Sample Question Paper
Class XII (2019-20)
Biology (044)

Time allowed: 3 hrs. **Maximum Marks: 70**

General Instructions:

1. There are a total of 27 questions and five sections in the question paper. All questions are compulsory.
2. Section A contains question numbers 1 to 5, multiple choice questions of one mark each.
   Section B contains question numbers 6 to 12, short answer type I questions of two marks each.
   Section C contains question numbers 13 to 21, short answer type II questions of three marks each.
   Section D contains question number 22 to 24, case-based short answer type questions of three marks each.
   Section E contains question numbers 25 to 27, long answer type questions of five marks each.
3. There is no overall choice in the question paper. However, internal choices are provided in two questions of one mark, one question of two marks, two questions of three marks and all three questions of five marks. An examinee is to attempt any one of the questions out of the two given in the question paper with the same question number.

SECTION – A

1. Androgens are synthesized by: 1
   a.) Sertoli Cells
   b.) Leydig cells
   c.) Seminal vesicles
   d.) Bulbourethral gland

OR

A procedure that finds use in testing for genetic disorders, but is also misused for female foeticide is:
   a.) Lactational amenorrhea
   b.) Amniocentesis
   c.) Artificial insemination
   d.) Parturition

2. Which type of immune response is responsible for the rejection of tissues/organs in the patient's body post transplantation? 1
   a.) auto-immune response
   b.) humoral immune response
   c.) physiological immune response
   d.) cell-mediated immune response

OR

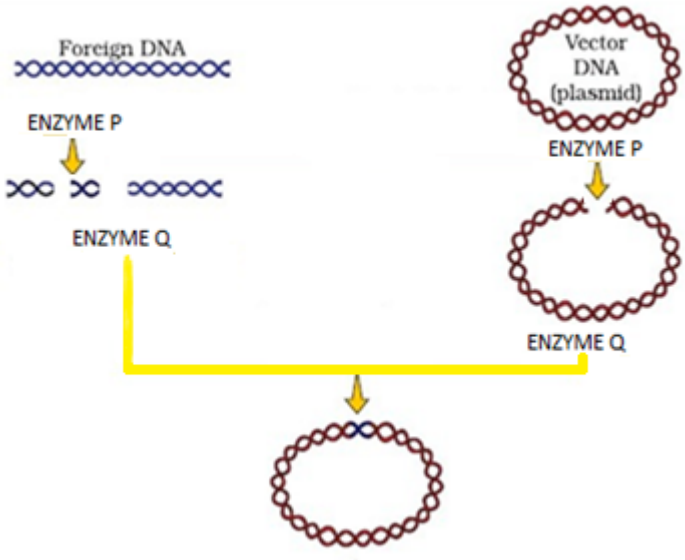
Rheumatoid arthritis is caused when . . .

i.) Lymphocytes become more active
ii.) Body attacks self cells
iii.) More antibodies are produced in the body
iv.) The ability to differentiate pathogens or foreign molecules from self-cells is lost

Choose the correct answer from the options given below:

a.) i and ii
b.) iii and iv
c.) i and iii
d.) ii and iv

3. Name the enzymes 'P' and 'Q' that are involved in the processes given below. 1



a.) Enzyme P-Exonuclease and Enzyme Q-Permease
b.) Enzyme P-Exonuclease and Enzyme Q- Ligase
c.) Enzyme P-Endonuclease and Enzyme Q- Permease
d.) Enzyme P-Restriction endonuclease and Enzyme Q-Ligase

4. A biotechnologist wanted to create a colony of *E.coli* possessing the plasmid pBR322, sensitive to Tetracycline. Which one of the following restriction sites would he use to ligate a foreign DNA? 1

a.) Sal I
b.) Pvu I
c.) EcoRI
d.) Hind III

5. The most important cause of biodiversity loss is: 1

a.) Over exploitation of economic species
b.) Habitat loss and fragmentation
c.) Invasive species
d.) Breakdown of plant-pollinator relationships

