

**Competency Based Question Bank**

**CLASS XII**

**Biology (044)**



**SESSION 2025-26**

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## WORKSHEET -1 (Sexual Reproduction in Flowering Plants)

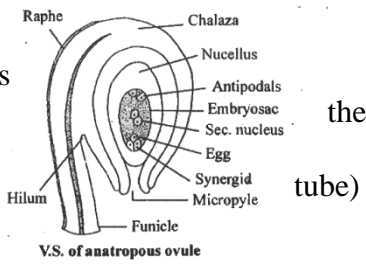
Max marks: 20

Time : 20 min.

Q1	Double fertilization results in zygote and endosperm. What is the ploidy of the endosperm? A. Haploid                      B. Diploid                      C. Triploid                      D. Tetraploid	1
Q2	"Cells of the tapetum of a microsporangium are usually multinucleate". Which of the following can be a reason for the tapetal cells to become multinucleate? A. They fuse with the polar cells of the megasporangium. B. They do not undergo karyokinesis. C. They do not undergo cytokinesis. D. They do not undergo mitosis.	1
	Choose the correct option for question no. 3 and 4: 1. <b>A.</b> Both Assertion and Reason are true, and the Reason is the correct explanation of the Assertion. 2. <b>B.</b> Both Assertion and Reason are true, but the Reason is <i>not</i> the correct explanation of the Assertion. 3. <b>C.</b> Assertion is true, but the Reason is false. 4. <b>D.</b> Assertion is false, but the Reason is true.	
Q3	<b>Assertion:</b> The functional megaspore develops into the female gametophyte. <b>Reason:</b> The megaspore divides mitotically to form the embryo sac.	1
Q4	<b>Assertion:</b> Cleistogamous flowers ensure cross-pollination. <b>Reason:</b> Cleistogamous flowers remain closed and self-pollinate without external agents.	1
Q5	Observe the flow chart given below and answer the questions that follow: Pollen grain lands on stigma ↓ Pollen tube grows through style ↓ Pollen tube enters ovule via micropyle ↓ Two male gametes released into embryo sac ↓ ( ? ) ↓ Formation of zygote and primary endospermic nucleus a) Fill in the blank step marked (?). b) Identify the ploidy of the two products formed at the end?	2
Q6	If the zygote starts dividing immediately after fertilisation, what potential problem might occur in angiosperms?	2
Q7	A farmer observes that despite abundant flowering in his mustard crop; seed formation is poor. Suggest reasons based on reproductive biology and provide solutions.	3
Q8	<b>Q8. Read the following passage and answer the questions that follow:</b> A plant breeder is developing hybrid varieties of crop plants for high yield. However, the hybrid seeds produced each year are expensive, and farmers must purchase them every season. The breeder is exploring apomixis as a potential solution to this problem. He notices that in some plants like <i>Hieracium</i> , seeds are formed without fertilisation, and the traits of the parent plant are retained in the next generation. A. Apomixis is beneficial in hybrid seed production because: <b>A.</b> It increases pollination efficiency <b>B.</b> It allows hybrid vigour to be maintained in progeny <b>C.</b> It increases genetic recombination	4

	<p><b>D.</b> It avoids the need for flowering</p> <p>B. Which of the following statements is <b>incorrect</b> about apomixis?</p> <p><b>A.</b> It bypasses both syngamy and meiosis</p> <p><b>B.</b> Offspring are genetically identical to the parent</p> <p><b>C.</b> It reduces the cost of hybrid seed production</p> <p><b>D.</b> It promotes genetic variation in progeny</p> <p>C. Which of the following statements is true about apomictic seeds?</p> <p><b>A.</b> They are genetically variable</p> <p><b>B.</b> They are always sterile</p> <p><b>C.</b> They do not require pollination</p> <p><b>D.</b> They require double fertilisation</p> <p>D. Suggest one challenge plant breeders might face while using apomixis in crops.</p> <p style="text-align: center;">OR</p> <p style="text-align: center;">Write any two advantages of Apomixis.</p>	
Q9	<p>E. A student observes an ovule under a microscope and finds the micropyle, chalaza and funicle aligned in such a way that the ovule appears inverted. Identify the type of ovule and explain how the embryo sac is oriented in it with the help of diagram.</p> <p>F. Recognise the contents of egg apparatus.</p> <p>G. A student says that the micropyle is essential for double fertilisation. Justify this statement.</p>	5

## Marking Scheme (Sexual Reproduction in Flowering Plants)

Q1	C	1
Q2	C	1
Q3	A- After formation of megaspore tetrad from MMC through meiosis the functional megaspore divides only mitotically to form mature embryo sac.	1
Q4	D- Cleistogamous flowers are closed flowers, they never cross pollinate.	1
Q5	5. Syngamy and triple fusion occurs (double fertilization)	1
	6. Zygote -diploid, Primary Endospermic Nucleus-triploid	1
Q6	No nutrition will be available to zygote to develop into embryo.	2
Q7	<p>REASON: (ANY 3)</p> <ol style="list-style-type: none"> <li>Lack of Pollinators</li> <li>Self-Incompatibility</li> <li>Pollen Sterility</li> <li>Unfavourable Environmental Conditions</li> <li>Nutrient Deficiency</li> </ol> <p>Solution: (ANY 3)</p> <ul style="list-style-type: none"> <li>Introduction of pollinating agents such as honey bees</li> <li>Use Compatible Varieties</li> <li>Maintain Proper Nutrition</li> <li>Optimize Environmental Condition</li> </ul>	<p>1 ½</p> <p>1 ½</p>
Q8	<p>H. b</p> <p>I. d</p> <p>J. c</p> <p>(iv) One major challenge plant breeders face while using <b>apomixis</b> is the <b>difficulty in introducing genetic variation</b>. Since apomixis involves <b>asexual reproduction through seeds</b>, the offspring are <b>genetically identical (clones)</b> to the parent plant. This limits the breeder's ability to <b>combine desirable traits from two different parent plants through hybridization</b>, which is essential for crop improvement.</p> <p style="text-align: center;">OR</p> <p><b>Preservation of Hybrid Traits:</b></p> <p>a. Apomixis allows plants to produce <b>genetically identical offspring</b>, helping maintain desirable <b>hybrid characteristics</b> over generations without the need for repeated crossing.</p> <p><b>K. Cost-Effective Seed Production:</b></p> <p>a. Farmers can reuse seeds without losing yield or quality, reducing the <b>cost of purchasing hybrid seeds</b> every season</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
Q9	<p>L. Anatropous ovule</p> <p><b>Explanation:</b></p> <p>M. In an <b>anatropous ovule</b>, the body of the ovule bends over completely and fuses with the funicle, making ovule appear <b>inverted</b>.</p> <p>N. As a result, the <b>micropyle</b> (entry point for pollen comes to lie <b>close to the hilum</b>, near the funicle.</p> <p>O. The <b>chalaza</b> remains at the opposite end of the micropyle.</p> <p>P. The <b>embryo sac</b> inside the ovule is oriented such that the <b>egg apparatus (egg cell and synergids)</b> is near the micropyle, and the <b>antipodal cells</b> are located near the chalazal end—thus maintaining <b>correct polarity</b> despite the inversion.</p> <p>Q. One egg cell and two synergid cells.</p> <p>R. Pollen tube enters the ovule through micropyle</p>	<div style="text-align: center;">  <p>V.S. of anatropous ovule</p> </div> <p>the tube)</p> <p>1</p> <p>1</p>

## Chapter – 2 (Sexual Reproduction in Flowering Plants)

### WORKSHEET -2

MAX MARKS: 20

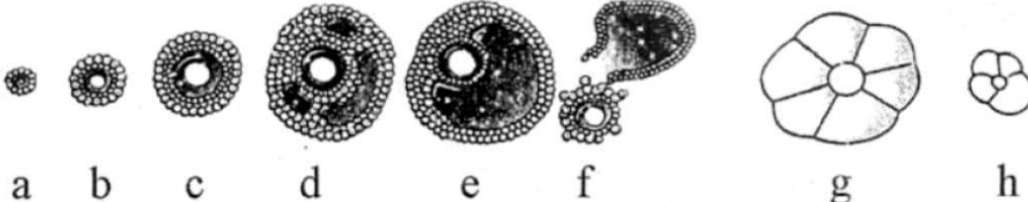
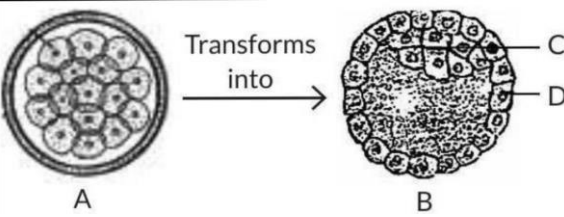
TIME: 20 MIN

