Grazing food chain, Saltation, Plasmid, Vegetative cell, Competition)

16. The extra cromosomal, self-replicating, double stranded, closed circular DNA molecule present in some bacterias are called as _____.
17. _____is the major conduit of energy flow in aquatic ecosystem.
18. A polulation interaction in which both the partners are harmed is called _____
19. _____is termed as single step large mutation.
20. Pollen mother cell-->pollen tetrad-->pollen grain--> _____ ----> generative cell.

PART – B

ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS IN 3-5 SENTENCES WHEREVER APPLICABLE : 2X5=10

21. What is infertility? Mention any two techniques implemented in Assisted Reproductive technology
22. Mention any four factors affecting rate of decomposition.
23. What is Ex-situ conservation? Give two examples.
24. What is Cancer? Mention the types of tumors.
25. Define productivity Mention any one difference between GPP and NPP.
26. Give four examples for convergent evolution.
27. Differentiate between Co dominance and incomplete dominance with one example each.
28. What is the use of cyclophorin A? Mention its source.

PART – C

ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS IN 40–80 WORDS EACH WHEREVER APPLICABLE : 3X5=15

29. List the salient features of genetic code.
30. What is foetal ejection reflex? Describe the mechanism of foetal ejection reflex during parturition.
31. What is gene therapy? Name the genetic disease treated by using this technlque and also mention the enzyme difficient in the disease.
32 What are out breeding devices? Explain briefly the various out breeding devices in plants.
33. State Hardy-Weinberg principle. List the factors affecting it.
34. Explain how human insulin is synthesized through genetic engineering.
35. List the features of an ideal contraceptive. Give an example for barrier method of contraception.
36. Alien species invasion caused decline or extinction of indigenous species. Justify the statement by giving three examples.

PART – D

SECTION-I

ANSWER ANY FOUR OF THE FOLLOWING QUESTIONS IN 200-250 WORDS EACH WHEREVER APPLICABLE : 5X4=20

37. Draw a neat labeled diagram of sectional view of female reproductive system.
38. a)What is meant by aneuploid?
    b)Describe the characteristics of individuals with the following chromosomal abnormalities.
    i) Trisomy at chromosome 21
    ii) XXY
39. What is mutualism? Explain it with four examples.
40. Describe lac-operon concept of gene regulation.
41. Explain the steps involved in the technique used in amplification of gene of interest
    Mention the thermostable enzyme used in the process.
    Name the organism from which the above enzyme is isolated.
42. Draw a neat labelled diagram of mature Embryo-sac of an angiosperm.
    a. Explain the role of synergids.
    b. If one embryo is formed from nucellus and other from synergids state the ploidy of embryo.
43. Explain different stages involved in sewage treatment.
44. What is innate immunity? Explain the different types of defense barriers of innate immunity.

SECTION-II

ANSWER ANY ONE OF THE FOLLOWING QUESTIONS IN 200-250 WORDS EACH WHEREVER APPLICABLE : 5X1=5

45. A tall plant with red flowers (dominant) is crossed with a dwarf plant with white flower (recessive) workout a dihybrid cross with a schematic representation of punnet square. State the phenotypic ratio of the above cross.
46. Give the schematic representation of the replication of retrovirus.
47. a) Draw a neat labelled diagram of $p^{BR}322$.
    b) Add a note on the functions of selectable markers of $p^{BR}322$.

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DISTRICT LEVEL P.U.C. SECOND YEAR PREPARATORY EXAMS JAN-2024

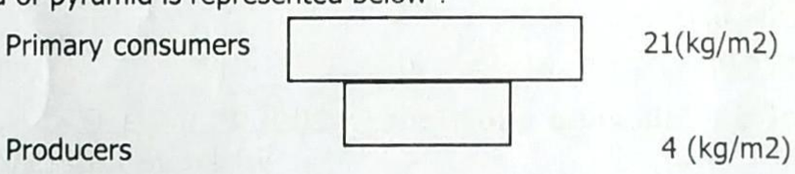
Time: **3.15 Hours** Subject: **BIOLOGY (36)** Max. Marks: **70**

INSTRUCTIONS: i) The question paper consists of four parts A,B,C and D.
ii) Part - A consists of section I & II and Part - D consists of section V & VI
iii) All the parts are compulsory
iv) Draw diagrams wherever necessary. Unlabelled diagrams do not attract any marks.