SECTION B

6. How does an encysted *Amoeba* reproduce on return of favourable conditions? 2

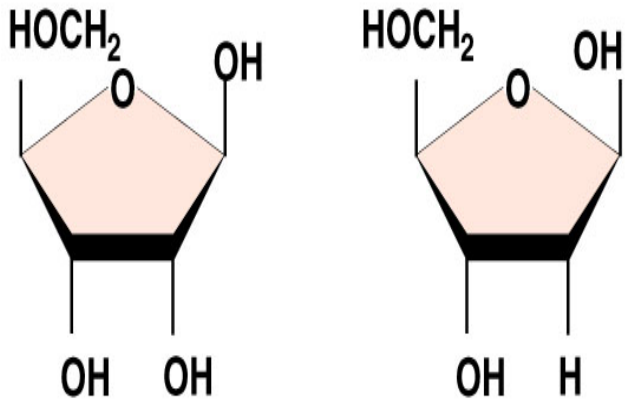
OR

What are gemmules and conidia? Name one organism each in which these are formed?

7. Name any two copper releasing IUD's. State how they act as a contraceptive. 2

8. Why is it not possible to study the pattern of inheritance of traits in human beings, the same way as it is done in pea plant? Name the alternate method employed for such an analysis of human traits. 2

9. Carefully examine structures A and B of pentose sugar given below. Which one of the two is more reactive? Give reasons. 2



A B

10. Name the technology and write the procedure that can help a scientist to recover virus free sugarcane plants from diseased canes for his crop breeding experiments. 2

11. Explain the events that occur in the host cell on introduction of nematode-resistant gene into the tobacco plant by using *Agrobacterium* vectors. 2

12. Construct a pyramid of biomass starting with phytoplankton. Label its three trophic levels. Is the pyramid upright or inverted? Justify your answer. 2

SECTION C

13. Draw a well-labelled diagram of L.S of a pistil of a flower showing the passage of growing of pollen tube up to its destination. 3

14. How does gain or loss of chromosome(s) takes place in humans? Describe one example each of chromosomal disorder along with the symptoms involving an autosome and a sex chromosome. 3

OR

A small stretch of DNA strand that codes for a polypeptide is shown below:
3'--- --- --- --- CAT CAT AGA TGA AAC--- --- --- --- 5'

a.) Which type of mutation could have occurred in each type resulting in the following mistakes during replication of the above original sequence?

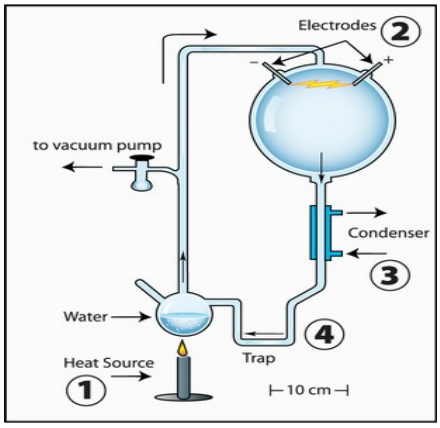
i. 3`… … … …CAT CAT AGA TGA ATC… … …5`

ii. 3`… … … …CAT ATA GAT GAA AC… … … 5`

b.) How many amino acids will be translated from each of the above strands i) and ii)?

15. "Apomixes is a form of asexual reproduction that mimics sexual reproduction in plants". Explain with the help of a suitable example. 3

16. 3



a.) State the hypothesis which S.L. Miller tried to prove in the laboratory with the help of the set up given above.

b.) Name the organic compound observed by him in the liquid water at the end of his experiment.

c.) A scientist simulated a similar set up and added CH_4, NH_3 and water vapour at 800℃. Mention the important component that is missing in his experiment?

17. a.) Study the table given below and identify (i), (ii), (iii) and (iv) 3

Amino acid	**Phe**	**Val**
DNA Code in Gene	AAA	CAC
Codon in mRNA	(i)	(ii)
Anticodon in tRNA	(iii)	(iv)

b.) A polypeptide consists of 14 different amino acids.

i) How many base pairs must be there in the processed mRNA that codes for this polypeptide?

ii) How many different types of tRNA are needed for the synthesis of this polypeptide?

18. How is inbreeding advantageous as well as disadvantageous in cattle breeding programme? (Mention any **two** advantages and **two** disadvantages) 3

19. "Specific Bt Toxin gene is incorporated into cotton plant so as to control infestation of Bollworm". Mention the organism from which the gene was isolated and explain its mode of action. 3

20. State any two criteria for determining biodiversity hotspots. Name any two hotspots designated in India. 3

OR

Differentiate between in-situ and ex-situ approaches for conserving biodiversity. Give an example for each.