Q1	A student observes that meiosis occurs in the ovule of a flowering plant. Identify the structure observed by students ? A) Ovary B) Embryo sac C) Megaspore mother cell D) Synergid cell	1
Q2	During a lab activity, students find a fruit developed from the thalamus rather than the ovary. Guess the fruit most likely to be observed by students? A) Mango B) Apple C) Tomato D) Grapes	1
	FOR QUESTION NO. 3 AND 4 CHOOSE THE RIGHT OPTION FROM FOLLOWING:  A) Both A and R are true, and R is the correct explanation of A B) Both A and R are true, but R is not the correct explanation of A C) A is true, but R is false D) A is false, but R is true	
Q3	<b>Assertion (A):</b> Meiosis in microspore mother cells is a reductional division. <b>Reason (R):</b> It results in gametes having the same chromosome number as the parent cell.	1
Q4	<b>Assertion (A):</b> Maize and castor seeds are examples of endospermic seeds. <b>Reason (R):</b> In endospermic seeds, the endosperm is completely consumed during seed development.	1
Q5	In an experiment, students observed that some seeds of <i>Citrus</i> developed multiple embryos, even though only one egg cell was fertilized.  (a) Identify the phenomenon and name the type of polyembryony observed. (b) Explain how this type of polyembryony benefits plant propagation.	2
Q6	A farmer grows both maize and pea plants in her field. She observes that maize plants require wind for pollination, while pea plants set seeds even without any external agents. (a) Identify the type of pollination in both plants. (b) Explain how floral structures support these modes of pollination.	2
Q7	If all insect pollinators were to disappear suddenly, which types of plants would be least affected and why?	3
Q8	A group of agricultural scientists at the Indian Agricultural Research Institute (IARI) is working on improving a local variety of wheat. This variety is known for its resistance to drought but has poor grain quality. Another variety from Punjab produces high-quality grains but is susceptible to drought.  The team decides to use <b>artificial hybridisation</b> to combine the desirable traits of both varieties. They carefully emasculate the drought-resistant variety and pollinate it with pollen from the high-quality grain variety. <b>Based on the case above, answer the following questions:</b> 6. What is the purpose of emasculation in this context? 7. How does artificial hybridisation help in combining traits? 8. What precautions must the scientists take during the process? 9. Why is it important to bag the emasculated flowers?	4
Q9	10. Explain the role of mitosis in the development of the female gametophyte from the functional megaspore. 11. Pollen grains are very light and can be carried long distances by wind. Yet, pollen grains from thousands of years ago have been found intact in fossil records. 12. Despite exine being a very tough and resistant layer, pollen tube germination occurs through it. Justify the statement.	5 (2+2+1)

## Chapter – 2 (Sexual Reproduction in Flowering Plants)

### MARKING SCHEME WORKSHEET -2

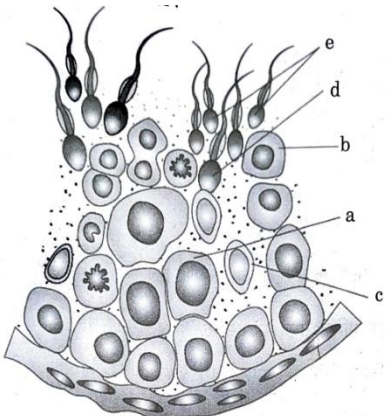
Q1	C) Megaspore mother cell	1
Q2	B) Apple	1
Q3	C) A is true, but R is false	1
Q4	C) A is true, but R is false	1
Q5	(a) The phenomenon is <b>polyembryony</b> , and the type is <b>adventive embryony</b> , a form of <b>apomictic polyembryony</b> , where embryos arise from <b>nucellar cells</b> of the ovule. (b) This type of polyembryony allows the production of <b>genetically identical (clonal)</b> seedlings without fertilization, which helps in maintaining <b>desirable traits</b> in plant propagation and ensures <b>uniformity and Vigor</b> in crops like citrus and mango.	1+1
Q6	(a) Maize – <b>Anemophily</b> (wind pollination); Pea – <b>Autogamy</b> (self-pollination). (b) Maize has <b>feathery stigmas</b> and <b>light pollen</b> for wind dispersal; Pea has <b>closed flowers</b> and <b>proximity of anthers and stigma</b> .	2
Q7	If all insect pollinators disappeared suddenly, <b>abiotically pollinated plants</b> —those that rely on <b>wind or water</b> for pollination—would be least affected. <b>Explanation:</b> 13. These plants do not depend on insects and instead use <b>natural elements</b> like wind or water to transfer pollen. 14. <b>Examples include:</b> 1. <b>Wind-pollinated plants</b> like <b>maize, wheat, and rice</b> , which produce large amounts of light, dry pollen and have exposed stamens and feathery stigmas to catch airborne pollen. 2. <b>Water-pollinated plants</b> like <b>Vallisneria</b> and <b>Hydrilla</b> , where pollen floats on water to reach the stigma. <b>Reason:</b> Their pollination mechanism is independent of insects, so the loss of insect pollinators would not disrupt their reproductive process.	3
Q8	15. <b>Purpose of Emasculation:</b> 1. Emasculation involves removing the anthers (male reproductive parts) from the drought-resistant variety (the female parent) to <b>prevent self-pollination</b> and ensure that only the desired pollen (from the high-quality grain variety) fertilises the ovules. 16. <b>How Artificial Hybridisation Helps Combine Traits:</b> 1. By manually transferring pollen from the high-quality grain parent to the emasculated drought-resistant plant, <b>traits from both parents</b> —drought resistance and grain quality—can be combined in the offspring through controlled pollination. 17. <b>Precautions to Be Taken:</b> 1. Emasculation must be done carefully without damaging the stigma. 2. The timing of pollination should match the receptive phase of the stigma. 3. Tools must be sterilised to prevent contamination. 4. The process should be carried out under controlled environmental conditions if possible. 18. <b>Importance of Bagging:</b> 1. After emasculation and pollination, <b>bagging</b> is done to <b>prevent unwanted pollen from contaminating the stigma</b> and ensure that only the intended cross takes place. 2. It also protects the flower from insects, wind, and rain, which could interfere with the hybridisation process.	4
Q9	1. The functional megaspore undergoes three successive mitotic divisions. This results in eight nuclei which are arranged into seven cells forming the mature embryo sac. 2. The outer wall of the pollen grain, called <b>exine</b> , is made of <b>sporopollenin</b> , one of the most resistant organic materials known. Sporopollenin is chemically stable, resistant to microbial decay, high temperatures, and strong acids/alkalis. This resistance helps pollen grains survive for thousands of years in sediments. 3. Absence of sporopollenin at points on exine forms germ pores which allows exit of pollen tube through it.	2  2  1

Q.No	Question	Marks														
1	<p>The following diagram is an illustration of the sequence of ovarian events (a to h) in the human female. Identify the stage 'f'.</p> <div></div> <p>A. Gestation    B. Implantation    C. Ovulation    D. Fertilization</p>	1														
2	<p>The Correct match between the parts of the sperm and their functions.</p> <table><thead><tr><th>Column I</th><th>Column II</th></tr></thead><tbody><tr><td>a. Head</td><td>1. Enzymes</td></tr><tr><td>b. Middle piece</td><td>2. Sperm motility</td></tr><tr><td>c. Acrosome</td><td>3. Energy</td></tr><tr><td>d. Tail</td><td>4. Genetic material</td></tr><tr><td>A. a-2, b-4, c-1, d-3</td><td>B. a-4, b-3, c-1 d-2</td></tr><tr><td>C. a-4, b-1, c-2, d-3</td><td>D. a-2, b-1, c-3, d-4</td></tr></tbody></table>	Column I	Column II	a. Head	1. Enzymes	b. Middle piece	2. Sperm motility	c. Acrosome	3. Energy	d. Tail	4. Genetic material	A. a-2, b-4, c-1, d-3	B. a-4, b-3, c-1 d-2	C. a-4, b-1, c-2, d-3	D. a-2, b-1, c-3, d-4	1
Column I	Column II															
a. Head	1. Enzymes															
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A. a-2, b-4, c-1, d-3	B. a-4, b-3, c-1 d-2															
C. a-4, b-1, c-2, d-3	D. a-2, b-1, c-3, d-4															
<p>Directions</p> <p>A. Assertion and reason both are correct statements, and the reason is correct. Explanation for the assertion</p> <p>B. Assertion and reason are both correct statements, but the reason is inaccurate. Explanation for the assertion</p> <p>C. The assertion is a correct statement, but the reason is a wrong statement.</p> <p>D. Assertion is a wrong statement, but the reason is the correct statement.</p>																
3	<p><b>Assertion:</b> The Placenta acts like endocrine tissue and produces hormones like LH and FSH</p> <p><b>Reason:</b> Increased production of hormones is essential for fetal growth</p>	1														
4	<p><b>Assertion:</b> Infundibulum is funnel shaped part closer to ovary</p> <p><b>Reason:</b> The edges of the infundibulum help in collection of ovum after ovulation.</p>	1														
5	<p>Study the given diagram.</p> <div></div> <p>A is an embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females.</p> <p>A. Identify A, B, and their parts C and D.</p> <p>B. State the fate of C and D during embryonic development in humans. _____</p>	2														
6	Study the graph and answer the questions that follow:	2														