PART – A

I. Select the correct alternative from the choices given below **15 X 1 = 15**

1. In a pollen grain the large cell with abundant reserve food is
   a) Generative cell b) Vegetative cell c) microspore mother cell d) megaspore mother cell
2. The residual and persistent nucellus in the seed is observed in
   a) Pea b) Groundnut c) Wheat d) Black pepper
3. The last part of oviduct with narrow lumen is
   a) ampulla b) Infundibulum c) womb d) Isthmus
4. Transfer of embryos with more than 8 blastomeres into the uterus refers to
   a) IUT b) IUI c) ZIFT d) ICSI
5. When a cross is made between tall plant with yellow seeds (TtYy) and tall plant with green seed (Ttyy). What is the proportion of tall & green plants and dwarf & green plants
   a) 3:1 b) 1:3 c) 6:1 d) 1:6
6. In sickle cell anaemia Hbs at the 6th position has the amino acid
   a) Glutamic acid b) Valine c) Proline d) Leucine
7. In lac operon , the enzyme that increases the permeability of the cell to ß – galactosides is
   a) ß – galactosidase b) transacetylase c) permease d) RNA polymerase
8. Which of the following statements are true
   i) Increase in melanised moths after industrial revolution in England is proof for Natural selection
   ii) When more individuals acquire a mean character value it is called disruption
   iii) Gene frequency of a population remains constant according to Hardey-Weinbergs principle
   a) i & ii are correct b) i & iii are correct c) ii & iii are correct d) only i is correct
9. Which of the following set includes only bacterial disease?
   a) Amoebiasis,Ascariasis,Filariasis b) Typhoid,Pneumonia,Plague
   c) Common cold,Typhoid,Malaria d) Malaria,Typhoid,Pneumonia
10. Morphine is extracted for the latex of
    a) Erythroxylum coca b) Atropa belladona c) Cannabis sativa d) Papaver somniferum
11. Baculoviruses (nucleopolyhedrovirus) do not show
    a) Species specific b) narrow spectrum applications
    c) negative impact on non target insects d)utility in IPM programme
12. Dragon flies used to get rid of
    a) mosquitoes b) aphids c) caterpillars d) both (a) & (b)
13. The capacity to generate a whole plat from explant refers to
    a) micropropagation b) totipotency c) somatic hybridisation d) production of somaclones
14. Which kind of pyramid is represented below ?



    a) pyramid of numbers in terrestrial ecosystem b) pyramid of biomass terrestrial ecosystem
    c) pyramid of biomass in aquaqtic ecosystem d) pyramid of numbers in aquqtic ecosystem
15. Genetic diversity refers to to
    a) the presence of different types of genes in different species
    b) Existence of genetically different strains of same species
    c) presence of different species in an ecosystem d) Both a and b

II Fill in the blanks by choosing the appropriate word/words from those given below 5 X 1 = 5
(colostrum, apomixis , Gross primary productivity, Genetic drift, Elution)

16. Production of seeds without fertilization is called _____
17. Change in gene frequency by chance is _____.
18. _____ is the yellowish fluid secreted by mother during the initial days of lactation.
19. Cutting of agarose gel and extraction of DNA from it is called _____
20. _____ of an ecosystem is the rate of production of organic matter during Àphotosynthesis.

PART - B

III Answer any FIVE of the following questions in 3 – 5 sentences each, wherever applicable. 5 X 2 = 10

21. Differentiate spermiogenesis & spermiation.
22. What is a Pleiotropic gene? Give an example.
23. How do euchromatin differs from heterochromatin ?
24. Draw a neat labeled diagram showing structure of antibody molecule..
25. Write the scientific name of the source and the application of Statin.
26. Mention any two methods of introducing alien DNA into host cells.
27. Sketch and label PBR -322.
28. Write the equation for exponential growth and logistic growth.

PART - C

IV Answer any FIVE of the following questions in 40 – 80 words each, wherever applicable. 5 X 3 = 15

29. Mention any three out breeding devices in flowering plants.
30. What is placenta? Mention hormones secreted by it.
31. What are the criteria to be fulfilled by a molecule that can act as genetic material?
32. List salient features of genetic code.
33. a) Differentiate active and passive immunity
    b) Define allergy
34. Draw labeled diagram of biogas plant.
35. Mention three steps in Polymerase chain reaction.
36. Write a note on limitations of ecological pyramids.

