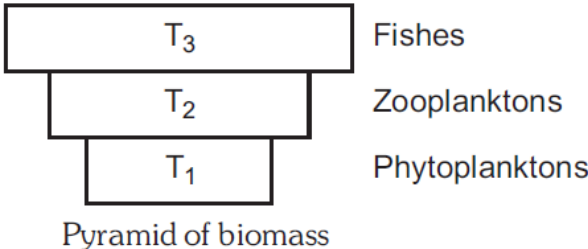


**MARKING SCHEME**  
**SAMPLE QUESTION PAPER**  
**2019-20**  
**CLASS XII (BIOLOGY)**

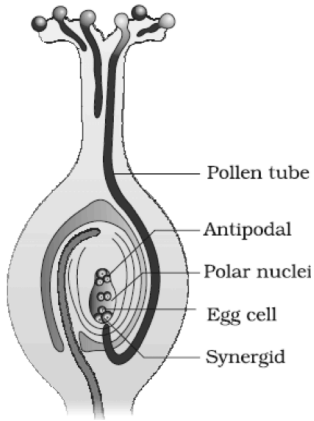
**TIME 3 HOURS**

**MM 70**

<b>Section – A</b>		
1.	b) Leydig cells <b>OR</b> b) Amniocentesis	1
2.	d) Cell-mediated immune response <b>OR</b> 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
<b>Section B</b>		
6.	Encysted <i>Amoeba</i> divides by multiple fission / produces amoeba or pseudopodiospores /cyst wall bursts out/spores are liberated to grow as amoebae(sporulation)  <p style="text-align: right;">(<math>\frac{1}{2} \times 4 = 2</math> Marks)</p> <b>OR</b> Gemmule- asexual reproductive structure in sponges Conidia- asexual reproductive structure in <i>Penicillium</i> . (or any other correct example) <p style="text-align: right;">(<math>\frac{1}{2} + \frac{1}{2} = 1</math> Mark) <p style="text-align: right;">(<math>\frac{1}{2} + \frac{1}{2} = 1</math> Mark)</p></p>	2
7.	CuT, Cu7, Multiload 375 Cu ions released suppresses sperm motility and the fertilizing capacity of sperms. <p style="text-align: right;">(Any two) (<math>\frac{1}{2}</math> and <math>\frac{1}{2} = 1</math> Mark ) <p style="text-align: right;">(<math>\frac{1}{2} + \frac{1}{2} = 1</math> Mark )</p></p>	2
8.	Control crosses cannot be performed in human beings, Alternate method- Pedigree analysis (study of the traits in several generations of a family). <p style="text-align: right;">(1+1=2 Marks)</p>	2
9.	A is more reactive <b>2'-OH group present in the pentose sugar</b> Makes it more labile/ catalytic and easily degradable. <p style="text-align: right;"><math>\frac{1}{2}</math> Mark <math>\frac{1}{2}</math> Mark <math>\frac{1}{2} + \frac{1}{2} = 1</math> Mark</p>	2
10.	<ul style="list-style-type: none"> <li>• Tissue culture <span style="float: right;"><math>\frac{1}{2}</math> Mark</span></li> <li>• Meristem apical or axillary is excised. <span style="float: right;"><math>\frac{1}{2}</math> Mark</span></li> <li>• Explant grown in a test tube under sterile condition/special nutrient medium</li> </ul> <p style="text-align: right;"><math>\frac{1}{2} + \frac{1}{2} = 1</math> Mark</p>	2

11.	<ul style="list-style-type: none"> <li>• RNA interference <span style="float: right;">½ Mark</span></li> <li>• silencing of a specific mRNA due to a complementary RNA <span style="float: right;">½ Mark</span></li> <li>• 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 <span style="float: right;">1 Mark</span></li> </ul>	2
12.	 <p>Pyramid of biomass</p> <p>The pyramid is inverted because the biomass of fishes is much more than that of the zooplankton and phytoplankton. <span style="float: right;">1+1= 2 Marks</span></p>	2

**Section C**

13.	 <p style="text-align: right;">(Diagram =1 Mark ) (Any four labellings ½ x 4=2)</p>	3
14.	<p>Failure of segregation of chromatids during cell division cycle results in the gain or loss of a chromosome(s) ( <b>aneuploidy</b>) <span style="float: right;">(1 Mark)</span></p> <p>Autosomes:-</p> <p><b>Down's Syndrome:</b> The cause is the presence of an additional copy of the chromosome number 21 (trisomy of 21). <span style="float: right;">(½ Mark)</span></p> <p>The affected individual is</p> <ul style="list-style-type: none"> <li>• short statured with small round head,</li> <li>• furrowed tongue and partially open mouth</li> <li>• Palm is broad with characteristic palm crease.</li> <li>• Physical, psychomotor and mental development is retarded.</li> </ul> <p style="text-align: right;">(Any one symptom ½ Mark)</p> <p>Sex chromosomes:-</p> <p><b>Klinefelter's Syndrome :</b> This is caused due to the presence of an additional copy of X-chromosome resulting into a karyotype of 47, XXY. <span style="float: right;">½ Mark</span></p>	3