	<p>The average age of the women at the onset of menopause is.....</p> <p>At what age are maximum primordial follicles present in the ovary, according to the given graph?</p>	
7	<p>The given diagram shows the human male reproductive system (one side only).</p> <p>A. Identify the structure 'X' and write its location in the body.</p> <p>B. Identify the accessory gland 'Y' and its secretion.</p> <p>C. Identify and state the function of 'Z'</p>	3
8	<p><b>Case-Based Question –</b></p> <p>Read the passage carefully and answer the following questions:</p> <p>A group of biology students visited a research lab studying male fertility. The scientist explained the process of spermatogenesis, which begins at puberty under hormonal control. Inside the seminiferous tubules, undifferentiated spermatogonia undergoes mitosis and meiosis to form spermatozoa. The process is regulated by hormones like FSH, LH, and testosterone, and supported by Sertoli cells and Leydig cells. The scientist also explained that factors like hormonal imbalance or testicular damage can impair spermatogenesis and reduce male fertility.</p> <p><b>Questions:</b></p> <p>A. State the role of Sertoli cells in spermatogenesis.</p> <p>B. Illustrate the role of the pituitary hormone that acts on the Leydig cell.</p> <p>C. Describe the sequence of stages involved in spermatogenesis from spermatogonia to spermatozoa.</p> <p style="text-align: center;">OR</p> <p>D. Mention the role of testosterone in this process.</p>	4
9	<p>The graph given below shows the variation in the levels of ovarian hormones during various phases of the menstrual cycle:</p> <p>A. Identify 'A' and 'B'.</p> <p>B. Specify the source of the hormone marked in the diagram.</p> <p>C. Reason out why A peaks before B.</p> <p>D. Compare the role of A and B.</p> <p>E. Under which condition will the level of B continue to remain high on the 28th day?</p>	5



Q.no	Value points	Marks
1	C	1
2	B	1
3	D	1
4	A	1
5	A. A) Morula                      B) Blastocyst                      C) Inner cell mass                      D) Trophoblast B. Fate of C and D:- C) (Inner Cell Mass): Develops into the embryo itself, giving rise to all tissues and organs of the foetus. D) (Trophoblast): Forms the placenta, which facilitates nutrient and gas exchange between the mother and the foetus.	1  1/2+1/ 2=1
6	A. 50 years. This is evident as the number of primordial follicles per ovary approaches zero at this age, indicated by the triangular markers near the x-axis at 50+ years. B. Around 0 to 5 years old. The graph shows the highest number of primordial follicles per ovary (more than 100,000) at the youngest ages.	1+1=2
7	A. X is the testis. Location: It is located in the scrotum, a sac-like structure outside the abdominal cavity, which helps maintain the temperature needed for sperm production. B. Y is the seminal vesicle. Secretion: It secretes a fructose-rich fluid that provides energy to sperm and contributes to the seminal fluid. C. Z is the epididymis. Function: It stores and matures sperm. Sperm gain motility and the ability to fertilize an ovum while in the epididymis.	1/2+1/ 2+1/2 +1/2+ 1/2+1/ 2=3
8	A. Sertoli cells provide nutritional and structural support to developing sperm cells and secrete factors that regulate their maturation. B. LH stimulates Leydig cells to produce testosterone, which is essential for the progression of spermatogenesis. C. Spermatogenesis begins with spermatogonia (diploid) undergoing mitotic division to form primary spermatocytes. These then undergo meiosis I to form secondary spermatocytes, which further undergo meiosis II to form spermatids. Finally, spermiogenesis transforms spermatids into spermatozoa (mature sperm cells). OR C. Testosterone helps in the maturation of sperm cells and maintains the function of seminiferous tubules and other male reproductive tissues. *enzymes to help penetration The acrosome contains enzymes that help the sperm penetrate the ovum during fertilization.	1  1  2  2
9	A. A) – Estrogen                      B) – Progesterone B. A) – Maturing ovarian follicle/Graafian follicle                      B) – Corpus luteum C. Formation of Graafian follicle (releases estrogen) is followed by the formation of corpus luteum (releases progesterone) D. <b>Role of A (Estrogen):</b> leads to changes in the ovary and uterus / regeneration of endometrium through proliferation <b>Role of B (Progesterone):</b> Maintenance of endometrium for implantation of the fertilized ovum/maintenance of other events of pregnancy E. In case of pregnancy.	1  1  1  1  1

Q.No	Question	Marks
1	The Correct number of Chromosomes in Human spermatogonia, Primary spermatocytes, and Spermatids is respectively A. 23, 23, 46 B. 46, 23, 23 C. 46,46,23 D. 23, 46, 23	1
2	Q2. Meiotic division of the secondary oocyte is completed A. Prior to ovulation B. at the time of copulation C. after zygote formation D. At the time of fusion of a sperm with an ovum	1
<b>Directions:</b> In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as: (A) If both Assertion and Reason are true, and Reason is the correct explanation of Assertion. (B) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion. (C) If the Assertion is true but the Reason is false. (D) If both Assertion and Reason are false.		
3	<b>Assertion:</b> Each seminiferous tubule is lined on its inside by three types of cells. <b>Reason:</b> These cells are male germ cells, Sertoli cells and Leydig cells.	1
4	<b>Assertion:</b> All copulations do not lead to fertilization and pregnancy. <b>Reason:</b> The acrosome helps the sperm enter the cytoplasm of the ovum.	1
5	If the fimbriae of the fallopian tube do not function properly, how would this affect the chances of fertilization and what potential complications might arise as a result?	2
6	A. Fructose present in the seminal plasma is considered essential for sperm function. Give reason B. If the bulbourethral glands failed to secrete properly, what challenge might it pose during sexual intercourse?	1 1
7	In the given figure, an enlarged section view of a seminiferous tubule, study the figure and answer the questions. 6. State the functions of part 'c' 7. What is the genetic makeup of a cell 'e' 8. Identify the parts 'a' and 'b'	3
		



Q	Answer/Hints/Value Points	Marks
1	Option C- 46,46,23	1
2	Option D. At the time of fusion of a sperm with an ovum.	1
3	D	1
4	B	1
5	If the fimbriae do not function properly, they may fail to capture the ovum released from the ovary during ovulation. As a result, the ovum may not enter the fallopian tube, reducing the chance of fertilization. Additionally, the ovum could implant outside the uterus (e.g., in the abdominal cavity), leading to an ectopic pregnancy, which is a serious medical condition.	2
6	A) Fructose in the seminal plasma provides an energy source for sperm motility, helping them swim through the female reproductive tract toward the ovum.	1
	C) If the bulbourethral glands fail to secrete properly, there may be insufficient lubrication of the penis, which can cause discomfort during intercourse and may hinder effective sperm transfer.	1
7	'c' is Sertoli cells which provide nutrition to the developing sperms 22+Y or 22+X 'a' is Primary Spermatocyte and 'b' is Secondary spermatocyte	1
		1
		1
8	8.1 B. Pituitary dysfunction leading to low LH and FSH 8.2 C. Hypothalamus → Pituitary → Ovary → Endometrium 8.3 Hormone Replacement Therapy (HRT), Oral Pills, Lifestyle Changes etc. (any two correct treatments) Or correct explanation of follicular development and uterine wall changes	1
		1
		2
		2
9	A) Chorionic villi have a large surface area due to their finger-like projections, allowing efficient exchange of gases, nutrients, and waste between maternal and fetal blood. B) The placenta is called a temporary endocrine gland because it produces hormones only during pregnancy. Two hormones it secretes are: hCG (human chorionic gonadotropin): maintains the corpus luteum and its progesterone secretion. hPL (human placental lactogen): helps in fetal growth and prepares mammary glands for lactation. C) Relaxin is produced later in pregnancy to soften the ligaments of the pelvis and cervix, helping in childbirth by making delivery easier.	1
		1
		1
		1
		1

**Time 20 mins**

**Max. Marks- 20**

Q.No	Question	Marks
1	A couple is trying to conceive but they have been unsuccessful for more than 2 years. What could be the possible reason for their infertility? i. Low sperm Count ii. Blocked Fallopian tube. iii. Hormonal imbalance iv. Lactational amenorrhoea 12. i and iv B. i, ii and iii C. i, and ii D. ii, iii and iv	1
2	Lactational amenorrhoea means A. absence of menstruation during pregnancy B. absence of menstruation during intense lactation C. excessive bleeding during menstruation D. no production and secretion of milk	1
<b>Directions:</b> In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as: A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion. B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion. C. If Assertion is true but Reason is false. D. If both Assertion and Reason are false.		
3	<b>Assertion:</b> Amniocentesis is an important technique to know the proper growth of the foetus yet it is banned in India. <b>Reason:</b> Female Foeticide has been a critical problem in our society since long past.	1
4	<b>Assertion:</b> Reproductive health is a critical aspect of public health. <b>Reason:</b> It affects not only individual but also communities and societies as a whole.	1
5	Study the diagram of the female reproductive system given below. Answer the questions based on the diagram. 13. Identify the contraceptive technique shown in the diagram. B. Mention any two events that are inhibited by the intake of oral contraceptive pills to prevent pregnancy in humans.	2
6	A. Write the importance of counseling in Reproductive Health issues. B. How ICSI is different from ZIFT?	1 1
7	“In rural India, infants are not breast fed immediately after the parturition as it is supposed that for initial 2-3 days mother breast milk is not pure and may cause harm to the baby.” Do you agree with the given statement? Support your view with logics and facts.	3
8	Given below is the diagram of CuT, a commonly used contraceptive method. Based on the information answer the following questions: A mother of one year old daughter wanted to space her second child. Her doctor suggested CuT. Explain its contraceptive actions. 4. Bring out one main difference between CuT and LNG-20. 5. A newly married couple does not want to have child at least for one year and also not to use any contraceptives. Suggest a method to prevent pregnancy. 6. If a woman is using copper-T, will it prevent her from sexually transmitted diseases?	1 1 1 1
9	A large number of married couples the world over are childless. It is shocking to know that in India the female partner is often blamed for the couple being childless. 1. Why in your opinion the female partner is often blamed for such situations in India? 2. State any two reasons responsible for the cause of infertility C. Suggest a technique that can help the couple to have a child where the problem is with the male partner.	2 2 1