PART - D

V. Answer any FOUR of the following questions in 200- 250 words each, wherever applicable. 4 X5=20

37. Explain the process of development of embryosac.
38. Draw a labeled diagram showing sectional view of mammary gland.
39. a) List the complications of untreated sexually transmitted infections in females -2
    b) Mention the methods of natural contraceptives -3
40. Describe incomplete dominance.
41. How does the sex is determined in Honeybees? Describe
42. a) Differentiate template strand & coding strand during transcription - 2
    b) Explain division of labour in RNA Polymerase - 3
43. Write a note on Origin & evolution of man
44. What is Innate immunity? Add a note on types of barriers.

VI. Answer any ONE of the following questions in 200- 250 words each, wherever applicable. 1 X 5=5

45. What are cry proteins? Name an organism that produce it. How has man exploited this protein?
46. Based on the following examples, write the kind of population interaction expressed
    a) Sparrow eating any seed
    b) Balanus which excludes Chathamalus from intertidal area.
    c) Cuckoo and Crow
    d) Sea anemone & Clown fish
    e) Flowering plants and Pollinators
47. a) Explain any three major causes of biodiversity loss. -3
    b) What are biodiversity hotspots? Give an example. -2

THE TEAM ACADEMY, SHIVAMOGGA

ll PUC PREPARATORY EXAMINATION

Subject : Biology (36)

Time : 3:15 Hrs **Max. Marks : 70**

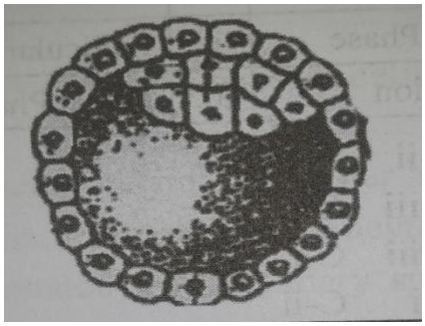
General Instructions

- This question paper consists of four parts A, B, C and D.
- Part -A consists of l and ll and part D consists of two parts, section – V and – Vl
- All the parts are compulsory
- Draw diagrams wherever necessary. Unlabelled diagrams do not carry any marks.

PART – A

a) Select the correct alternatives from the choices given below : 1×15=15

1. **Statement l** : Xenogamy is cross pollination functionally but self pollination genetically.
   Statement ll : In geitenogamy, pollen from one flower are transferred to another flower born on same plant.
   a. Both statement l and statement ll are correct
   b. Both statement l and statement ll are incorrect
   c. Statement l is correct and statement ll is incorrect
   d. Statement 1 is incorrect and statement ll is correct
2. Haploid condition is not observed in which of the following cells
   a. Synergids and Egg
   b. Zygote and PEN
   c. Antipodal and Egg
   d. Antipodal and Synergids
3. Select the correct sequence for transport of sperm cells in male reproductive system.
   a. Testis→Epididymis →Vasa efferentia→ Rete testis→ Inguinal canal→ Urethra
   b. Seminiferous tubules→Rete testis→ Vasa efferentia→ Epididymis → Vas deferens→ Ejaculatory duct→ Urethra→Urethral meatus
   c. Seminiferous tubules →Vasa efferentia→Epididymis →Inguinal canal →Urethra
   d. Testis→Epididymis →Vasa efferentia →Vas deferens→Ejaculatory duct →Inguinal canal→Urethra→Urethral meatus
4. Identify the human development stage shown below as well as the related right place of its occurrence in a normal pregnant woman, and select the right option for the two together :



Developmental stage	Site of occurrence
a. Late morula	Middle part of Fallopian tube
b. Blastula	End part of Fallopian tube
c. Blastocyst	Uterine wall
d. 8-celled morula	Starting point of Fallopian tube

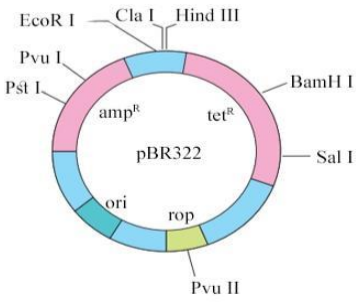
5. Which of the following approaches does not give the defined action of contraceptive

a Barrier Methods	Prevent fertilization
b. Intrauterine	Increase phagocytosis of sperms, suppress sperm motility and fertilizing capacity of sperms
c. Hormonal contraceptives	Prevent /retard entry of sperms, prevent ovulation and fertilization
d. Vasectomy	Prevents spermatogenesis