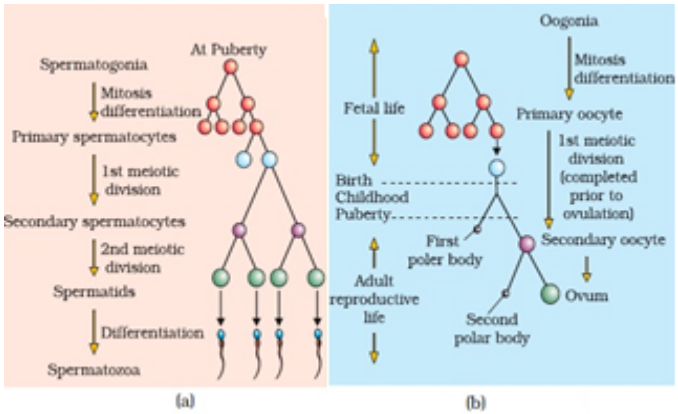
21. When the gene product is required in large amounts, the transformed bacteria with the plasmid inside the bacteria are cultured on a large scale in an industrial fermenter which then synthesizes the desired protein. This product is extracted from the fermenter for commercial use. 3

a.) Why is the used medium drained out from one side while fresh medium is added from the other? Explain.

b.) List any four optimum conditions for achieving the desired product in a bioreactor.

SECTION D

22. 3

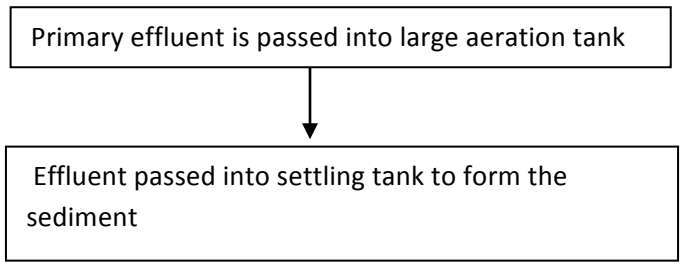


With reference to the above schematic representation of *(a)* Spermatogenesis and *(b)* Oogenesis answer the following questions:

a.) About 300 million spermatozoa may be present in a human male ejaculation at one time. Calculate how many spermatocytes will be involved to produce 300 spermatozoa.

b.) How many chromatids are found during Oogenesis in (i) Primary oocyte and (ii) First polar body in a human female?

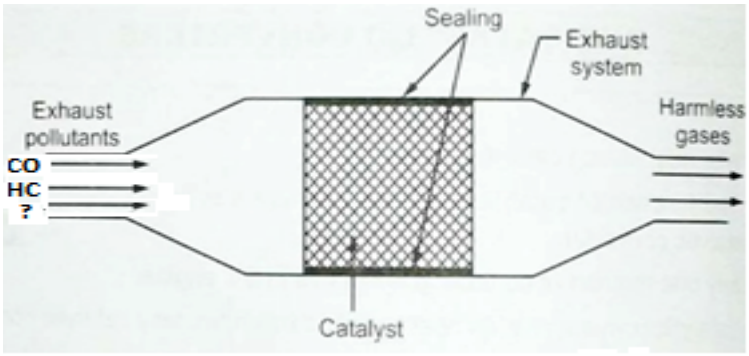
23. Large quantities of sewage is generated everyday in cities and towns, which is treated in Sewage Treatment Plants (STPs) to make it less polluted. Given below is the flow diagram of one of the stages of STP. 3
Observe the given flow diagram and answer the questions accordingly.



a.) Why primary effluent is passed into large aeration tanks?
b.) Write the technical term used for the sediment formed? Mention its significance.

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

24. 3



Observe the diagram of the catalytic converter and answer the questions which follow:

a.) Name any two metals used as catalyst in the catalytic converter.

b.) Name the gases that are released after passing the exhaust hydrocarbons through the catalytic converter.

c.) Name the other poisonous gas which is missing *(?)* in the exhaust pollutant of an automobile in the above diagram?

SECTION E

25. Certain phenotypes in human population are spread over a gradient and reflect the contribution of more than two genes. Mention the term used for the type of inheritance? Describe it with the help of an example in human population. 5

OR

Summarize the process by which the sequence of DNA bases in Human Genome Project was determined using the method developed by Frederick Sanger. Name a free living non-pathogenic nematode whose DNA has been completely sequenced.