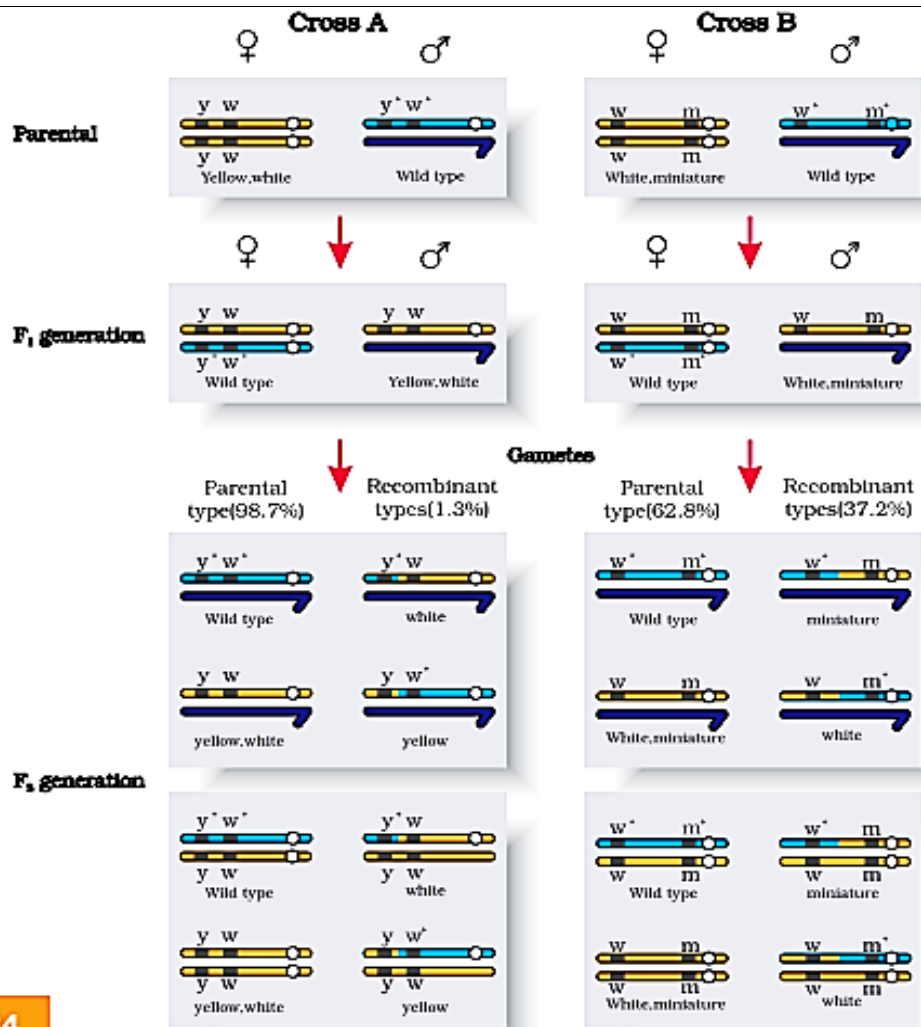
Q. No.	Answers	Marks
1	(b) i, ii and iii	
2	(b) absence of menstruation during intense lactation	
3	(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.	
4	(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.	
5	(i) The diagram depicts the process of tubectomy. (ii) Two events that are inhibited by the intake of oral contraceptive pills to prevent pregnancy in humans are ovulation and implantation.	
6	(a) Through counseling, individuals and couples can improve their emotional well-being, make informed decisions about treatment, strengthen their relationships, and ultimately better prepare for the joys and challenges and parenthood. (b) correct difference .	
7	It is scientifically inaccurate. <b>Colostrum: The "First Milk"</b> The milk produced in the first few days after childbirth is called <b>colostrum</b> . This is a thick, yellowish substance that is rich in nutrients, antibodies, and immune cells. It is not "impure"; in fact, it is one of the most important substances a newborn can receive. Colostrum contains high levels of <b>immunoglobulins (mainly IgA)</b> , which help protect the infant from infections by providing passive immunity. It also acts as a natural laxative to help the newborn pass the first stool (meconium).	
8	(i) CuT increases phagocytosis of sperms within the uterus and the Cu <sup>2+</sup> ions released suppress sperm motility and the fertilising capacity of sperms. (ii) CuT is copper releasing IUDs and LNG-20 is hormone releasing IUDs. Cu <sup>2+</sup> ions released suppress sperm motility and thus the fertilising capacity of sperms decreases. While the hormone releasing IUDs make the uterus unsuitable for implantation and the cervix hostile to the sperms. (iii) Periodic abstinence or coitus interruptus	
9	(A) In India, the female partner is often blamed for a childless marriage due to deep-rooted cultural norms and social expectations surrounding gender roles, marriage, and motherhood. Here are a few reasons why this might happen: 1. <b>Cultural Expectations and Gender Roles</b> 2. Blaming the Woman for Infertility 3. Lack of Awareness (B) Infertility can be caused by various factors, but here are two common reasons: 1. <b>Ovulatory Disorders:</b> Problems with ovulation can prevent the release of eggs from the ovaries. Conditions such as polycystic ovary syndrome (PCOS), thyroid issues, or hormonal imbalances can interfere with normal ovulation, leading to difficulty in conceiving. 1. <b>Fallopian Tube Blockage:</b> Blocked or damaged fallopian tubes can prevent sperm from reaching the egg or the fertilized egg from traveling to the uterus. This can result from conditions like pelvic inflammatory disease (PID), endometriosis, or previous surgeries in the pelvic area. (C) When infertility is related to the male partner, one common technique that can help is <b>Intrauterine Insemination (IUI)</b> combined with <b>sperm washing</b> . 1. <b>Sperm Collection and Processing:</b> In IUI, the male partner provides a sperm sample, which is then processed (or "washed") in the lab. This process removes dead sperm, impurities, and other substances that might interfere with fertilization. 2. <b>Insemination:</b> After processing, the most active sperm are selected and directly inserted into the female partner's uterus during her ovulation window. This increases the chances of the sperm reaching the egg for fertilization.	

**CHAPTER- PRINCIPLES OF INHERITANCE & VARIATION WORK SHEET-1**

Max. Marks – 20

TIME- 20 Min

S.N.	QUESTIONS	MARKS
1	Which of the following characteristics represents Inheritance of blood groups in humans? 1. Dominance                      2. Codominance                      3. Multiple allele 4. Incomplete dominance                      5. Polygenic inheritance A. 2,4 and 5                      B. 2 and 3                      C. 2, 3 and 5                      D. 1, 3 and 5	1
2	In humans, red-green color blindness is an X-linked recessive trait. A woman with normal vision, whose father is color blind, marries a man with normal vision. What is the probability that their first child is a color-blind son? A. 0%                      B. 25%                      C. 50%                      D. 100%	1
3	<b>ASSERTION AND REASON</b> A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, but 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.): In pleiotropy, a single gene influences multiple phenotypic traits. Reason (R): This occurs because the gene product is involved in multiple biochemical pathways.	1
4	Assertion : When yellow bodied, white eyed Drosophila females were hybridised with brown-bodied, red eyed males; and F <sub>1</sub> progeny was intercrossed, F <sub>2</sub> ratio deviated from 9: 3: 3: 1. Reason : When two genes in a dihybrid are on the same chromosome, the proportion of parental gene combinations are much higher than the non-parental type.	1
5	Linkage and crossing over of genes are alternatives of each other, Justify.	2
6	Give an example of a disease or condition that exhibits pleiotropy. Explain how it affects multiple traits.	2
7	Linkage and crossing over are two related processes in genetics that affect how genes are inherited. Linkage refers to the tendency of genes located on the same chromosome to be inherited together, while crossing over is the exchange of genetic material between homologous chromosomes during meiosis. This exchange can break apart linked genes, leading to new combinations of traits in offspring. Answer the following question: What are the factors that affect the occurrence of crossing over during meiosis?	2
8	A. In humans, males are heterogametic and females are homogametic. Explain. Are there any examples where males are homogametic and females heterogametic? B. Also describe as to, who (human male or female) determines the sex of an unborn child?	3
9	Explain why genes that are located far apart on the same chromosome are more likely to be separated by crossing over than genes that are close together.	3
10	Read the following and answer any four questions from (i) to (v) given below : During a study of inheritance of two genes, teacher asked students to perform an experiment. The students crossed white eyed, yellow bodied female Drosophila with a red eyed, brown bodied male Drosophila (i.e., wild.. They observed that progenies in F <sub>2</sub> generation had 1.3 percent recombinants and 98.7 percent parental type combinations. The experimental cross with results is shown in the given figure.[Note: Dominant wild type alleles are represented with (+) sign in superscript.]	4



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(i) By conducting the given experiment, teacher can conclude that

- A. Genes for eye colour and body colour are linked
- B. Genes for eye colour and body colour show complete linkage
- C. Linked gene remain together and are inherited

Choose the best option

- A. A and B only
- B. B only
- C. A and C only
- D. A, B and C

(ii) Teacher asked to conduct an experiment on Drosophila because

- A. the male and female flies are easily distinguishable
- B. it completes its life cycle in about two weeks
- C. a single mating could produce a large number of progeny flies
- D. all of these.