6. Which of the following STD are not curable?
    a. Chlamydiasis, Syphilis, Genital warts
    b. HIV, Gonorrhoea, Trichomoniasis
    c. Gonorrhoea, Trichomoniasis, Hepatitis B
    d. Genital herpes, Hepatitis B, HIV infection
7. Which of the following Mendelian gene disorder is the representation of allosomal recessive trait?
    a. Hemophilia
    b. Thalassemia
    c. Sickle cell anemia
    d. Myotonic dystrophy
8. The genotypes of a Husband and Wife are l A and l B and I A and i. Among the blood type of their children, how many different genotypes and phenotypes are possible?
    a. 3 genotypes ; 3 phenotypes
    b. 3 genotypes ; 4 phenotypes
    c. 4 genotypes ; 3 phenotypes
    d. 4 genotypes ; 4 phenotypes
9. According to Darwin, the organic evolution is due to :
    a. Reduced feeding efficiency in one species due to the presence of interfering species
    b. Intraspecific competition
    c. Interspecific competition

d. Competition within closely related species

10. Transplantation of tissues/organs fails often due to non-acceptance by the patient's body. Which type of immune response is responsible for such rejections?
    a. Autoimmune response
    b. Cell mediated immune response
    c. Hormonal immune response
    d. Physiological immune response
11. *Monascus purpureus* is a yeast used commercially in the production of :
    a. Blood cholesterol lowering agent
    b. Ethanol
    c. Streptokinase for removing clots from the blood vessels
    d. Citric acid
12. The figure below is the diagrammatic representation of the *E. coli* vector pBR 322. Which one of the given options correctly identifies its certain component (s)?



    a. Ori – original restriction enzyme
    b. Amp R, tet R – antibiotic resistance genes
    c. rop – reduced osmotic pressure
    d. Hind III, EcoRl – selectable markers
13. Which of the following organisms are studied by Cornell's in his elegant field experiments to study competition
    a. Warbler species
    b. Chathamalus and Balanus
    c. Cuckoo and crow
    d. Cattle egret and grazing cattle
14. In the equation GPP – R = NPP.
    R represents :
    a. Retardation factor
    b. Environment factor
    c. Respiration losses
    d. Radiant energy
15. The earth summit held in Rio de Janeiro in 1992 was called
    a. To reduce CO2 emissions and global warming
    b. For conservation of biodiversity and sustainable utilization of its benefits
    c. To access threat posed to native species by invasive weed species
    d. For immediate steps to discontinue use of CFCs that were damaging the ozone layer

II. Fill in the blanks by choosing the appropriate word/words from those given below: 1×5=5

(Euchromatin, Fossils, Intrinsic rate of natural increase, Fimbriae, Heterochromatin, Apomixis)

16. The special mechanism in some plants to produce seeds without fertilization is called.....
17. Infundibulum has finger like projection called..... which helps in collection of the secondary oocyte after ovulation
18. The densely packed and darkly stained chromatin is known as .....
19. The remains of hard parts of living organisms of the past in rocks or sediments are called .....
20. In the equation dN/dt = rN, the letter 'r' denotes .....

PART – B

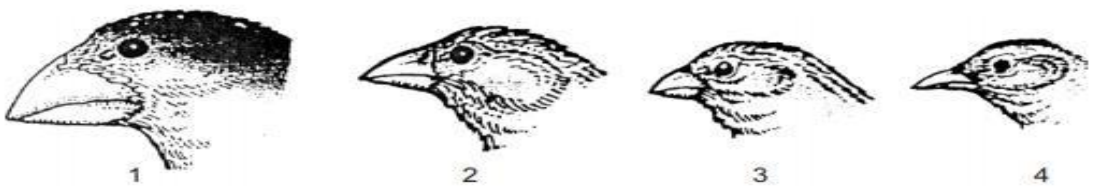
Answer any FIVE of the following questions in 3-5 sentences wherever applicable : 2×5=10

21. List any four complications a person suffers from untreated sexually transmitted infections.
22. How is infertility is treated by assisted reproductive technologies like GIFT and ICSI.
23. "A single gene can exhibit multiple phenotypic expression ". Name this condition with two examples.
24. State Hardy Weinberg principle. Mention any two factors which affects Hardy Weinberg equilibrium.
25. Mention the common approaches for the treatment of cancer.
26. Distinguish between active and passive immunity.
27. Baculoviruses are an excellent biocontrol agents in Integrated Pest Management. Comment.
28. Define the terms primary productivity and secondary productivity of an ecosystem.

