

**SOLUTIONS**  
**Senior Secondary School Examination, 2023**  
**BIOLOGY (Subject Code–044)**  
**Paper Code: 57/6/3**

**Maximum Marks: 70**

Q.N.	Expected answer/value points	Mark	Total marks
<b>SECTION A</b>			
1.	(A)/ Polypeptide only	1	1
2.	(B) /Autosomal recessive	1	1
3.	(C) /0.32	1	1
4.	(C) /(iii) and (iv)	1	1
5.	(C) /(ii), (iv) and (v)	1	1
6.	(C) /One X-chromosome of mother	1	1
7.	(B) /UAAGCUAC	1	1
8.	(D) /5' end (before start codon) and 3' end (after stop codon).	1	1
9.	(B) /MALT	1	1
10.	(A) /Ichthyosaurus	1	1
11.	(A) /Nucleopolyhedrovirus	1	1
12.	(C) /Pst I	1	1
13.	(A) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	1	1
14.	(A) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	1	1
15.	(C) /Assertion (A) is true, but Reason (R) is false.	1	1
16.	(A) /Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	1	1
<b>SECTION B</b>			
17	(a) <ul style="list-style-type: none"> <li>• To check indiscriminate and illegal female foeticide</li> <li>• First trimester/ 12 weeks/ First three Three month</li> </ul> <p style="text-align: center;"><b>OR</b></p>	1+1	

	(b) <ul style="list-style-type: none"> <li>• Pelvic Inflammatory disease</li> <li>• Human immunodeficiency Virus /HIV, Genital herpes, Hepatitis B</li> </ul> <p style="text-align: center;"><b>(Any two)</b></p>	1 ½ + ½	2
<b>18</b>	(a) <p>(i) Provides antibodies/provides IgA/ provide nutrition/ Provides passive immunity</p> <p>(ii) Colostrum</p> <p style="text-align: center;"><b>OR</b></p> <p>(b) <p>(i) Allergy</p> <p>(ii) (ii) IgE</p> <p>(iii) Histamine and Serotonin</p> </p>	1 1  ½ ½ ½+½	2
<b>19</b>	(a) One petal of <i>Ophrys</i> bear uncanny resemblance to the female of the bee in size colour and marking, male bee pseudo-copulates with the flower considering it as a female and during the process is dusted with pollen from the flower <p style="text-align: center;"><b>OR</b></p> <p>(b) Fragmentation, leaching, Catabolism, humification, Mineralisation</p> <p style="text-align: center;"><b>(1 Mark for correct sequence)</b></p> <p><b>Humification:</b> It leads to accumulation of a dark coloured amorphous substance which is called humus that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate.</p>	1+1  1  1	2
<b>20</b>	(a) Gene cloning /Amplification <p>(b) <p>(i) EcoR I to cut both the plasmid and alien DNA</p> <p>(ii) Cutting with Same restriction enzyme will yield sticky ends at the end of both DNA which can be joined together by DNA ligase</p> </p>	½  ½  1	2
<b>21</b>	(a) six <p>(b) <ul style="list-style-type: none"> <li>● 10</li> <li>● 0.34nm/3.4 A°</li> </ul> <p>(c) The plane of one base pair stack over the other in double helix additionally confirms stability of helical structure of DNA</p> </p>	½  ½ ½ ½	2
<b>SECTION-C</b>			
<b>22</b>	(a) Sedimented bacterial flocs in settling tank is called activated sludge <p>(b) In anaerobic bacteria digest the bacteria and the fungi in the sludge, during this</p>	1	

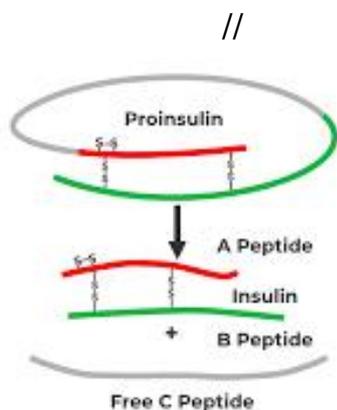




**Section - E**

**31**

(a) (i) Pro- insulin is processed by removal of c-peptide which is removed during maturation into insulin.



1

1

(ii) Two DNA sequences corresponding to A and B chains of human insulin, are introduced in plasmids of *E.coli* to produce insulin chains, A & B chain are produced separately, extracted and combined by creating disulphide bonds to form human insulin.

1x4

**OR**

(b) (i)

-A simple stirred-tank reactor is cylindrical or with a curved base to facilitate the mixing of the reactor contents

-The stirrer facilitates even mixing and oxygen availability throughout the bioreactor,

-Air can be bubbled through the reactor,

-It has an agitator system,

- a foam control system,

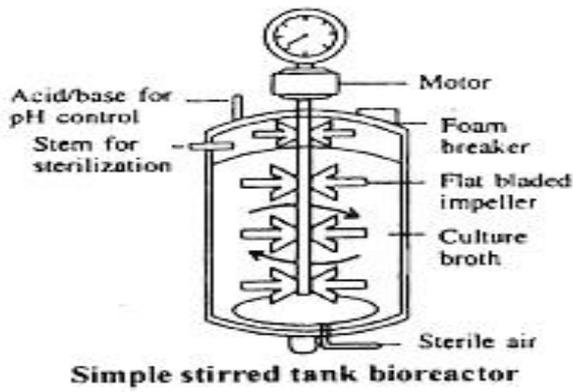
-a temperature control system,

-pH control system,

½ x6

**(any six point)**

//



Simple stirred tank bioreactor

(Diagram with any six labeling )

(ii) The processes include separation, and purification which are collectively referred to as downstream processing.

