OSDAV Public School, Kaithal

December Examination (2024-25)

Class : XII

Subject : Biology

SET- A

Time: 3 Hrs .

M.M. : 70

General Instructions:

(i)All questions are compulsory.

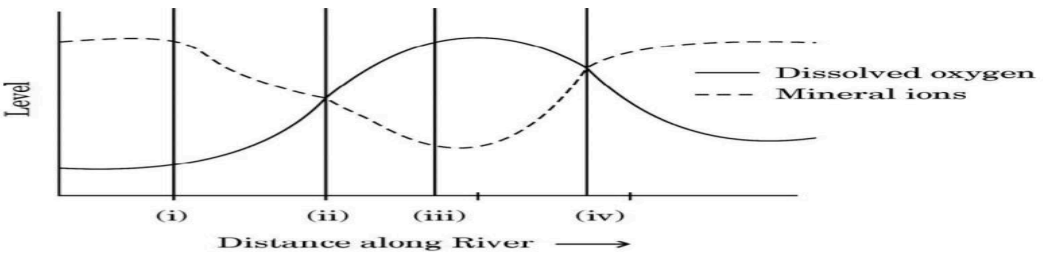
(ii)The question paper has five sections and 33 questions.

(iii)Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.

(iv)There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v)Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION- A

Q 1	In which one of the following options does the endocrine gland correctly match with its hormonal secretion and its function ? **Endocrine Gland** **Hormone** **Function** (a) Sertoli cells Testosterone Development of secondary sexual characteristics (b) Placenta Estrogen Initiates secretion of milk (c) Leydig cells Androgen Initiates the production of sperms (d) Ovary FSH Stimulates follicular development	**1**
Q.2	Amniocentesis is a medical procedure where some of the amniotic fluid of the developing foetus is drawn to analyse the foetal cells and dissolved substances.It was banned in India around 1994 under the Preconception and PrenatalDiagnostic Techniques Act in order to stop female foeticides. Which of the following highlight the importance of amniocentesis despite the ban? A.identification of a decline in sex ratio B.prevention of sexually transmitted diseases C.determination of biological sex of the unborn baby D.detection of genetic disorders	**1**
Q.3	Given below are steps involved in the gene therapy of a patient with adenosine deaminase (ADA) deficiency. P) Lymphocytes are grown in a culture outside the human body. Q) Lymphocytes are altered with a functional ADA cDNA. R) Lymphocytes are collected from the blood of the patients. S) The genetically modified lymphocytes are infused back into the patient. Which of the following show the correct order in which these steps must occur? A. Q --> P --> R --> S B. R --> S --> Q --> P C. R --> P --> Q --> S D. S --> R --> P --> Q	**1**
Q.4	The theory of spontaneous generation stated that (a) life arose from living forms only (b) life can arise from both living and nonliving (c) life can arise from nonliving things only (d) life arises spontaneously, neither from living nor from the non-living.	**1**
Q.5	 The graph plotted above is based on the data collected by biology students with respect to the levels	**1**

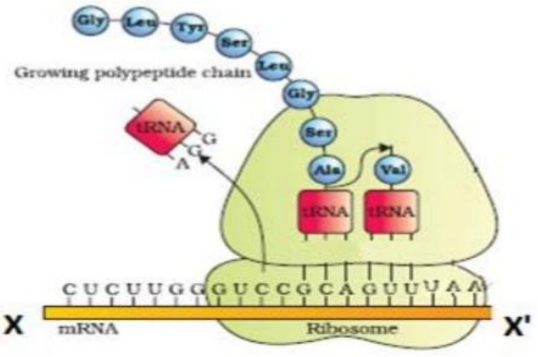
	of oxygen at the specific points in the river flowing outside their city. Which point in the graph indicates the entry of untreated sewage in the river ? (a) Point (i) (b) Point (ii) (c) Point (iii) (d) Point (iv)	
Q.6	Match column I with column II and select the correct option from the codes given below. Column I Column II (a) Pathogens (i) Pathogen-carrying organisms (b) Vaccination (ii) Prevents the growth of microorganisms (c) Pasteurisation (iii) Microbes that cause diseases (d) Vectors (iv) Gives immunity A)a iv b iii c ii d i B) a iii b iv c ii d i C)a iii b iv c i d ii D)a i b iv c ii d iii	**1**
Q 7	Match the following list of microbes with their importance? (A) Saccharomyces cerevisiae (i) Production of immunosuppressant (B) Monascus Purpureus (ii) Ripening of Swiss cheese (C) Trichoderma polysporum (iii) Commercial production of ethanol (D) Propionibacterium shermanii (iv) Production of blood cholesterol Lowering agent (A) (B) (C) (D) (a) (iv) (iii) (ii) (i) (b) (iv) (ii) (i) (iii) (c) (iii) (i) (iv) (ii) (d) (iii) (iv) (i) (ii)	**1**
Q.8	The organism used in construction of the first artificial recombinant DNA by Cohen and Boyer in 1972 was : (a) E. coli (b) Salmonella typhimurium (c) Agrobacterium tumefaciens (d) Bacillus thuringiensis	**1**
Q 9	Somatic hybridisation is the artificial technique of creating a hybrid plant combining the desirable characteristics of two plants.Which of the following conditions MUST be satisfied by the two cells used forSomatic hybridisation? A.They are gametes. B.They lack a cell wall C.They contain chlorophyll. D.They belong to the same species.	**1**
Q.10	A stable community is usually resistant to invasion by alien species. Which of the following would NOT be affected in a stable community due to this resistance? A. species richness B. productivity C. co-extinction D. total biomass	**1**
Q.11	Select the option that correctly identifies A, B and C in the given table. **Organism** **Trophic level** **Food chain** Eagle A Grazing Earthworm Primary consumer B Frog C Grazing (a) A-Top carnivore, B-Detritus, C-Secondary consumer (b) A-Top carnivore, B-Detritus, C-Primary consumer (c) A-Secondary consumer, B-Grazing, C-Secondary consumer (d) A-Scavenger, B-Grazing, C-Producer	**1**
Q.12	Many copepods live on the surface of marine fish.This type of interaction is termed as (a) symbiosis (b) mutualism (c) parasitism (d) commensalism	**1**
Q.13	**Q.No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:** **A. Both A and R are true and R is the correct explanation of A.** **B. Both A and R are true and R is not the correct explanation of A.** **C. A is true but R is false.** **D. A is False but R is true** **Assertion (A)** : A patient of ADA deficiency undergoing treatment for gene therapy requires periodic infusion of genetically engineered lymphocytes. **Reason (R)** : Lymphocytes are immortal.	**1**