PART – C

Answer any FIVE of the following questions in 40-80 words each wherever applicable : 3×5=15

29. Explain the mechanism of pollination in *Vallisneria* and Sea grasses.
30. Give reasons for the following :
    a. Oxytocin is necessary for parturition.
    b. Ovulation takes place on the 14th day of menstrual cycle.
    c. Doctors recommend breast feeding during the initial period of infant growth.
31. Draw a diagrammatic sketch of lac operon when lactose is present in the medium.
32. Figure given below are variety of beaks of Darwin finches. With respect to this, answer the questions that follows :



a. Mention the specific geographical area where these were found.

b. Name and explain the phenomenon that has resulted in the evolution of such diverse species in the region.
c. How did Darwin visit the particular geographical area?

33. Explain how Bt cotton is made natural bio pesticide against wide range of insect pests through genetic engineering.
34. What is gene therapy? Explain the steps involved in curing ADA deficiency by gene therapy.
35. a. "The Amazonian rain forest in South America has the greatest biodiversity on earth". Justify the statement. (2)
    b. What are endemic species? (1)
36. a. Give the graphical representation of pyramid of energy in an ecosystem. (2)
    b. If we count the number of insects on a tree and the number of small birds depending on those insects as also the number of larger birds eating the smaller. What kind of pyramid of number would we get? (1)

PART – D

Section -I

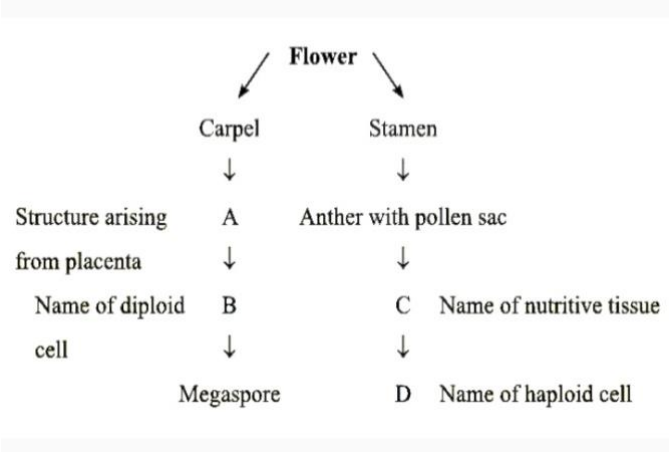
Answer any FOUR of the following questions about 200-250 words each wherever applicable : 5×4=20

37. Draw a neat labelled diagram of human female reproductive system.
38. Explain the law of segregation using monohybrid cross by taking stem height in garden pea plant and mention the result.
39. With the help of schematic representation, illustrate how an infected animal cell can survive while viruses are being replicated and released.
40. What are VNTR's? Mention the steps to detect VNTR's in identifying criminals in forensic investigations.
41. Describe the process of translation of mRNA.
42. Explain the role of microbes in the production of industrial products.
43. a. Write the diagrammatic representation of Recombinant DNA technology. (3)
    b. Write a note on downstream processing. (2)
44. Mention the population interactions exist among the following.
    a. Abingdon tortoise and goats in galapagos island.
    b. Cuckoo lays egg in crow's nest.
    c. Sea – anemone and clown fish.
    d. Wasp laying eggs in fig fruit.
    e. Orchid ophrys and bees.

Section -II

Answer any ONE of the following question about 200-250 words each wherever applicable : 5×1=5

45. a. Given below is an incomplete flowchart showing the formation of gametes in an angiospermic plant. Observe the flowchart carefully and fill in the blanks A, B, C and D. (2)



b.

I. Why is bagging of emasculated flowers essential during hybridization experiment? (1)
II. Mention the cells of the mature pollen grain. (1)
III. Give the scientific name of the plant that has the viability record of 10,000 years. (1)

46. a. Describe the Haplodiploid sex determination in Honey bees. (3)
b. Differentiate male heterogamety from female heterogamety with example. (2)

47. a. Name the body part and the host in which the following events takes place in the life cycle of plasmodium. (2)
I. Fertilization
II. Development of gametophyte
III. Release of sporozoites
IV. Asexual reproduction
b. What is the role of histamine in inflammatory response? Name few drugs which reduce the symptoms of allergy. (2)
c. From which plant Cannabinoids are obtained? (1)