26. a.) What is mutation breeding? Give an example of a crop and disease to which resistance was induced by this method. 5

b.) Differentiate between pisci-culture and aquaculture.

OR

a.) If a patient is advised anti-retroviral drug, name the possible infection he/ she is likely to be suffering from. Name the causative organism.

b.) How do vaccines prevent subsequent microbial infection by the same pathogen?

c.) How does a cancerous cell differ from a normal cell?

d.) Many microbial pathogens enter the gut of humans along with food. Name the physiological barrier that protects the body from such pathogens.

27. "Indiscriminate human activities have strengthened the greenhouse effect resulting in Global Warming." Give the relative contribution of various Green House Gases in the form of a pie chart and explain the fate of the energy of sunlight reaching the earth's surface contributing towards Global Warming. 5

OR

Given below is a table depicting population interactions between species A and species B.

Type of interaction	Species A	Species B
(a)	(-)	(+)
(b)	(+)	(-)

Name the types of interactions (a) and (b) in the above table.
Justify giving three reason, how the type of interaction (b) is important in an ecological context.

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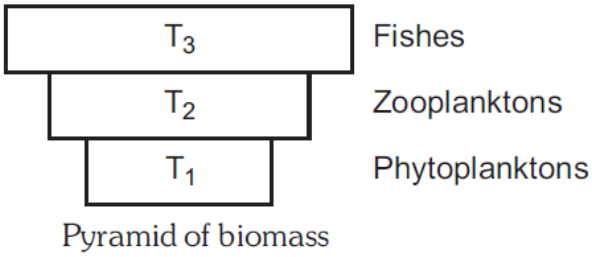
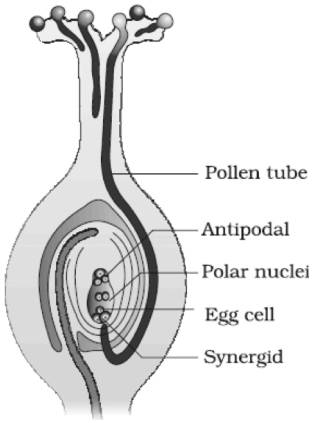
MARKING SCHEME
SAMPLE QUESTION PAPER
2019-20
CLASS XII (BIOLOGY)

TIME 3 HOURS **MM 70**

	Section – A	
1.	b) Leydig cells **OR** b)Amniocentesis	1
2.	d) Cell-mediated immune response **OR** d) ii and iv	1
3.	d) P enzyme is Restriction endonuclease and Q enzyme is ligase	1
4.	a) Sal I	1
5.	b) Habitat loss and fragmentation	1
	Section B	
6.	Encysted *Amoeba* divides by multiple fission / produces amoeba or pseudopodiospores /cyst wall bursts out/spores are liberated to grow as amoebae(sporulation) (½X4=2 Marks) **OR** Gemmule-asexual reproductive structure in sponges (½+½=1Mark) Conidia-asexual reproductive structure in *Penicillium*.(or any other correct example) (½+½ = 1Mark)	2
7.	CuT,Cu7,Multiload 375 (Any two) (½ and ½ =1Mark) Cu ions released suppresses sperm motility and the fertilizing capacity of sperms. (½ +½ =1 Mark)	2
8.	Control crosses cannot be performed in human beings, Alternate method-Pedigree analysis (study of the traits in several generations of a family). (1+1=2 Marks)	2
9.	A is more reactive ½ Mark **2′-OH group present in the pentose sugar** ½ Mark Makes it more labile/ catalytic and easily degradable. ½+½ =1 Mark	2
10.	• Tissue culture ½ Mark • Meristem apical or axillary is excised. ½ Mark • Explant grown in a test tube under sterile condition/special nutrient medium ½+½ = 1 Mark	2