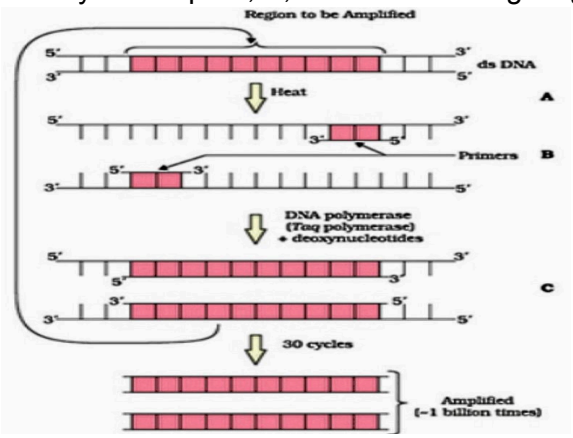
Q 14	**Assertion**: Parturition is induced by a complex neuro endocrine mechanism. **Reason**: At the end of gestation period, the maternal pituitary releases prolactin which causes uterine contractions	**1**
Q.15	**Assertion**: Smoking can raise blood pressure and increase heart rate. **Reason**: Nicotine stimulates adrenal glands to release adrenaline and noradrenaline into the blood circulation, both of which raise blood pressure and increase heart rate.	**1**
Q 16	**Assertion (A)** : A cattle egret and grazing cattle in close association is a classic example of commensalism. **Reason (R)** : As grazing cattle move through the field, they stir up and flush out insects from the vegetation that otherwise might be difficult for egrets to find and catch.	**1**

SECTION-B

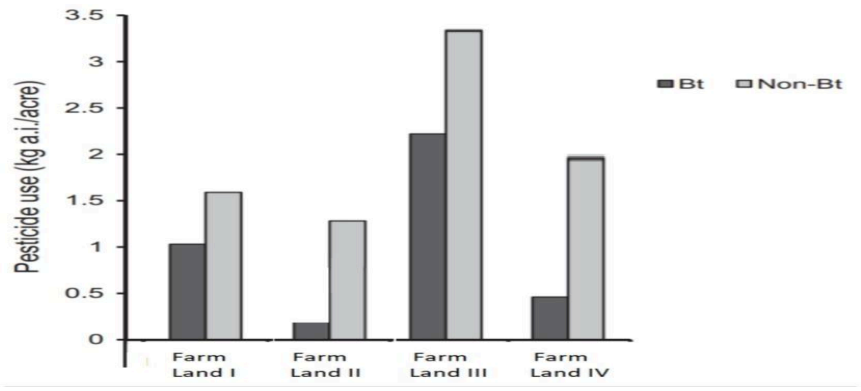
Q.17	(a) Differentiate between malignant and benign tumours. (b) Name and explain the most feared property of a malignant tumour.	**2**
Q 18	Draw the diagram of microsporangium of an Angiosperm and label any four parts .State the function of its innermost wall layer.	**2**
Q.19	A)Ecological pyramids give important information about the ecological system, but do have some limitations. List any two limitations of ecological pyramids. B)India is the seventh largest country in the world in terms of total land area including land and water. Write the value of the land area of our country (in terms of percentage) of the world. Mention then, what makes India is one of the 12 mega diversity countries of the world.	**2**
Q.20	Why does the lac operon shut down some time after the addition of lactose in the medium where E.coli was growing? Why is low level expression of lac operon always required?	**2**
Q.21	A DNA molecule is much longer than the length of the nucleus of a cell.Describe the organisation of DNA inside a nucleus in Eukaryotes.	**2**

SECTION- C

Q.22	(a) Identify the polarity of x to x' in the diagram below and mention how many more amino acids are expected to be added to this polypeptide chain.  (b) Mention the codon and anticodon for alanine. (c) Why are some untranslated sequences of bases seen in mRNA coding for a polypeptide? Where exactly are they present on mRNA?	**3**
Q.23	Explain the phases in embryonic development from the morula stage till the establishment of pregnancy in a human female.	**3**
Q.24	(a) Name the two primate ancestors of the present day humans, who existed approximately about 15 million years ago. (b) According to geological records, when and where did Do Australopithecines live ?	**3**

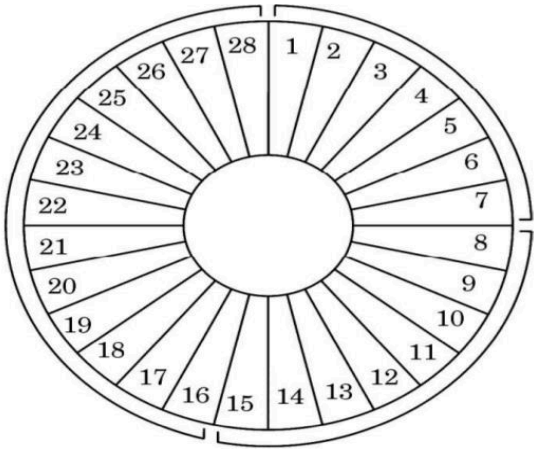
	(c) Give two differences between Homo habilis and Homo erectus.	
Q.25	Explain the process of double fertilisation in an angiosperm starting from the germination of pollen grains on the stigma, mentioning the ploidy of the end products formed at the end.	**3**
Q 26	Identify the steps A, B, C in the following diagram and explain….  	**3**
Q.27	(a) Differentiate between humoral immune response and cell-mediated immune response. (b) Draw a schematic diagram of an antibody molecule and label any four parts.	**3**
Q.28	Predation is referred to as a detrimental interaction. Explain any three positive roles, supported by an example each, that a predator plays in an ecosystem.	**3**