(iii) Genes white eyed and yellow bodied located very close to one another on the same chromosome tend to be transmitted together are called

- A. allelomorphs
- B. identical genes
- C. linked genes
- D. recessive genes

(iv) Select the correct statement regarding the given experiment.

- A. The physical distance between two genes determines strength of linkage
- B. The physical distance between two genes determines frequency of crossing over
- C. The two linked genes always segregate independently of each other
- D. Both (A. and (B.

CHAPTER- PRINCIPLES OF INHERITANCE & VARIATION WORK SHEET-1  
ANSWER KEY

- |   |  |
|---|--|
| 1 | 2. Answer: (B. 2 and 3<br>1. Explanation: ABO blood groups show codominance (A & B expressed together) |
|---|--|



	2. Involve multiple alleles (IA, IB, i)	
2	3. Answer: (C. 50% 4. Explanation: 1. Carrier mother ( $X^N X^c$ ) $\times$ normal father ( $X^N Y$ ) 2. Sons have 50% chance of inheriting the $X^c$ = color-blind	
3	1. Answer: (A. Explanation: 2. One gene affects multiple traits 3. Because it functions in multiple pathways	
4	1. (A. Both are true, and the reason explains the assertion.	
5	Explanation: 1. Linkage keeps genes together 2. Crossing over separates them 3. They work against each other	
6	4. An example of a disease that exhibits pleiotropy is Phenylketonuria (PKU). causing multiple effects across different systems: S. Brain, skin & hair, growth, psychiatric	
7	1 Distance between genes                      2 Chromosome structure 3 External factors                                  4 Recombination hotspots	
8	A. Heterogametic and Homogametic T. Humans: a. Males (XY) – Heterogametic (sperm = X or Y) b. Females (XX) – Homogametic (egg = X only) c. Sex is determined by the male. U. Other examples: a. In birds, butterflies, reptiles: i. Females (ZW) – Heterogametic ii. Males (ZZ) – Homogametic iii. Sex is determined by the female. B. Father (male) decides the sex ( $X \rightarrow$ girl, $Y \rightarrow$ boy).	
9	V. Farther apart = higher chance of crossing over W. More space = more likely recombination point forms between them X. Close genes = less recombination = strong linkage	
10	(i) Conclusion: (D. A, B, and C Y. Genes are linked, show complete linkage, and are inherited together. (ii) Why Drosophila? (D. all of these 1. Easy sex ID, short life cycle, many offspring. (iii) Closely located genes are called: (C. linked genes (iv) What affects linkage/crossover? (D. Both (A. and (B. Z. Physical distance affects both linkage and crossover rate.	

**CHAPTER- PRINCIPLES OF INHERITANCE & VARIATION WORK SHEET-2**

Max. Marks – 20

TIME- 20 Min

S.N.	QUESTIONS	MARKS										
1	<p>As per Mendelian inheritance pattern identify the correct matching.</p> <table><tr><td>Conditions</td><td>Alleles/Genotypes</td></tr><tr><td>1.Dominant allele</td><td>i.TT or tt</td></tr><tr><td>2.Recessive allele</td><td>ii. T</td></tr><tr><td>3.Homozygous</td><td>iii. Tt</td></tr><tr><td>4.Heterozygous</td><td>iv. t</td></tr></table> <p>A. 1-ii, 2-iv, 3-i, 4-iii B. 1-i, 2-ii, 3-iv, 4-iii C. 1-ii, 2-iii, 3-i, 4-iv D. 1-i, 2-ii, 3-iv, 4-iii</p>	Conditions	Alleles/Genotypes	1.Dominant allele	i.TT or tt	2.Recessive allele	ii. T	3.Homozygous	iii. Tt	4.Heterozygous	iv. t	1
Conditions	Alleles/Genotypes											
1.Dominant allele	i.TT or tt											
2.Recessive allele	ii. T											
3.Homozygous	iii. Tt											
4.Heterozygous	iv. t											
2	<p>An allele is said to be dominant when.</p> <p>A. it does not expresses its phenotype in homozygous condition B. it expresses its phenotype in heterozygous condition C. it express only desirable phenotype D. Both (B. and (C.</p>	1										
3	<p>In Antirrhinum (Snapdragon), a red flower was crossed with a white flower and in F1 generation, pink flowers were obtained. When pink flowers were selfed, the F2 generation showed white, red and pink flowers. Choose the incorrect statement from the following.</p> <p>A. Law of segregation apply in this experiment. B. Pink colour in F1 is due to incomplete dominance. C. Ratio of F2 is <math>\frac{1}{4}</math> (ReD.: <math>\frac{2}{4}</math> (Pink): <math>\frac{1}{4}</math> (white). D. The experiment does not follow the principle of dominance.</p>	1										
4	<p>A tall pea plant bearing violet flower is given with unknown genotypes. Explain how would you find the correct genotypes.</p>	2										
5	<p>Name the pattern of inheritance where F1 phenotype:</p> <p>2.       Resemble only one of the parent. 3.       Does not resemble either of the two parents.</p>	2										
6	<p>Why Mendel choose pea plant for their experiment?</p>	2										
7	<p>What will be possible effect when a allele get modified/mutate?</p>	2										
8	<p>A heterozygous round, yellow seeded garden pea (Pisum sativum) was crossed with a double recessive plant.</p> <p>a- What type of cross is this? b- Workout on the genotype and phenotype of the progeny. c- What principle of Mendel is illustrated through the result of this cross?</p>	3										
9	<p>Two genes, A and B, are located on the same chromosome in a plant. A cross between a plant with genotype AABB and a plant with genotype aabb produces F1 plants with genotype AaBb. If you cross two F1 plants, what phenotypic ratios would you expect if the genes are linked and no crossing over occurs? What if crossing over does occur?</p>	3										
10	<p>Explain the phenomena of dominance, multiple allelism and codominance with suitable example.</p>	3										

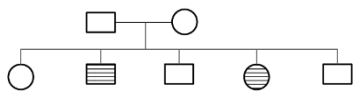
## CHAPTER- PRINCIPLES OF INHERITANCE &amp; VARIATION WORK SHEET-2

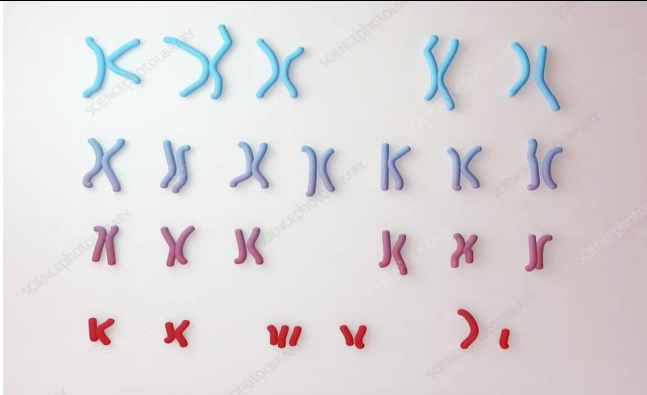
S.N.	ANSWER										
1	A										
2	B										
3	D										
4	By test cross [crossing with dwarf white flower pea plant]										
5	a-Dominance b- Incomplete dominance										
6	4. they are easy to grow 5. have a short life cycle 6. exhibit distinct traits (like seed color or shape) 7. both self- and cross-pollination possible										
7	i- the normal/less efficient enzyme ii- a non-functional enzyme iii- no enzyme at all										
8	a- It is a dihybrid test cross b- Phenotype- round & yellow genotype- RrYy c- It illustrates the Principle of independent assortment.										
9	3:1, 9:3:3:1										
10	ABO blood grouping . <table border="1" data-bbox="188 759 786 1021"> <thead> <tr> <th>Phenotype</th><th>Genotype</th></tr> </thead> <tbody> <tr> <td>Blood Type A</td><td><math>I^A I^A</math> or <math>I^A i</math></td></tr> <tr> <td>Blood Type B</td><td><math>I^B I^B</math> or <math>I^B i</math></td></tr> <tr> <td>Blood Type AB</td><td><math>I^A I^B</math></td></tr> <tr> <td>Blood Type O</td><td><math>ii</math></td></tr> </tbody> </table> Dominance- $I^A i$ , $I^B i$ Multiple allelism- $I^A$ , $I^B$ , $i$ Codominance- $I^A I^B$	Phenotype	Genotype	Blood Type A	$I^A I^A$ or $I^A i$	Blood Type B	$I^B I^B$ or $I^B i$	Blood Type AB	$I^A I^B$	Blood Type O	$ii$
Phenotype	Genotype										
Blood Type A	$I^A I^A$ or $I^A i$										
Blood Type B	$I^B I^B$ or $I^B i$										
Blood Type AB	$I^A I^B$										
Blood Type O	$ii$										