11.	• RNA interference ½ Mark • silencing of a specific mRNA due to a complementary RNA ½ Mark • dsRNA/Introduction of DNA was such that it produced both sense/ and anti-sense RNA in the host cells/these two RNAs formed dsRNA that initiated RNAi 1 Mark	2
12.	 The pyramid is inverted because the biomass of fishes is much more than that of the zooplankton and phytoplankton. 1+1= 2 Marks	2
	Section C	
13.	 (Diagram =1 Mark) (Any four labellings ½ x 4=2)	3
14.	Failure of segregation of chromatids during cell division cycle results in the gain or loss of a chromosome(s) (**aneuploidy)** (1 Mark) Autosomes:- **Down's Syndrome:** The cause is the presence of an additional copy of the chromosome number 21 (trisomy of 21). (½ Mark) 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 one symptom ½ Mark) Sex chromosomes:- **Klinefelter's Syndrome** : This is caused due to the presence of an additional copy of X-chromosome resulting into a karyotype of 47, XXY. ½ Mark	3

	Such an individual has overall masculine development • has overall masculine development • feminine development is also expressed by the development of breast/ Gynaecomastia). Such individuals are sterile. (Any one symptom ½ Mark) *If students give the example of Turner's Syndrome, it should be considered and marks given.* **OR** a) i. point mutation/ single base substitution ½ Mark ii. point mutation/ single base deletion ½ Mark b) i 4 aminoacids 1 Mark ii 4 aminoacids 1 Mark	
15.	In some species, the diploid egg cell is formed without reduction division and develops into the embryo without fertilization. 1 Mark In many *Citrus* and *Mango* varieties some of the nucellar cells surrounding the embryo sac start dividing, protrudes into the embryo sac and develops into the embryos. In such species each ovule contains many embryos. 2 Mark	3
16.	a.) Chemical evolution – First form of life originated from pre-existing non-living organic molecules. b.) Amino acids c.) H_2 1x3 =3 Mark	3
17.	a.) Amino acid / **Phe** / **Val** DNA Code in Gene / AAA / CAC Codon in mRNA / i)UUU / ii)GUG Anticodon in tRNA / iii)AAA / iv)CAC 1Mark b.) i) A polypeptide containing 14 different amino acid = 14x3=42 base pairs. 1Mark ii) 14 different types of RNA are needed for the synthesis of polypeptide. 1Mark	3
18.	**Advantages**:-Inbreeding is necessary if we want to evolve a pure line in any animal. • It helps in accumulation of superior genes and elimination of less desirable genes • Inbreeding exposes harmful recessive genes that are to be eliminated by selection. • Where there is selection at each step, it increases the productivity of inbred population. **(Any two 1 Mark each)** Disadvantages:- • reduces fertility • decreases productivity. **(Any two ½ x2=1 Mark)**	3
19.	Specific Bt toxin genes isolated from ***Bacillus thuringiensis*** is incorporated into cotton is coded by the genes *cryIAc* and *cryIIAb* that control the cotton bollworms (½ + ½ = 1 Mark) • *Bacillus* forms protein crystals that contain a toxic **insecticidal protein**. • once an insect ingest the inactive toxin, it is converted into an active form • The toxin in the form of crystals gets solubilised due to alkaline pH in the gut • The activated toxin binds to the surface of gut epithelial cells and perforate the walls causing the death of insect larva (½ x2=2 Marks)	3

20.	criteria for determining biodiversity hot spots are: – • high levels of species richness (1 Mark) • High degree of endemism. (1 Mark) hotspots In India - Western Ghats, Himalaya (Indo-Burma/Sunderland to be accepted) (Any 2) (½+½ = 1Mark) OR ***In-situ* Conservation**– Threatened /endangered plants and animals are provided with urgent measures to save from extinction **within their natural habitat** and they are **protected and allowed to grow naturally.** Example- wildlife sanctuaries/ national parks /biosphere reserves/ sacred groves (Any one example) **(**½ Mark, 1 Mark for difference) ***Ex-situ* Conservation** –Threatened animals and plants are **taken out from their natural habitat** and placed in a setting where they can be **protected and given care** Example- in botanical gardens/ zoological gardens/ seed/pollen/gene banks (Any one example) (½ Mark, 1 Mark for difference)	3
21.	(a) To maintain the cells in their physiologically most active log/exponential phase. 1 Mark (b) Temperature, pH, substrate, salts, vitamins, oxygen (Any 4) (½ x4 =2 Mark)	3
	Section D	
22.	a.) Each primary spermatocyte will undergo meiosis-I and meiosis-2 which will result in 4 spermatozoa 300 million/4=75 million 1 Mark b) Since replication has occurred by this stage 46x2 = 92 chromatids 1 Mark Meiosis –I is completed by this time 92/2 =46 chromatids - 1 Mark	3
23.	a) Vigorous growth of useful aerobic microbes into flocs. 1 Mark b) Activated sludge – some of it is pumped back into the aeration tank to serve as the inoculum ½ + ½ Mark c) During this digestion, a mixture of gases such as methane, hyrogensulphide is made and carbon dioxide. These gases form biogas. 1 Mark	3
24.	Platinum-pallidium Rhodium **(Any two ½ +½ = 1Mark)** CO_2,H_20 and CO [any 2] ½ + ½=1 Mark Nitric oxide 1 Mark	3
	Section E	
25.	Polygenic inheritance 1 Mark • If we assume skin colour is controlled by three genes A, B, C • Dominant forms (A,B,C) are responsible for dark skin colour and recessive form (a, b, c) for light skin colour 1 Mark • The genotype with all dominant alleles (AABBCC) will be darkest skin colour and with recessive alleles will be light test skin colour (aabbcc) (1+1=2 Marks)	5