SECTION- D

Q.29	**CASE STUDY BASED QUESTION** GM crops especially Bt crops are known to have higher resistance to pest attacks. To substantiate this an experimental study was conducted in 4 different farmlands growing Bt and non Bt-Cotton crops. The farm lands had the same dimensions, fertility and were under similar climatic conditions. The histogram below shows the usage of pesticides on Bt crops and non-Bt crops in these farm lands. a). Which of the above 4 farm lands has successfully applied the concepts of Biotechnology to show better management practices and use of agrochemicals? If you had to cultivate, which crop would you prefer (Bt or Non- Bt) and why? b.) Cotton Bollworms were introduced in another experimental study on the above farm lands wherein no pesticide was used. Explain what effect would a Bt and Non Bt crop have on the pest.  	**4**
Q.30	Large quantities of sewage is generated everyday in cities and towns,which is treated in Sewage Treatment Plants (STPs) to make it less polluting.Given below is the flow diagram of one of the stages of STP.Observe the given flow diagram and answer the questions accordingly. **Primary effluent is passed into large aeration tank** | **Effluent passed into settling tank to form the sediment** a.)Why primary effluent is passed into large aeration tanks? b.)What is the scientific term used for the sediment formed?Mention its significance.	**4**

	c.) Explain the final step resulting in the formation of biogas in the large tank before the treated effluent is released into water bodies.Name that large tan	

SECTION- E

Q.31	Observe the diagram given below showing the menstrual cycle of a normal human female and answer the questions that follow :  **Numbers indicate the days of the menstrual cycle** (i) What are the suitable technical terms used for the following ? (1) Days 1-4 (2) Days 8 -12 (3) Days 16- 28 (4) Days 13- 15 (ii) Explain the role of ovarian and pituitary hormones during the following time periods : (1) Days 8- 12 (2) Days 13 -15 (3) Days 16- 28	**5**
Q.32	(i) A true breeding pea plant with yellow and round seeds is crossed with a recessive pea plant having green and wrinkled seeds. Work out the cross up to F2generation giving the phenotypic ratios of F1 and F2 generation respectively. (ii) State the Mendelian principle that can be derived only with the help of such a cross.	**5**
Q 33	a)In pBR322, foreign DNA has to be introduced in tetR region. From the restriction enzymes given below, which one should be used and why?**PvuI, EcoRI, BamHI.**Give reasons why the other two enzymes cannot be used. b)Identify the type of given ecological pyramid and give one example each pyramid of number and pyramid of Biomass in such cases.  c) Describe Rivett proper hypothesis.	**5**

BIOLOGY-- XII Set A

DECEMBER EXAMINATION(24)

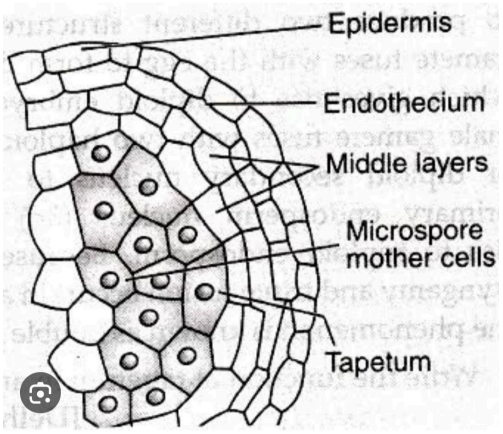
ANSWER KEY AND MARKING SCHEME

SECTION A

Q 1	C	**1**
Q 2	D	**1**
Q 3	C	**1**
Q 4	C	**1**
Q.5	A	**1**
Q 6	B	**1**
Q 7	D	**1**
Q 8	B	**1**
Q.9	B	**1**
Q.10	B	**1**
Q.11	A	**1**
Q.12	C	**1**
Q 13	C	**1**
Q.14	C	**1**
Q.15	A	**1**
Q.16	A	**1**

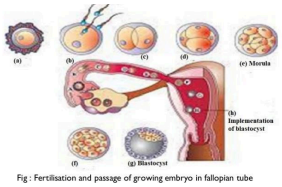
SECTION-B

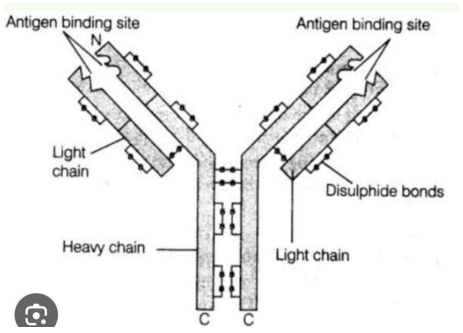
Q 17	a)Criteria Benign tumour Malignant tumour LocationConfined to the area of origin Present at different regions Severity Less More Metastasis Does not show metastasis Shows metastasis b) The characteristic of metastasis has to be the most feared property of malignant tumours. These are cancerous in nature, grow and spread quickly to other normal tissues of the body. This is metastasis.	**1.5** **½**

Q.18	 Provide nourishment to developing pollen grains	**1.5** **.5**
Q.19	A)**The limitations of ecological pyramids are** ● It does not take into account the same species belonging to two or more trophic levels. ● Saprophytes are not given any place in ecological pyramids. ● It assumes a simple food chain and does not accommodate a food web. B)Although India has only 2.4 per cent of the world's land area. But its share of the global species diversity is an impressive 8.1 percent. That is what makes our country one of the 12 megadiversity countries of the world. Nearly 45,000 species of plants and twice as many animals have been recorded from India.	**1** **1**
Q.20	After addition of lactose, complete breakdown of lactose to glucose and galactose takes place. Therefore, there is no more lactose to bind to the repressor protein and the lac operon shuts down. A very low level of expression of lac operon has to be present in the cell all the time, otherwise lactose cannot enter the cell	**1** **1**
Q.21	Positively charged basic histone proteins combine to form a unit of molecules called the histone cluster. - DNA is wrapped around the histone cluster to form a nucleosome. - Many such nucleosomes repeat to form a bead-in-a-string structure called the chromatin which are thread-like bodies. - The chromatin is further packaged with the help of non-histone chromosomal proteins to fit into the nucleus.	½ ½ ½ ½