	<p>Such an individual has overall masculine development</p> <ul style="list-style-type: none"> <li>• has overall masculine development</li> <li>• feminine development is also expressed by the development of breast/ Gynaecomastia). Such individuals are sterile.</li> </ul> <p style="text-align: right;">(Any one symptom ½ Mark)</p> <p><i>If students give the example of Turner's Syndrome, it should be considered and marks given.</i></p> <p style="text-align: center;"><b>OR</b></p> <p>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</p>													
15.	<p>In some species, the diploid egg cell is formed without reduction division and develops into the embryo without fertilization. 1 Mark</p> <p>In many <i>Citrus</i> and <i>Mango</i> 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</p>	3												
16.	<p>a.) Chemical evolution – First form of life originated from pre-existing non-living organic molecules.</p> <p>b.) Amino acids</p> <p>c.) H<sub>2</sub> 1x3 =3 Mark</p>	3												
17.	<p>a.)</p> <table border="1" data-bbox="276 1019 815 1153"> <thead> <tr> <th>Amino acid</th> <th>Phe</th> <th>Val</th> </tr> </thead> <tbody> <tr> <td>DNA Code in Gene</td> <td>AAA</td> <td>CAC</td> </tr> <tr> <td>Codon in mRNA</td> <td>i)UUU</td> <td>ii)GUG</td> </tr> <tr> <td>Anticodon in tRNA</td> <td>iii)AAA</td> <td>iv)CAC</td> </tr> </tbody> </table> <p style="text-align: right;">1Mark</p> <p>b.)</p> <p>i) A polypeptide containing 14 different amino acid = 14x3=42 base pairs. 1Mark</p> <p>ii) 14 different types of RNA are needed for the synthesis of polypeptide. 1Mark</p>	Amino acid	Phe	Val	DNA Code in Gene	AAA	CAC	Codon in mRNA	i)UUU	ii)GUG	Anticodon in tRNA	iii)AAA	iv)CAC	3
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DNA Code in Gene	AAA	CAC												
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18.	<p><b>Advantages:-</b>Inbreeding is necessary if we want to evolve a pure line in any animal.</p> <ul style="list-style-type: none"> <li>• It helps in accumulation of superior genes and elimination of less desirable genes</li> <li>• Inbreeding exposes harmful recessive genes that are to be eliminated by selection.</li> <li>• Where there is selection at each step, it increases the productivity of inbred population.</li> </ul> <p style="text-align: right;"><b>(Any two 1 Mark each)</b></p> <p><b>Disadvantages:-</b></p> <ul style="list-style-type: none"> <li>• reduces fertility</li> <li>• decreases productivity.</li> </ul> <p style="text-align: right;"><b>(Any two ½ x2=1 Mark)</b></p>	3												
19.	<p>Specific Bt toxin genes isolated from <i>Bacillus thuringiensis</i> is incorporated into cotton is coded by the genes <i>cryIAc</i> and <i>cryIIAb</i> that control the cotton bollworms (½ + ½ = 1 Mark)</p> <ul style="list-style-type: none"> <li>• <i>Bacillus</i> forms protein crystals that contain a toxic <b>insecticidal protein</b>.</li> <li>• once an insect ingest the inactive toxin, it is converted into an active form</li> <li>• The toxin in the form of crystals gets solubilised due to alkaline pH in the gut</li> <li>• 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)</li> </ul>	3												