# CHAPTER- PRINCIPLES OF INHERITANCE & VARIATION WORK SHEET-3

Max. Marks – 20

TIME- 20 Min

S.NO	QUESTIONS	MARKS
1	Which of the following is a Mendelian disorder? A. Down syndrome B. Klinefelter syndrome C. Cystic fibrosis D. Turner syndrome	1
2	Sickle cell anemia is caused by: A. Chromosomal mutation B. Addition of a chromosome C. A point mutation in the gene coding for beta-globin chain D. Deletion of a chromosome	1
3.	Assertion-Reason Questions (1 mark each)  Assertion (A.): Thalassemia is a Mendelian disorder. Reason (R): It is caused due to alteration or mutation in a single gene. A. Both A and R are true and R is the correct explanation of A. B. Both A and R are true but R is not the correct explanation of A. C. A is true but R is false. D. A is false but R is true.	1
4	Assertion (A.): Down syndrome is an autosomal disorder. Reason (R): It is caused due to nondisjunction of chromosome 21. A. Both A and R are true and R is the correct explanation of A. B. Both A and R are true but R is not the correct explanation of A. C. A is true but R is false. D. A is false but R is true.	1
5	The pedigree chart given below shows a particular trait which is absent in parents but present in the next generation irrespective of sexes. Draw your conclusion based on the pedigree. 	2
6	What is the cause of phenylketonuria and what are its symptoms?	2
7	Why are males more likely to suffer from X-linked recessive disorders?	2
8	Explain the genetic cause and symptoms of Sickle cell anemia.	3
9	Describe any three chromosomal disorders, including their chromosomal causes.	3

10	<p>Study the karyotype image and answer the following questions:</p> <p>A. Identify the chromosomal disorder.</p> <p>B. Name the chromosomal anomaly observed.</p> <p>C. Mention two symptoms of the disorder.</p> <p>D. Is this a Mendelian or chromosomal disorder? Justify your answer</p>		4
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### CHAPTER- PRINCIPLES OF INHERITANCE & VARIATION WORK SHEET-3

#### Marking scheme

S.NO	Answer key and Marking Scheme	MARKS
1	C. Cystic fibrosis (1 mark for correct answer)	1
2	C. A point mutation in the gene coding for beta-globin chain (1 mark for correct answer)	1
3.	A. Both A and R are true and R is the correct explanation of A.(1 mark for correct answer)	1
4	A. Both A and R are true and R is the correct explanation of A.	1
5	Based on pedigree, both the parents are a carrier and among the offspring's a few shows the trait which is indifferent of sex. The other one may either normal or carrier	2
6	<p>Cause and Symptoms of Phenylketonuria:</p> <ul style="list-style-type: none"> <li>•Cause: Mutation in the gene coding for the enzyme phenylalanine hydroxylase</li> <li>•Symptoms: Mental retardation, musty odour in urine, delayed development</li> </ul> <p>(1 mark for cause, 1 mark for any two symptoms)</p>	2
7	<p>Reason Males are More Likely to Suffer from X-linked Disorders:</p> <ul style="list-style-type: none"> <li>•Males have only one X chromosome; a single recessive mutation on it leads to disorder (Full 2 marks for correct explanation)</li> </ul>	2

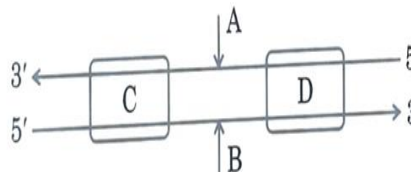
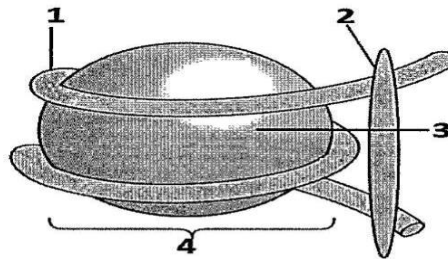
8	<p>Sickle Cell Anemia:</p> <ul style="list-style-type: none"> <li>•Genetic Cause: Point mutation in the beta-globin gene (GAG to GTG)</li> <li>•Symptoms: Anemia, fatigue, pain episodes, organ damage (1 mark for cause, 2 marks for at least two correct symptoms)</li> </ul>	3
9	<p>Three Chromosomal Disorders:</p> <ul style="list-style-type: none"> <li>•Down Syndrome: Trisomy 21</li> <li>•Turner Syndrome: Monosomy X (XO)</li> <li>•Klinefelter Syndrome: XXY condition</li> </ul> <p>(1 mark for each correctly named disorder with chromosomal cause)</p>	3
10	<p>10.A. Disorder: Down syndrome</p> <p>B. Anomaly: Trisomy 21 (extra chromosome on 21<sup>st</sup> pair of chromosome)</p> <p>C. Symptoms: Intellectual disability, distinct facial features</p> <p>D. Type: Chromosomal disorder – due to abnormal number of chromosomes</p> <ul style="list-style-type: none"> <li>• A. 1 mark</li> <li>• B. 1 mark</li> <li>• C. 1 mark for any two valid symptoms</li> <li>• D. 1 mark for correct classification with justification</li> </ul>	4

# Chapter: 5 (Molecular Basis Of Inheritance) Worksheet 1

Max. Marks: 20

Time: 20 Minutes

S.N.	Question	Marks
1.	Which one of the following triplet codes, is correctly matched with its specificity for an amino acid in protein synthesis or as 'start' or 'stop' codon? A. UCG – Start    B. UUU – Stop    C. UGU – Leucine    D. AUG– Methionine	1
2.	During DNA replication, Okazaki fragments are used to elongate A. the lagging strand towards replication fork B. the leading strand away from replication fork C. the lagging strand away from the replication fork D. the leading strand towards replication fork.	1
3.	If the DNA codons are ATG ATG ATG and a cytosine base is inserted at the beginning, then which of the following will result? A. CAT GAT GAT G    B. A non-sense mutation    C. C ATG ATG ATG    D. CA TGA TGA TG	1
4.	Which of the following country is not involved in the Human genome project? 8.        Japan                      B. India                      C. China                      D. Switzerland	1
5.	Mention the main difference between genes of prokaryotes and eukaryotes.	2
6.	An mRNA also has some additional sequences that are not translated and are referred to as untranslated regions (UTR). Describe their significance. At which end they are present?	2
7.	a. Label the given diagram as asked 1, 2, 3 and 4 b. There are some basic amino acids which are positively charged bind to the negatively charged DNA to form a structure constituting the repeating unit of a structure in nucleus called chromatin. Name the two amino acids.	3
8.	The process of copying the genetic information from one strand of DNA into RNA is termed a transcription. The principle of complementarity of bases govern the process of transcription, except that uracil comes in place of thymine. Study the complete transcription unit given below and answer the following questions: (a) Name the main enzyme involved in the process of transcription. (b) Identify coding strand and template strand of DNA in the transcription unit. (c) Identify (C) and (D) in the diagram, mention their significance in the process of transcription.	4
9.	The lac operon is a polycistronic gene that helps a bacterial cell in metabolising lactose. It consists of an inducer i-gene that represses the transcription of lac genes under certain environmental conditions. (a) Why is the lac gene called polycistronic? (b) What would happen if there was a mutation blocking the translation of: (i) gene z    (ii) gene y (c) What happens to the expression of the lac operon when the growth medium is provided with: (i) both glucose and lactose    (ii) only galactose	5



## Chapter: 5 (Molecular Basis Of Inheritance) Worksheet 1    Marking Scheme

1.	C	1
2.	D	1
3.	A	1

4.	C	1
5.	Monocistronic gene arrangement in eukaryotes and polycistronic gene arrangement in prokaryotes.	1+1
6.	UTR helps in efficient translation, they are present at both 5' and 3' ends.	1+1
7.	(a) DNA, H1, Histone, Nucleosome. (b) Arginine and Lysine.	1/2×4 1
8.	(a) DNA dependent RNA Polymerase (b) coding: 5'-3', template:3'-5' (c) C: promotor D: terminator and their role.	1 1/2×2 1/2×2 1
9.	(a) It has a single promoter for multiple connected genes. OR (a) A single mRNA is transcribed to be translated to multiple proteins. (b) (i) Lactose will not be able to enter into the bacterial cell. (ii) Lactose will enter the cell but will not be broken down into glucose and galactose. (c) (i) Glucose is the preferred carbon source. It is consumed first while lactose induces the lac operon producing small levels of the lac proteins. (ii) In the absence of lactose, the repressor protein will continue binding to the operator of the lac operon preventing transcription of its genes.	1  1 1 1 1