SECTION- C

Q.22	a) x to x' is 5′———— > 3′ No more amino acids will be added (b) GCA, Anticodon is CGU (c) The untranslated regions are required for an efficient translation process. They are present before the initiation codon at the 5' end and after the stop/termination codon, at the 3'	½ ½ **1** **1**
Q.23	The embryo with 8 to 16 blastomeres is called a morula. The morula continues to divide and transforms into blastocyst as it moves further into the uterus.The blastomeres in the blastocyst are arranged into an outer layer called trophoblast and An inner group of cells attached to trophoblast called the inner cell mass.The trophoblast layer then gets attached to the endometrium and the inner cell mass gets differentiated as the embryo.After attachment, the uterine cells divide rapidly and covers the blastocyst. As a result, the blastocyst becomes embedded in the endometrium of the uterus. This is called	**2**

	implantation and it leads to pregnancy.  Fig : Fertilisation and passage of growing embryo in fallopian tube	**1**
Q 24	(a) Primates were Dryopithecus and Ramapithecus that lived 15 million years ago. (i) They were hairy and walked like gorillas and chimpanzees. (ii) Ramapithecus was more man-like. b)Ethiopia and Tanzania 3.5 million years ago c)Brain Size: Homo habilis had a smaller brain, with an average size of about 600-700 cubic centimeters. Homo erectus had a larger brain, averaging about 900 cubic centimeters. 3. Body Size: Homo habilis was smaller and less human-like in body proportions, with shorter legs and longer arms. Homo habilis had a mixed diet of meat and fruits, whereas, Homo erectus diet consisted of major meat. H. habilis didn't use tools whereas, H. erectus used tools for hunting and gathering.	**1** **1** **1**
Q.25	The process of double fertilization in angiosperms involves the fusion of two male gametes with a female gametophyte, or embryonic sac. The process is complex and can be summarized as follows: Pollen germination: Pollen grains land on the stigma of the flower and germinate, forming a pollen tube. Pollen tube growth: The pollen tube grows down through the style, guided by chemicals released by the egg. Pollen tube entry: The pollen tube enters the ovule through the micropyle. Sperm cell release: The pollen tube releases two sperm cells into the embryonic sac. Fertilization: One sperm cell fertilizes the egg cell to form a diploid zygote, and the other sperm cell fuses with two polar nuclei to form a triploid endosperm. End products: The zygote grows into an embryo, and the endosperm provides nourishment for the embryo. The embryo and endosperm are protected by a seed coat, forming a seed. The process is called double fertilization because it involves two types of fusion: syngamy (the fusion of sperm with an egg) and triple fusion (the fusion of sperm with two polar nuclei).	**1/2×6=3**
Q.26	**A** Denaturation **B** Annealing **C** Extension **A** denaturation, in which double-stranded DNA templates are heated to separate the strands; **B** annealing, in which short DNA molecules called primers bind to flanking regions of the target DNA; **C** extension, in which DNA polymerase extends the 3′ end of each primer along the template strands.	**½+½+½** **½** **½** **½**
Q.27	(a)Humoral immunity This type of immunity is activated by B cells and produces	

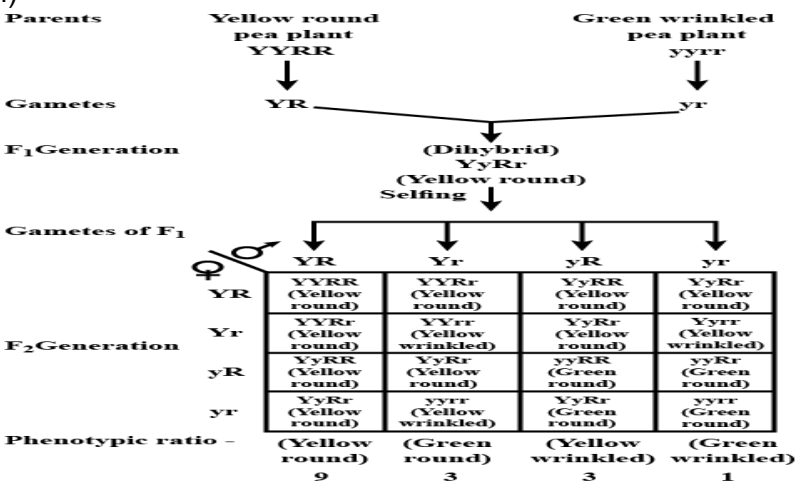
	antibodies that bind to antigens. Humoral immunity is also known as antibody-mediated immunity. It's effective against extracellular microorganisms and poisons, and develops quickly. Humoral immunity is mainly found in the blood, spleen, and lymph nodes. Cell-mediated immunity This type of immunity is activated by T cells and doesn't produce antibodies. It's effective against intracellular microorganisms and tumour cells, and takes longer to develop than humoral immunity. Cell-mediated immunity involves the activation of macrophages .	1
	b) 	2
Q 28	Population control: Predators keep prey populations in check, which is known as biological control. For example, wolves can prevent beavers from damming streams and turning forests into wetlands. Biodiversity maintenance: Predators reduce competition among prey species, which helps maintain biodiversity. Ex-Sea stars: Sea stars eat mussels in areas without natural predators. If sea stars are removed from an ecosystem, the mussel population would increase, which could negatively affect other species in the ecosystem. Energy transfer: Predators act as conduits for energy transfer across trophic levels. Ex-The herbivores feed on plants and energy from plants is transferred to herbivores. The herbivores can be called as predators of plants.	1 1 1

SECTION-D

Q 29	a). Farm Land II. Bt crop. Because the use of pesticides is highly reduced for Bt crop // Decrease of pesticide used is also more significant for Bt crop. b). In Bt cotton a cry gene has been introduced from bacterium Bacillus thuringiensis (Bt) which causes synthesis of a toxic protein. This protein becomes active in the alkaline gut of	½ ½ ½

	bollworm feeding on cotton, punching holes in the lining causing the death of the insect. However; a Non Bt crop will have no effect on the cotton bollworm/ the yield of cotton will decrease / non Bt will succumb to pest attack.	**2** **½**
Q.30	a) Vigorous growth of useful aerobic microbes into flocs. b) Activated sludge some of it is pumped back into the aeration tank to serve as the inoculum c) During this digestion, a mixture of gases such as methane, hydrogen sulphide i and carbon dioxide are formed. These gases form biogas. Anaerobic sludge digester	**1** **½** **½** **1** **1**