20.	<p>criteria for determining biodiversity hot spots are: –</p> <ul style="list-style-type: none"> <li>• high levels of species richness (1 Mark)</li> <li>• High degree of endemism. (1 Mark)</li> </ul> <p>hotspots In India - Western Ghats, Himalaya (Indo-Burma/Sunderland to be accepted) (Any 2) (<math>\frac{1}{2} + \frac{1}{2} = 1</math>Mark)</p> <p style="text-align: center;">OR</p> <p><b>In-situ Conservation</b>– Threatened /endangered plants and animals are provided with urgent measures to save from extinction <b>within their natural habitat</b> and they are <b>protected and allowed to grow naturally</b>. Example- wildlife sanctuaries/ national parks /biosphere reserves/ sacred groves (Any one example) (<math>\frac{1}{2}</math> Mark, 1 Mark for difference)</p> <p><b>Ex-situ Conservation</b> –Threatened animals and plants are <b>taken out from their natural habitat</b> and placed in a setting where they can be <b>protected and given care</b> Example- in botanical gardens/ zoological gardens/ seed/pollen/gene banks (Any one example) (<math>\frac{1}{2}</math> Mark, 1 Mark for difference )</p>	3
21.	<p>(a) To maintain the cells in their physiologically most active log/exponential phase. 1 Mark</p> <p>(b) Temperature, pH, substrate, salts, vitamins, oxygen (Any 4) (<math>\frac{1}{2} \times 4 = 2</math> Mark)</p>	3
<b>Section D</b>		
22.	<p>a.) Each primary spermatocyte will undergo meiosis-I and meiosis-2 which will result in 4 spermatozoa <math>300 \text{ million} / 4 = 75 \text{ million}</math> 1 Mark</p> <p>b) Since replication has occurred by this stage <math>46 \times 2 = 92</math> chromatids 1 Mark Meiosis –I is completed by this time <math>92 / 2 = 46</math> chromatids - 1 Mark</p>	3
23.	<p>a) Vigorous growth of useful aerobic microbes into flocs. 1 Mark</p> <p>b) Activated sludge – some of it is pumped back into the aeration tank to serve as the inoculum <math>\frac{1}{2} + \frac{1}{2}</math> Mark</p> <p>c) During this digestion, a mixture of gases such as methane, hydrogen sulphide is made and carbon dioxide. These gases form biogas. 1 Mark</p>	3
24.	<p>Platinum-palladium Rhodium (Any two <math>\frac{1}{2} + \frac{1}{2} = 1</math>Mark)</p> <p>CO<sub>2</sub>, H<sub>2</sub>O and CO [any 2] <math>\frac{1}{2} + \frac{1}{2} = 1</math> Mark</p> <p>Nitric oxide 1 Mark</p>	3
<b>Section E</b>		
25.	<p>Polygenic inheritance 1 Mark</p> <ul style="list-style-type: none"> <li>• If we assume <u>skin colour</u> is controlled by three genes A, B, C</li> <li>• Dominant forms (A,B,C) are responsible for dark skin colour and recessive form (a, b, c) for light skin colour 1 Mark</li> <li>• 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)</li> </ul>	5

	<ul style="list-style-type: none"> <li>The genotypes (AaBbCc) will be of intermediate skin colour i.e. with three dominant alleles and three recessive alleles <span style="float: right;">1 Mark</span></li> </ul> <p style="text-align: center;"><b>OR</b></p> <ul style="list-style-type: none"> <li>The sequences were arranged based on some overlapping regions present in them (Alignment of these sequences was not humanly possible) <span style="float: right;">1Mark</span></li> <li>Therefore, specialized computer based programme was developed. <span style="float: right;">1Mark</span></li> <li>These sequences were subsequently annotated and were assigned to each chromosome-1Mark</li> <li>Chromosome 1 <span style="float: right;">1Mark</span></li> <li><i>Caenorhabditis elegans</i> <span style="float: right;">1Mark</span></li> </ul>	
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26.	<p>a) Inducing mutation <b>artificially</b> using <b>chemicals</b> /<b>radiations</b> /and <b>selecting plants</b> with desirable characters <span style="float: right;"><math>\frac{1}{2} \times 2 = 1\text{Mark}</math></span></p> <p>Mung Bean <span style="float: right;">1Mark</span></p> <p>Yellow mosaic virus <span style="float: right;">1Mark</span></p>	5				
<b>OR</b>						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">b) AQUACULTURE</th> <th style="width: 50%;">PISCICULTURE</th> </tr> </thead> <tbody> <tr> <td>1. It involves production and culturing of all types of aquatic organisms in water bodies.</td> <td>Production and culturing of fishes is called pisciculture. <span style="float: right;">1x2= 2 Mark</span></td> </tr> </tbody> </table>			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. <span style="float: right;">1x2= 2 Mark</span>
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. <span style="float: right;">1x2= 2 Mark</span>					
<b>OR</b>						
<p>a) AIDS caused by the Human Immuno deficiency Virus <span style="float: right;">(<math>\frac{1}{2} + \frac{1}{2} = 1</math> Mark)</span></p> <p>b) Vaccines prevent microbial infections by initiating production of antibodies against these antigens to neutralise the pathogenic agents during later actual infection. (1/2)</p> <p>The vaccines also <b>generate memory</b> – B and T-cells that recognize the pathogen quickly on subsequent exposure. (1/2) <span style="float: right;">1 Mark</span></p> <p>c) Normal cells show a property called <b>contact inhibition</b> by virtue of which contact with other cells inhibits their uncontrolled growth. Cancer cells appear to have lost this property.(1)</p> <p>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 <b>metastasis</b>. (1) <span style="float: right;">2 Marks</span></p> <p>d) <b>Physiological barriers</b> : Acid in the stomach and saliva in the mouth. <span style="float: right;"><math>\frac{1}{2}</math> Mark</span></p>						

27.	<p>A pie chart illustrating the relative contribution of four greenhouse gases. The largest slice is pink, representing Carbon dioxide at 60%. The next largest is green, representing Methane at 20%. A light blue slice represents CFCs at 14%, and a small dark grey slice represents N<sub>2</sub>O at 6%.</p>	5
<p>(Marks to be given only if relative contribution is correct) <span style="float: right;">(<math>\frac{1}{2} \times 4 = 2</math> Marks )</span></p>		

Pie chart -  $\frac{1}{2}$  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 back/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.

( $\frac{1}{2}$  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)