- The genotypes (AaBbCc) will be of intermediate skin colour i.e. with three dominant alleles and three recessive alleles 1 Mark

OR

- The sequences were arranged based on some overlapping regions present in them (Alignment of these sequences was not humanly possible) 1Mark
- Therefore, specialized computer based programme was developed. 1Mark
- These sequences were subsequently annotated and were assigned to each chromosome-1Mark
- Chromosome 1 1Mark
- *Caenorhabditis elegans* 1Mark

26. a) Inducing mutation **artificially** using **chemicals /radiations** /and **selecting plants** with desirable characters ½ x 2 = 1Mark
Mung Bean 1Mark
Yellow mosaic virus 1Mark

b) AQUACULTURE	PISCICULTURE
1. It involves production and culturing of all types of aquatic organisms in water bodies.	Production and culturing of fishes is called pisciculture. 1x2= 2 Mark

OR

a) AIDS caused by the Human Immuno deficiency Virus (½+½= 1 Mark)

b) Vaccines prevent microbial infections by initiating production of antibodies against these antigens to neutralise the pathogenic agents during later actual infection. (1/2)

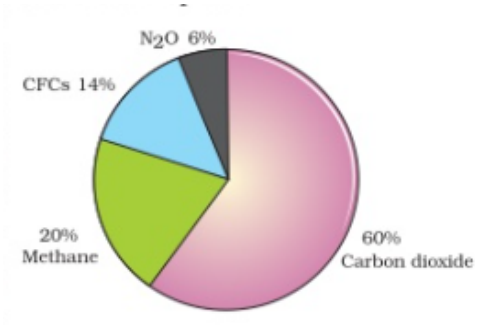
The vaccines also **generate memory** – B and T-cells that recognize the pathogen quickly on subsequent exposure. (1/2) 1 Mark

c) Normal cells show a property called **contact inhibition** by virtue of which contact with other cells inhibits their uncontrolled growth. Cancer cells appear to have lost this property.(1)

These cells grow very rapidly, invading and damaging the surrounding normal tissues. Cells sloughed from such tumors reach distant sites through blood, and wherever they get lodged in the body, they start a new tumor there. This property called **metastasis. (1)**
2 Marks

d) **Physiological barriers :** Acid in the stomach and saliva in the mouth. ½ Mark

27.



(Marks to be given only if relative contribution is correct) (½ x 4 = 2 Marks)

	Pie chart - ½ Marks to be detected if not given in form of pie chart Clouds and gases reflect one-fourth of incoming solar radiation/absorb some of it/but almost half of incoming solar radiation falls on Earth's surface heating it/while a small is reflected backs/Earth's surface re-emits heat in the form of infra red radiation/but part of this does not escape into space as atmospheric gases absorb a major fraction of it. (½ x 6 points = 3 Marks) **OR** (a) – Amensalism (1 Mark) (b) – Predation (1 Mark) Justifications- • Nature's way of transferring energy fixed by plants to higher trophic levels/conduits for energy transfer. • Keep prey population under control • Predators help in maintaining species diversity in a community, by reducing the intensity of competition among competing prey species. (1x3 Points = 3 Marks)	