SECTION-E

Q.31	i) 1 Menstrual 2 follicular 3 Luteal 4 Ovulatory ii) The menstrual cycle is a natural process that's controlled by female hormones and has four phases: menstruation, the follicular phase, ovulation, and the luteal phase. The concentration of the sex hormones estrogen and progesterone changes in each phase. Menstruation The first day of a period, which is characterized by low levels of estrogen and progesterone. If conception doesn't occur, both hormones decrease, which can trigger PMS symptoms. As the cycle ends, progesterone levels rise, triggering uterine contractions that shed the uterine lining and cause a period. Menstrual bleeding usually lasts 4–8 days and involves a blood loss of 1/5–2 1/2 ounces. Follicular phase The pituitary gland produces follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which stimulate the ovaries to produce estrogen and progesterone. Estrogen inhibits further production of FSH and LH, but rising estrogen levels can also make the pituitary more responsive to GnRH from the hypothalamus, which causes the pituitary to secrete more FSH and LH. This surge of FSH and LH usually happens one to two days before ovulation. Ovulation The surge of FSH and LH stimulates the rupture of the antral follicle and the release of the oocyte. Luteal phase Oestrogen and progesterone stimulate the uterus and breasts to prepare for possible fertilization.	**2** **1+1+1**
Q.32	i)  ii) Law of independent assortment	**3** **1** **1**
Q 33	a)Bam HI should be used, as restriction site for this enzyme is present in tetR region PvuI will not be used, as restriction site for this enzyme is present in	**½** **½**

	ampR region not in tetR EcoRI will not be used, as restriction site for this enzyme is not present in selectable marker tetR b) inverted ecological pyramid Pyramid of number in a tree ecosystem and pyramid of Biomass in a lake c)The Rivet Popper Hypothesis was proposed by Paul Ehrlich. The hypothesis suggests the importance of species richness in the maintenance of the ecosystem. The rivets of an aeroplane were compared with species in an ecosystem. If the passengers start to pop the rivets from the wings of the aeroplane, the aeroplane will not be able to perform its flight. So, if the species present in an ecosystem are reduced, the ecosystem will collapse.	½ ½ ½+½ **1/2×4=2**

OSDAV Public School, Kaithal

December Examination (2024-25)

Class : XII

Subject : Biology

SET- B

Time: 3 Hrs .

M.M. : 70

General Instructions:

(i)All questions are compulsory.

(ii)The question paper has five sections and 33 questions. All questions are compulsory.

(iii)Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.

(iv)There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v)Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION- A

Q 1	Crickets are insects that follow the XO type of sex determination. Which of the following statements is ALWAYS TRUE about this type of sex determination? (a) Eggs that have an O chromosome will give rise to a male cricket. (b) Eggs that have an X chromosome will give rise to a female cricket. (c) Sperms that have an X chromosome will give rise to a male cricket. (d) Sperms that have an O chromosome will give rise to a male cricket.	**1**
Q.2	Choose the option that gives the correct number of pollen grains that will be formed after 325 microspore mother cells undergo microsporogenesis. (a) 325 (b) 650 (c) 1300 (d) 975	**1**
Q.3	Given below are the steps carried out to construct a recombinant DNA. Which one of the following gives the correct sequence of these steps ? (i) Isolation of genetic material (ii) Insertion of recombinant DNA in the host cell / organism (iii) Obtaining the foreign gene product (iv) Amplification of gene of interest (v) Downstream processing (a) (i) (iii) (iv) (ii) (v) (b) (i) (iv) (ii) (iii) (v) (c) (ii) (i) (iii) (iv) (v) (d) (ii) (iv) (v) (iii) (i)	**1**
Q.4	Which one of the following pairs is not correctly matched ? (A) Clostridium butylicum- Butyric acid (B) Trichoderma polysporum -Cyclosporine A (C) Monascus purpureus- Citric Acid (D) Streptococcus -Streptokinase	**1**
Q.5	In certain diseased conditions such as pneumonia, the fingernails of an individual turn blue.What could be the reason for this? A. blood does not reach fingernails due to an increase in fat content around the fingernails B. nails become cold due to a decrease in fat content around the fingernails C. reduced levels of oxygen in the blood D. increase in oxygen levels in the blood	**1**
Q.6	Apis mellifera are killer bees possessing toxic bee venom. Identify the treatment and the type of immunity developed from the given table to treat a person against the venom of this bee. Remedy — Immunity (a)Inactivated proteins — Active (b)Proteins of the venom — Passive (c)Preformed antibodies — Passive (d)Dead microorganisms — Active	**1**
Q 7	Which of the following water samples in the table given below, will have a higher concentration of organic matter?	

		1

Water Sample	*Level of pollution*	*Value of BOD*
(a)	High	High
(b)	Low	Low
(c)	Low	High
(d)	High	Low

Q.8 Which of the following samples of DNA in the table given below will give the desired result during polymerase chain reaction ? **1**

	Sample	Temperature used for Denaturation	Enzyme used for extension
(a)	I	High temp. / 90°C	Heat stable
(b)	II	Low temp. / 50°C	Heat stable
(c)	III	Low temp. / 50°C	Heat resistant
(d)	IV	High temp. / 90°C	Heat unstable

Q 9 Which of the following is correct about mature RNA in eukaryotes? **1**
A. Exons and introns do not appear in the mature RNA.
B. Exons appear, but introns do not appear in the mature RNA.
C. Introns appear, but exons do not appear in the mature RNA.
D. Both exons and introns appear in the mature RN

Q.10 Which one among the following biofertilizers does not fix atmospheric nitrogen ? **1**
(a) Oscillatoria (b) Rhizobium (c) Azospirillum (d) Glomus

Q.11 Consider three plants with the following modes of pollination: **1**
Plant P: autogamy Plant Q: xenogamy Plant R: geitonogamy
Which of the above case/s is/are most likely to NOT show genetic variation in offspring?
A. only P B. only Q C. only P and R D. only Q and R

Q.12 Examples that show commensalism are : **1**
(i) An orchid growing on mango tree (ii) Cuckoo bird and crow
(iii) Cuscuta growing on Nerium tree (iv) Barnacles growing on a whale
(a) (i) and (ii) (b) (i) and (iv) (c) (ii) and (iii) (d) (ii) and (iv)

Q.No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:
A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true

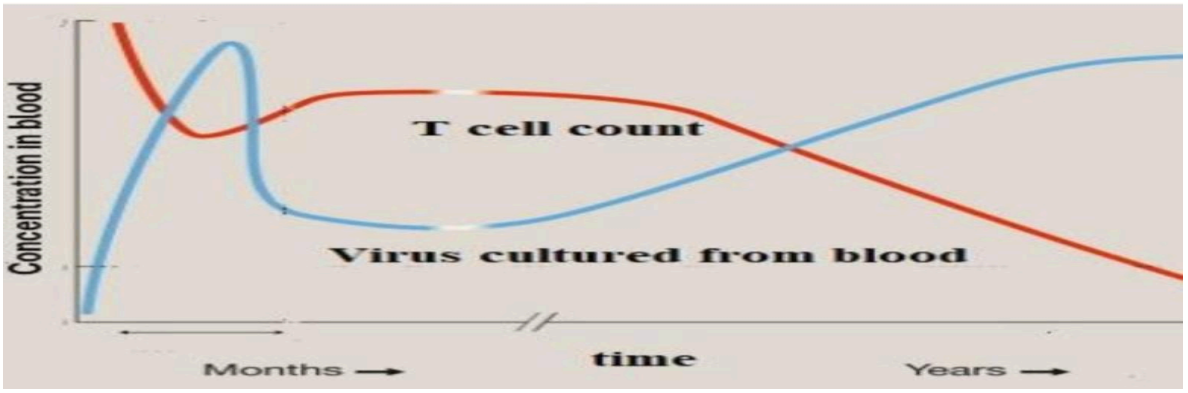
Q.13 **Assertion** : A species of wasp and a fig species cannot complete their life cycle without each other. **1**
Reason : While visiting wasps come to lay eggs in the fig inflorescence, the flower of wasp gets pollinated in return.