	CHAPTER 5 : MOLECULAR BASIS OF INHERITANCE GRADED WORKSHEET- 2	
	Total marks: 20 Time: 20 min	
	<b>Section A: Multiple choice (1×2)</b>	
1	Which of the following statement is true for double helical structure proposed by Watson and Crick? 9. The two strands of DNA are complementary to each other under antiparallel. 10. The backbone of the molecule is constituted by nitrogenous bases which projects outward. 11. The nitrogen bases in two strands are paired through glycosidic bonds. 12. The two strands are coiled in right-handed fashion with the pitch of the helix being 2.4 nm.	1
2	Which term is used for the stretch of DNA that codes for a polypeptide? 13. Cistron                      b. Muton                      c. Recon d. Intron	1
	Two statements are given below in Q3 and Q4- one is an Assertion (A) and the other is a Reason (R).	
	A. Both A and R are true, and R is the correct explanation for A. B. Both A and R are true, but R is not the correct explanation for A. C. A is true, but R is false. D. A is false, but R is true.	
3	Assertion: A probe having radioactive isotope is helpful in detecting specific DNA sequences. Reason: The probe is often a double stranded DNA with base sequences complementary to the DNA sequence to be detected.	1 1
4	Assertion(A): DNA-dependent RNA polymerase catalyses polymerisation in the 5' to 3' direction. Reason (R): The strand with 5' to 3' polarity is called the coding strand.	1
5	A DNA sequence consists of 35% cytosine nucleotides. What would be the percentage of adenine nucleotides in the same DNA sequence? Justify your answer.	2
6	Why both the strands are not copied during transcription?	2
7	In an experiment, two strains of bacteria – one smooth and virulent (S) and another rough and non-virulent (R) were injected into mice. When heat killed S strain and live R strain were injected together, the mice died and live strain bacteria were recovered from them. 14. Name the scientist known to perform this experiment. 15. What conclusion did he draw from the experiment? 16. Name the process involved in the transformation of R to S strain.	3

<p>8</p>	<p>At a crime scene, investigators recovered a small blood sample believed to belong to the suspect. Three individuals have been arrested based on circumstantial evidence. DNA profiles have been extracted from all three individuals and compared to the DNA found at the scene.</p> <p>Task for students after observing the given dig:</p> <div data-bbox="844 76 1321 492"> </div> <p>17. This technique is popularly known by the name _____</p> <p>18. The given technique uses VNTR as it shows a high degree of polymorphism. Expand VNTR?</p> <p>19. Examine the given DNA profiles and match the crime scene DNA with the correct individual under arrest.</p> <p>20. Rearrange the following steps involved in DNA finger printing</p> <ol style="list-style-type: none"> <li>Hybridisation using labelled VNTR probe</li> <li>Separation of DNA fragments by electrophoresis</li> <li>Isolation of DNA</li> <li>Detection of hybridised DNA fragments by autoradiography</li> <li>Transferring (blotting) of separated DNA fragments to synthetic membranes, such as nitrocellulose or nylon</li> <li>Digestion of DNA by restriction endonucleases</li> </ol> <p>(A) iii, vi, ii, v, i, iv      (B) iii, vi, ii, iv, v, i (C) ii, v, i, iv, iii, vi      (D) ii, vi, iii, v, i, iv</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>9</p>	<p>Observe the following diagram and answer the following.</p> <div data-bbox="379 1272 1203 1666"> <p>(Separation of DNA by Centrifugation) Meselson and Stahl's Experiment</p> </div> <p>21. What was the aim of performing this experiment?</p> <p>22. A similar experiment was performed involving radioactive _____ on <i>Vicia faba</i> by _____.</p> <p>23. If this experiment is continued for 80 minutes (till third generation) then what would be the ratio of DNA containing <math>N^{15}/N^{15}:N^{15}/N^{14}:N^{14}/N^{14}</math> in the medium?</p> <p>24. Separation of DNA strands by centrifugation was performed in which medium?</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>

## ANSWER KEY

25. A

26. A

27. C

28. B

**Q5)** If Cytosine nucleotides constitute 35% then according to Chargaff's rule guanine will also be 35%. Remaining 30% will be adenine and thymine. As the bond is formed between adenine and guanine therefore the percentage constituted by adenine will be 15%.

**Q6)** Both the strands are not transcribed during DNA translation because if both the strands are transcribed then both the strands will produce mRNA that will be complementary to each other and thus will form double stranded RNA stopping the process of translation.

**Q7)** (a) Frederick Griffith

29. He concluded that R strain bacteria had somehow been transformed by the heat killed S strain bacteria.

30. Some transforming principle transferred from heat killed S strain, had enabled the R strain to synthesise a smooth polysaccharide coat and become virulent.

**Q8)** (a) DNA fingerprinting

1. Variable Number of Tandem Repeats

2. Mike is the criminal

3. A

**Q9)** (a) To prove semiconservative replication of DNA

1. thymidine and Taylor Et al

2. 0:1:3

3. Cesium chloride (CsCl)

## Chapter 6: Evolution Worksheet - 1

Total Marks: 20

Time: 20 minutes

Q1.	The theory of natural selection was proposed by: A) Lamarck B) Wallace C) Charles Darwin D) Hugo de Vries	1
Q2.	Which of the following is not a vestigial organ in humans? A) Appendix B) Coccyx C) Ear muscles D) Kidney	1
Q3.	Industrial melanism is an example of: A) Genetic drift B) Natural selection C) Mutation D) Artificial selection	1
	Two statements are given below in Q4 and Q5 one is an Assertion (A) and the other is a Reason (R). Choose from the following given options: A. Both A and R are true, and R is the correct explanation for A. B. Both A and R are true, but R is not the correct explanation for A. C. A is true, but R is false. D. A is false, but R is true.	1
Q4.	<b>Assertion (A):</b> The wings of a butterfly and the wings of a bat are analogous organs. <b>Reason (R):</b> They have a common origin but different functions. A) Both A and R are true, and R is the correct explanation of A B) Both A and R are true, but R is not the correct explanation of A C) A is true, but R is false D) A is false, but R is true	1
Q5.	<b>Assertion (A):</b> Genetic drift affects smaller populations more significantly. <b>Reason (R):</b> In large populations, chance events have a negligible effect on allele frequencies. A) Both A and R are true, and R is the correct explanation of A B) Both A and R are true, but R is not the correct explanation of A C) A is true, but R is false D) A is false, but R is true	1
Q6.	Differentiate between homologous and analogous organs with one example each.	2
Q7.	What is Hardy-Weinberg principle? Write any one factor that can affect it.	2
Q8.	Mention any three evidences that support the theory of evolution.	3
Q9.	Explain how variations help in evolution.	3
Q10.	Describe Darwin's theory of natural selection.	5

## Chapter 6: Evolution Worksheet - 1

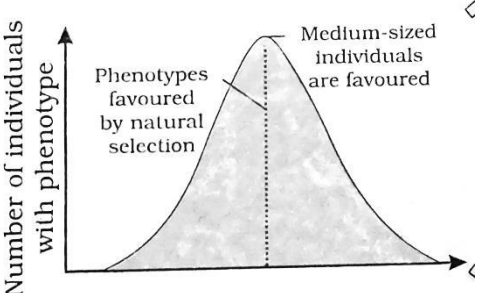
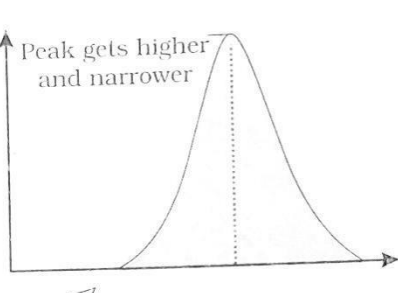
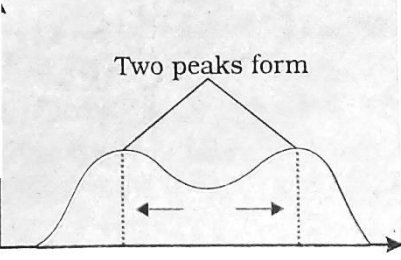
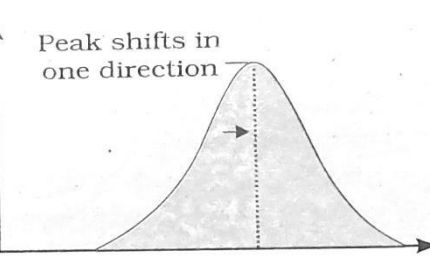
Marking Scheme	
9.	<b>Answer:</b> C) Charles Darwin
10.	<b>Answer:</b> D) Kidney
11.	<b>Answer:</b> B) Natural selection
12.	<b>Answer:</b> C) A is true, but R is false <b>Hint:</b> Analogous organs have similar functions but different origins.
13.	<b>Answer:</b> A) Both A and R are true, and R is the correct explanation of A
14.	<b>Homologous organs:</b> Same origin, different functions (e.g., forelimbs of humans and bats). <b>Analogous organs:</b> Different origin, same functions (e.g., wings of birds and insects).
15.	It states that allele frequencies in a population remain constant from generation to generation in the absence of evolutionary influences. One affecting factor: Mutation, gene flow, genetic drift, non-random mating, natural selection.
16.	Fossil records (e.g., Archaeopteryx), Comparative anatomy (homologous organs), Molecular evidence (similarities in DNA and proteins).
17.	Variations provide material for natural selection. Beneficial traits enhance survival and reproduction. Over time, favorable traits become common in the population, leading to evolution.
18.	<b>Overproduction:</b> Organisms produce more offspring than can survive. <b>Variation:</b> Individuals in a population show variations. <b>Struggle for existence:</b> Due to limited resources, there is competition. <b>Survival of the fittest:</b> Individuals with favorable variations survive. <b>Inheritance:</b> These variations are passed on to the next generation. Over generations, this leads to the evolution of new species.