1/2x6

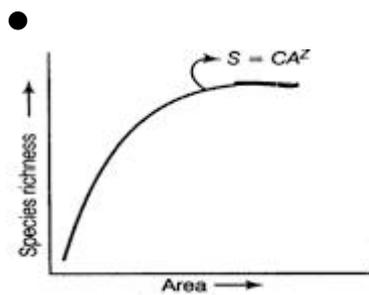
2

5

32

(a) He observed that within a region species richness (the number of different species) increase with increasing area, only up to a limit

(ii)

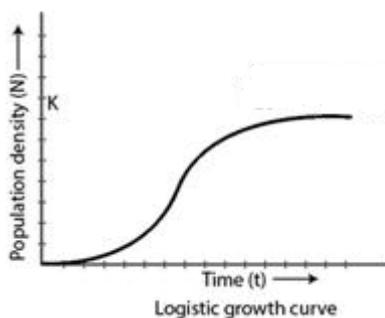


(1/2 mark each for both axis and 1 mark for correct graph )

- Z shows relationship between species richness and area/ Regression coefficient/ slope of graph

OR

(b) (i) A population growing in a habitat with limited resources show initially a lag phase, followed by phases of acceleration, and deceleration and finally an asymptote, when the population density reaches the carrying capacity



1+1

1+1

1

1/2x4

1

	<p>(ii) <math>DN/dt = rN(K-N/K)</math></p> <p>Where N = Population density at time t</p> <p>r = Intrinsic rate of natural increase</p> <p>K = Carrying capacity/ maximum possible numbers in a given habitat</p>	<p>1</p> <p>½</p> <p>½</p>	<p>5</p>
<p>33</p>	<p>(a)</p> <p>(i) Three cells are grouped together at the micropylar end of embryo sac, constitute the egg apparatus, the egg apparatus in turn consists of two synergids, one egg cell, the synergids have special cellular thickenings at the micropylar tip called filiform apparatus, 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 though 8-nucleate is 7-celled</p> <p style="text-align: center;">//</p> <div style="text-align: center;"> </div> <p>(Award marks for correct diagram with 8 labeling)</p> <p>(iii) One of the two male gametes fuses with the two polar nuclei located in the central cell to produce a triploid primary endosperm nucleus (PEN).</p>	<p>½x 8</p> <p>½x 8</p>	<p>1</p>

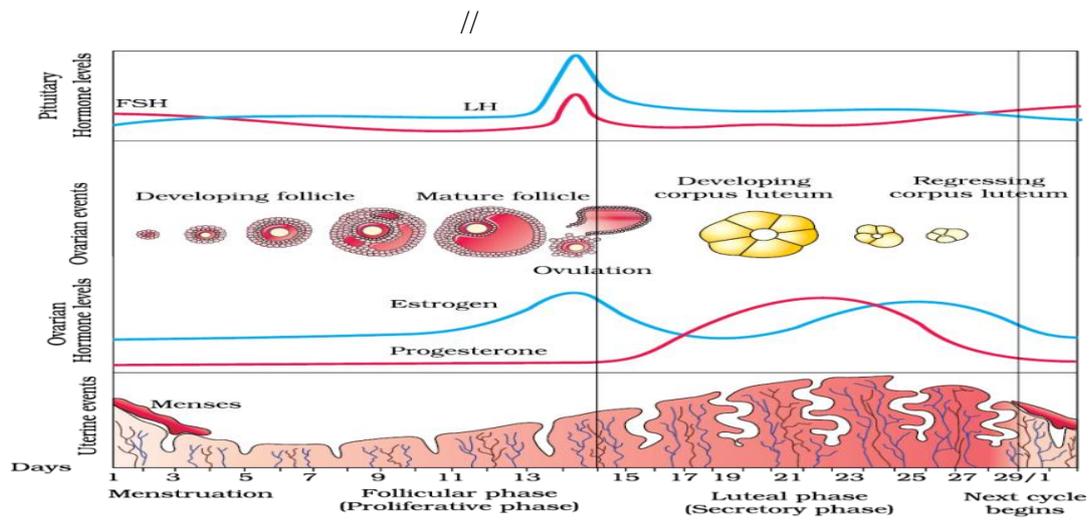
Or

(b)

Phases of Menstrual cycle	Pituitary hormones	Ovarian hormone	Ovary	Uterus
1) Menstrual phase/day 1-5	Low FSH and LH	Low Progesterone and Estrogen	Follicle start to develop	Lining of endometrium shed and expelled as menstrual flow
2) Follicular/Proliferative phase/day 6-13	FSH and LH rises	Estrogen rises and low progesterone	Follicle mature	Endometrium to thicken
3) Ovulatory phase/day 14-15	LH surge (about 14 <sup>th</sup> day)	Increase level of estrogen and low progesterone	Graafian follicle ruptures	Uterus lining further thickens
4) Luteal phase/day 16-28	FSH and LH level begins to decline	High progesterone and low Estrogen	Ruptured follicle transformed into the corpus luteum which produce progesterone and estrogen	Uterus lining continues to thicken for implantation

1  
+  
½x4  
+  
½x4

**(NOTE: If all phases of menstrual cycle are correct then award 1 mark, Award ½ marks if both ovarian and pituitary hormone levels are correct in each phase and ½ marks for changes in both ovary and uterus for each phase)**



(NOTE: If all phases of menstrual cycle are correct then award 1 mark,  
Award ½ marks if both ovarian and pituitary hormone levels are correct in  
each phase and ½ marks for changes in both ovary and uterus for each  
phase)

1  
+  
½x4  
+  
½x4