Q 14 **Assertion** : For sequencing, the total DNA from a cell is isolated and converted into random fragments **1**
Reason : DNA is a very long polymer.

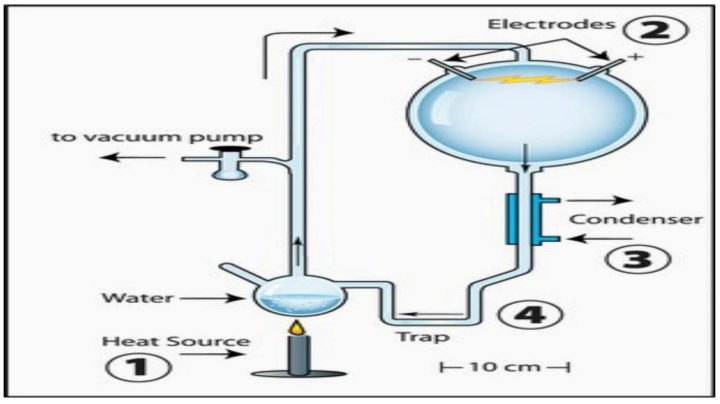
Q.15 **Assertion**: Cellular defence mechanism in eukaryotes is RNAi. **1**
Reason: RNAi is silencing of a specific tRNA.

Q 16 **Assertion** : Loss of biodiversity can occur due to overexploitation of resources. **1**
Reason : Introduction of Clarias gariepinus in Indian rivers has led to a decline in native Indian fishes

SECTION-B

Q.17	Given below is the relationship between the HIV levels in the blood and helper T cell count in a person detected with AIDS. Study the relationship and answer the questions that follow.  A. What kind of relationship is observed in the virus levels and the immune response after some days of the initial infection? B. Does it completely clear the virus from the body permanently? Give reason for your answer	**2**
Q 18	Comment upon the mode of pollination in Vallisneria and Eichhornia which have emergent flowers.	**2**
Q.19	Thalassemia is an autosomal recessive disorder that causes anaemic conditions in an individual. A blood smear from a heterozygous individual shows blood cells that are small, pale and irregularly shaped along with normal RBCs. (a) State the genotypic and phenotypic ratios of offspring born to a carrier mother and a thalassemic father. (b) Does the allele for thalassemia exhibit codominance? Justify.	**2**
Q.20	Describe the phenomenon of adaptive radiation as explained by Darwin.	**2**
Q.21	a) In a pond there were 200 frogs. 40 more were born in the year. Calculate the birth rate of the population. b) Population in terms of number is not always a necessary parameter to measure population density. Justify with two examples	**2**

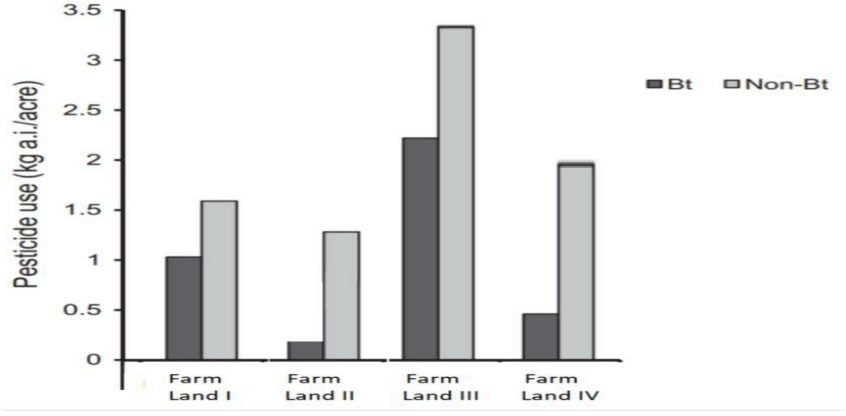
SECTION- C

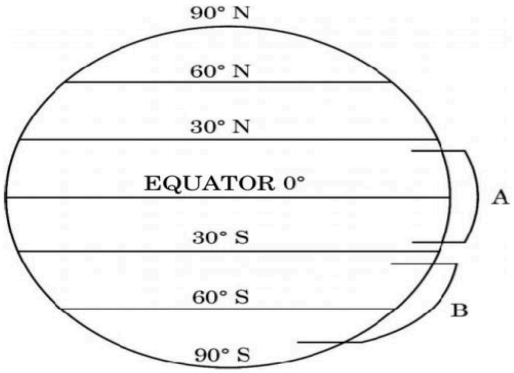
Q.22	Treatment of wastewater is done in a sewage treatment plant to make it less polluting. Explain the following with reference to this treatment process : (a) Primary sludge (b) Activated sludge (c) Anaerobic sludge digesters	**3**
Q.23	A)The embryo sac in the female gametophyte is seven celled and eight nucleated. Justify the statement with the help of a labelled diagram. B)List two changes that occur when an ovule matures into seed	**3**
Q.24	 a.) State the hypothesis which S.L. Miller tried to prove in the laboratory with the help of the set up given above.	**3**

	b.)Name the organic compound observed by him in the liquid water after running the experiment. c.) A scientist simulated a similar set up and added CH4,NH3 and water vapour at 800 °C. Which important component is missing in his experiment.	
Q.25	A)Parturition is induced by a complex Neuro endocrine mechanism'. Justify B)Kavya says that the placenta produces relaxin which plays a crucial role during pregnancy.Is she correct? Justify.	**3**
Q 26	Explain how PCR technique can be used for amplification of a small amount of DNA template.	**3**
Q.27	Name the source plant and one effect of the following drugs on the human body : (1) Marijuana (2) Cocaine (3) Morphine	**3**
Q.28	Identify A, B, C, D, E and F in the table given below :	**3**

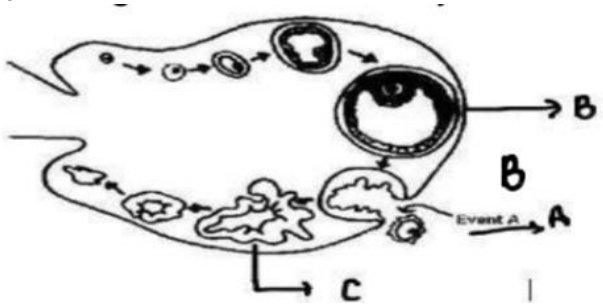
Name of Human Disease	*Causative Organism*	*Symptoms*
Pneumonia	*Streptococcus*	'A'
Typhoid	'B'	High fever, weakness, headache, stomach pain
Common cold	Rhino virus	'C'
Ringworm	'D'	Dry scaly lesions on body parts, redness, itching
Ascariasis	*Ascaris*	'E'
'F'	*Entamoeba histolytica*	Constipation, cramps, stools with mucous and blood clots

SECTION- D

Q.29	**CASE STUDY BASED QUESTION** GM crops especially Bt crops are known to have higher resistance to pest attacks. To substantiate this an experimental study was conducted in 4 different farmlands growing Bt and non Bt-Cotton crops. The farm lands had the same dimensions, fertility and were under similar climatic conditions. The histogram below shows the usage of pesticides on Bt crops and non-Bt crops in these farm lands.  a). Which of the above 4 farm lands has successfully applied the concepts of Biotechnology to show better management practices and use of agrochemicals? If you had to cultivate, which crop would you	**4**

	prefer (Bt or Non- Bt) and why? b.) Cotton Bollworms were introduced in another experimental study on the above farm lands wherein no pesticide was used. Explain what effect would a Bt and Non Bt crop have on the pest.	
Q.30	Study the diagrammatic representation given below of the Earth with region A to B.Answer the questions that follow.  (a) Write the observations made regarding the species diversity when moving from A to B.Give three reasons also. (b) Stating the reason, mention the approximate number of bird species recorded in India. (c) Name the region in the world that records the greatest biodiversity.	4

SECTION- E

Q.31	A)The figure below shows the sequence of changes within the ovary that occur during the menstrual cycle.  a) Name the process A. Name the hormone that plays an important role during this event. b) Identify B and name the hormone that regulates the maturation of B. c) Identify and write the function of C. B) Explain how pituitary hormones influence the activity of Leydig cells and Sertoli cells present in human testes.	**5**
Q.32	Aneuploidy of chromosomes in human beings results in certain disorders. Draw out the possibilities of the karyotype in common disorders of this kind in human beings and its consequences in individuals.	**5**
Q 33	a)In pBR322, foreign DNA has to be introduced in tetR region. From the restriction enzymes given below, which one should be used and why?**PvuI, EcoRI, BamHI.**Give reasons why the other two enzymes cannot be used. b)  Identify the type of given ecological pyramid and give one example each pyramid of number and pyramid of Biomass in such cases c) Describe Rivett proper hypothesis.	**5**

BIOLOGY-- XII Set B
DECEMBER EXAMINATION(24)
ANSWER KEY AND MARKING SCHEME
SECTION A

Q 1	D	**1**
Q 2	C	**1**
Q 3	B	**1**
Q 4	C	**1**
Q.5	C	**1**
Q 6	C	**1**
Q 7	A	**1**
Q 8	A	**1**
Q.9	B	**1**
Q.10	D	**1**
Q.11	C	**1**
Q.12	B	**1**
Q 13	A	**1**
Q.14	A	**1**
Q.15	C	**1**
Q.16	B	**1**

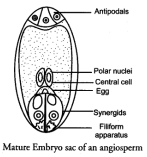
SECTION-B

Q 17	A. As the adaptive immune response gears up, there is a reciprocal relationship between virus levels in the blood and helper T lymphocytes levels. As the level of helper T levels rises, the virus levels decline. B. Several years later, if untreated, HIV patient will lose the adaptive immune response, including the ability to make antibodies, as gradually the HIV enters the helper T lymphocytes leading to a progressive decrease in the number of helper T lymphocytes.	**1** **1**
Q.18	In Eichhornia the flowers emerge above the level of water and are pollinated by insects or wind. In Vallisneria, the female flower reaches the surface of water by the long stalk and the male flowers or pollen grains are released onto the surface of water. They are carried passively by water currents; some of them eventually reach the female flowers and the stigma.	**1** **1**
Q.19	a)Genotypic ratio: 1:1 ratio of carriers:affected - Phenotypic ratio: 50% will not show major symptoms while 50% will show the symptoms. (b) - Yes - Since both proteins are produced/both types of RBCs are visible, it is	**½** **½** **1**

	codominance.	
Q.20	a)In general, species diversity decreases as we move from the equator towards the poles. ... i) Temperate latitudes have been subjected to frequent glaciations in the past. ii) Tropical environments are less seasonal. iii) More solar energy is available at the tropics in comparison to temperate and polar regions a) 1200 b) Amazonian rain forest Adaptive radiation is the evolutionary process by which many species originate from one species in an area and radiate to different species. The phenomenon of adaptive radiation was first observed by Darwin when he travelled to a place called Galapagos Island. There he observed that there were finches with different types of beaks. So, he concluded that all of these inches radiated on the same island from a single ancestor Finch. All of these finches developed beaks according to the kind of food available to them. Hence, they evolved from the conventional seed-eating finches to vegetarian and insectivorous finches. They later came to be known as Darwin's finches.	
Q.21	a) Birth rate = No of in individuals born Total no of individuals = 40 /200 = 0.5 frogs per year. b) Number is not always a necessary parameter to measure population density. Example – 1. If there are 200 Parthenium plants but only a single huge banyan tree with a large canopy, the population density of banyan is low relative to that of Parthenium which amounts to underestimating the enormous role of the Banyan in that community. In such cases, the percent cover or biomass is a more meaningful measure of the population size. 2. In a dense laboratory culture of a microbial population in a petri dish, the total number of microbes is again not an easily adoptable measure because the population is huge, counting is impossible and time-consuming.	**1** ½ ½

SECTION- C

Q.22	The **treatment of wastewater** in a sewage treatment plant involves multiple processes to make it less polluting.(a) Primary sludge is the solid material that settles to the bottom during the primary treatment process. This sludge contains organic matter and is removed and treated separately from the wastewater. (b) Activated sludge refers to a mixture of microorganisms, such as bacteria and protozoa, that are added to the wastewater to break down organic pollutants. The activated sludge process involves aerating the wastewater to provide oxygen for the	**1+1+1**

	microorganisms to thrive and degrade the pollutants. (c) Anaerobic sludge digesters are tanks where the primary and activated sludge are further treated under anaerobic conditions. In these digesters, bacteria break down the organic matter in the sludge, producing biogas (mainly methane) and stabilising the sludge.	
Q.23	A)The typical female gametophyte or embryo sac has three cells that are grouped together at the micropylar end and constitute the egg apparatus. The egg apparatus, in turn, consists of two synergids and one egg cell. Three cells are at the chalazal end and are called the antipodals. The large central cell has two polar nuclei. Thus, a typical angiosperm embryo sac, at maturity is 8-nucleate is 7-celled.  Mature Embryo sac of an angiosperm B) Integuments of ovules harden as tough protective seed coats The micropyle remains as a small pore in the seed coat As the seed matures, its water content is reduced Seeds become relatively dry (10-15 per cent moisture by mass). The general metabolic activity of the embryo slows down. The embryo may enter a state of inactivity called dormancy(Any two)	**1** **1** **1**
Q 24	a)Chemical evolution – First form of life originated from pre-existing non-living organic molecules. b.) Amino acids c.) H2	**1** **1** **1**
Q.25	A)Parturition is a process where vigorous contraction of the uterus at the end of pregnancy causes expulsion/delivery of the foetus. The signals for parturition originate from the fully developed foetus and the placenta which induce mild uterine contractions called foetal ejection reflex. This triggers release of oxytocin from the maternal pituitary. Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin. The stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contractions.This leads to expulsion of the baby out of the uterus through the birth canal – parturition, after the infant is delivered; the placenta is also expelled out of the B)No she is not correct. - Relaxin is produced by the ovaries and not the placenta.	**1/2×4=2** **½+½**
Q.26	PCR stands for Polymerase Chain Reaction. In this reaction, multiple copies of the gene (or DNA) of interest are synthesised in vitro using two sets of primers (small chemically synthesised oligonucleotides that	**½+½+½** **1**

	are complementary to the regions of DNA) and the enzyme DNA polymerase. The enzyme extends the primers using the nucleotides provided in the reaction and the genomic DNA as a template. If the process of replication of DNA is repeated many times, the segment of DNA can be amplified approximately billion times, i.e., 1 billion copies are made. Such repeated amplification is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, Thermus aquaticus), which remains 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. Each cycle has three steps: (i) Denaturation, (ii) Annealing and (iii)Extensions.	**1** **1**
Q.27	1)Marijuana refers to the dried leaves, flowers, stems, and seeds from the Cannabis sativa or Cannabis indica plant. Cannabinoids produce a marked depression of motor activity via activation of receptors of cannabinoid receptor type 1. 2.Cocaine is an alkaloid extract from the Erythroxylum coca plant that is abused for its euphoric and stimulatory effects and has significant adverse impact on the cardiovascular system, including direct vasoconstrictor effects 3.Morphine is the active principle of opium. It is the most valuable analgesic. It causes addiction. It is obtained from papaver somniferum.	**1** **1** **1**
Q 28	A cough with phlegm or pus, fever, chills and difficulty breathing. B Salmonella typhi C runny nose, sneezing and congestion D Microsporum,Trichophyton,Epidermophyton E Abdominal pain, bloating, nausea, vomiting, diarrhoea, and passing worms in stool F Amoebiasis	**1** **1** **1**

SECTION-D

Q 29	a). Farm Land II. Bt crop. Because the use of pesticides is highly reduced for Bt crop // Decrease of pesticide used is also more significant for Bt crop. b). In Bt cotton a cry gene has been introduced from bacterium Bacillus thuringiensis (Bt) which causes synthesis of a toxic protein. This protein becomes active in the alkaline gut of bollworm feeding on cotton, punching holes in the lining causing the death of the insect. However; a Non Bt crop will have no effect on the cotton bollworm/ the yield of cotton will decrease / non Bt will succumb to pest attack.	½ ½ ½ **2** ½
Q.30	a)In general, species diversity decreases as we move from the equator towards the poles. ... i) Temperate latitudes have been subjected to frequent glaciations in the past. ii) Tropical environments are less seasonal. iii) More solar energy is available at the tropics in comparison to temperate and polar regions b)1200 c)Amazonian rain forest	 **2** **1** **1**

SECTION-E

Q.31	A)a) Ovulation - LH b) Graafian Follicle- Estrogen c) Corpus Luteum- produces progesterone B) LH acts on Leydig cells and causes them to release androgens, which stimulate the process of spermatogenesis while the FSH acts on the Sertoli cells, which helps in spermiogenesis.	**1** **1** **1** **1** **1**
Q.32	Down's syndrome, Turner's syndrome, Klinefelter's syndrome are common examples of Aneuploidy of chromosomes in human beings. Down's syndrome results in the gain of extra copy of chromosome 21- trisomy. Turner's syndrome results due to loss of an X chromosome in human females- X0 monosomy. Klinefelter's Syndrome is caused due to the presence of an additional copy of X Chromosome resulting in XXY condition. Down's Syndrome: 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. (any two) Klinefelter's Syndrome: The affected individual is a male with development of breast, i.e., Gynecomastia Such individuals are sterile. Turner's Syndrome: The affected individual shows following characters- Females are sterile as ovaries are rudimentary lack of other secondary sexual characters	½ ½ ½ ½ **½+½** **½+½** **½+½**
Q 33	a)Bam HI should be used, as restriction site for this enzyme is present in tetR region PvuI will not be used, as restriction site for this enzyme is present in ampR region not in tetR EcoRI will not be used, as restriction site for this enzyme is not present in selectable marker tetR b) inverted ecological pyramid Pyramid of number in a tree ecosystem and pyramid of Biomass in a lake c)The Rivet Popper Hypothesis was proposed by Paul Ehrlich. The hypothesis suggests the importance of species richness in the maintenance of the ecosystem. The rivets of an aeroplane were compared with species in an ecosystem. If the passengers start to pop the rivets from the wings of the aeroplane, the aeroplane will not be able to perform its flight. So, if the species present in an ecosystem are reduced, the ecosystem will collapse.	½ ½ ½ ½ **½+½** **1/2×4=2**