## CHAPTER 6: EVOLUTION Worksheet - 2

TIME: 20 min

M.M:

20

<b>Q1.</b>	Select the odd pair with reference to analogy. A. Acacia throne:cactus throne B. Pitcher of pitcher plant:cactus throne C. Bird wings:insect wings D. Human fore limb:tiger fore limb	<b>1</b>
<b>Q2.</b>	<p>Select the possible <b>in-correct</b> combination with figure and given formula:</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <p>(A) </p> <p><math>P^2+2pq+q^2 = 1</math></p> </div> <div style="width: 50%;"> <p>(B) </p> <p><math>P^2+2pq+q^2 = 0.8</math></p> </div> <div style="width: 50%;"> <p>(c) </p> <p><math>P^2+2pq+q^2 = 0.6</math></p> </div> <div style="width: 50%;"> <p>(D) </p> <p><math>P^2+2pq+q^2 = 0.5</math></p> </div> </div>	<b>1</b>
<b>Q3.</b>	<p><b>Assertion:</b> Limited resource and limited geographical area promote analogy.</p> <p><b>Reason:</b> Analogy reflects convergent pattern of evolution.</p> <p>A) Both A and R are true, and R is the correct explanation of A          B) Both A and R are true, but R is not the correct explanation of A          C) A is true, but R is false          D) A is false, but R is true</p>	<b>1</b>
<b>Q4.</b>	Consider a population showing great change in its allelic frequencies. Enlist the effects of these changes in this population.	<b>2</b>
<b>Q5.</b>	Compare the current atmosphere with the atmosphere at the time of origin of life.	<b>2</b>
<b>Q6.</b>	How Darwin finches evolved?	<b>2</b>
<b>Q7.</b>	How the biochemicals present in different organisms provide evidence of evolution?	<b>2</b>
<b>Q8.</b>	<p>In a given population (population size 500) have 25% homozygous dominant plants. Calculate the following assuming that the population is following the Hardy Weinberg law:</p> <p>19. Frequency and number of homozygous dominant plants.          20. Frequency and number of heterozygous plants.</p>	<b>3</b>
<b>Q9.</b>	Can industrial melanism in insects is possible in India? If yes mention any place with reason.	<b>3</b>
<b>Q10.</b>	Compare between divergent and convergent evolution?	<b>3</b>

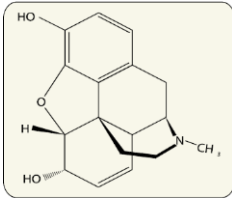
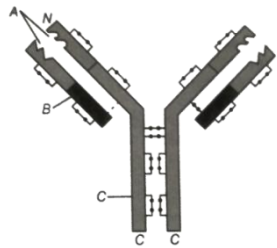
## CHAPTER 6: EVOLUTION Worksheet - 2

### MARKING SCHEME


Q1. A
Q2. A
Q3. B
Q4. Speciation/ origin of new species/ branching ..
Q5. Comparison in terms of presence and absence of gases like oxygen/ temperature etc.
Q6. Change in food habits due to limited resources and resource partitioning.
Q7. Similar protein and genes in different organisms performing same function provide the evidence.
Q8. Answer: A: $P^2 + 2pq + q^2 = 1$ AA = P2 P2 = 25% $P2 = 25/100 = 0.25$ P2 = 0.25 $P = \sqrt{0.25} = 0.5$ (No of plants with homozygous dominant = $25/100 \times 500 = 125$ ) Answer: B: $p + q = 1$ $1 - 0.25 = q$ $0.75 = q$ (No of plants with homozygous recessive = $75/100 \times 500 = 375$ )
Q9. Yes. Any industrial area like Kanpur/Delhi/Maharashtra/Dhanbad. Because of air pollution.
Q10. Divergent evolution shows homology with diverse habitat. Convergent evolution shows analogy in limited geographical areas.
OR
Yes. Fossils provide important geobiological events taken place in the past time. Comparison of the fossils with the current organisms provide the phylogenetic relationship.

Max.Marks.: 20

TIME: - 90 min.

S.NO	QUESTIONS	MARKS
1	Which of the following drug does <b>not</b> give relief in allergy? a) antihistamine                      b) adrenalin                      c) streptokinase                      d) steroid	1
2	Identify the drug  a) morphine                      b) cannabinoid c) cocaine                      d) barbiturate	1
3.	Which of the following is <b>not</b> an example of Passive immunity? a) colostrum                      b) antivenom for snake bite c) antitoxin for tetanus                      d) vaccine for corona virus	1
4	Identify quick immune response case? a) Directly inject weakened pathogen at time of emergency. b) Directly inject preformed antigens. c) Directly inject preformed antibodies. d) Directly inject immunosuppressant.	1
	<b>Directions:</b> In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:  (a) Both assertion and reason are true, and reason is the correct explanation of assertion.  (b) Both assertion and reason are true, but reason is not the correct explanation of assertion.  (c) Assertion is true but reason is false.  (d) Assertion is false but reason is true.	
5	Assertion: Some antigens present in the environment cause allergy. Reason: Drugs like anti-histamine quickly reduce the symptoms of allergy.	1
6	Assertion: <i>Erythroxylum coca</i> is cultivated to obtain drugs. Reason: Cocaine is obtained from its latex.	1
7	Label the A,B, and C in given antibody molecule. 	3



8	<p>Observe the image of the plant and answer the following questions.</p> <p>(a) Write its scientific name.</p> <p>(b) Name the drug obtained from the plant.</p> <p>(c) Write the effects of the drug obtained from this plant.</p> 	3
9	<p>Sameer has attended a birthday party hosted by one of his classmate. He found some guests at the party sitting in a corner making a lot of noise and consuming 'something'. After a while one of the boy from the group started screaming, behaving abnormally and sweating profusely. On enquiry you found that the group members were taking drugs.</p> <p>(a) What did he observed there in party and what precautions would he take?</p> <p>(b) Prepare a note to be circulated among the schoolmates about the sources and dangers of any two drugs.</p> <p>(c) Write any two ways that you will suggest to your school principal so as to promote awareness among the youth against the use of these drugs.</p>	1+2+1
10	<p>The overall ability of the host to fight the disease-causing organisms, conferred by the immune system is called immunity.</p> <div data-bbox="272 1059 1147 1422" data-label="Diagram"> <pre> graph LR     Immunity --&gt; InnateImmunity[Innate Immunity]     Immunity --&gt; AdaptiveImmunity[Adaptive Immunity]     AdaptiveImmunity --&gt; Natural[Natural]     AdaptiveImmunity --&gt; Artificial[Artificial]     Natural --&gt; PassiveMaternal[Passive (maternal)]     Natural --&gt; ActiveInfection[Active (Infection)]     Artificial --&gt; PassiveAntibody[Passive (antibody transfer)]     Artificial --&gt; ActiveImmunization[Active (immunization)] </pre> </div> <p>Based on the above flow chart answer the following questions:</p> <p><b>1. Which of the following immunity is present from our birth?</b></p> <p>(a) Innate Immunity                      (b) Active immunity</p> <p>(c) Passive immunity                      (d) Acquired immunity</p> <p><b>2. Type of cell responsible for graft rejection / organ transplant failure is.</b></p> <p>(a) T-cells                                      (b) B-cells</p> <p>(c) Mast cells                                      (d) Both T and B cells</p> <p><b>3. Give one example each of primary and secondary lymphoid organs.</b></p> <p><b>4. Name the antibody that is</b></p>	4

	(a) responsible for allergy (b) present in colostrum	
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**Answer Key - Chapter-7 Human Health And Disease Work Sheet -2**

S.NO	Answer key and Marking Scheme	MARKS									
1	c) streptokinase	1									
2	a) morphine	1									
3.	d) vaccine for corona virus	1									
4	c) Directly inject preformed antibodies.	1									
5	(b) Both assertion and reason are true, but reason is not the correct explanation of assertion.										
6	(c) Assertion is true but reason is false.	1									
7	A. Antigen binding site B. Light chain C. Heavy chain	3									
8	(a) <i>Papaver somniferum</i> (b) morphine (c) the drug works as a depressant and slows down body functions.	3									
9	(a) He observed effects of drug abuse and he should aware about harmful effects of drug abuse and try to keep himself away from it. (b) <table border="1"> <thead> <tr> <th>Drug</th><th>Source</th><th>Effect</th></tr> </thead> <tbody> <tr> <td>Cocaine</td><td>Erythroxylum coca</td><td>Affects central nervous system and interferes with transport of dopamine.</td></tr> <tr> <td>Opioids/ Heroin/Smack</td><td>Latex of Papaver somniferum (poppy plant)</td><td>Slows down body functions.</td></tr> </tbody> </table>	Drug	Source	Effect	Cocaine	Erythroxylum coca	Affects central nervous system and interferes with transport of dopamine.	Opioids/ Heroin/Smack	Latex of Papaver somniferum (poppy plant)	Slows down body functions.	1+2+1
Drug	Source	Effect									
Cocaine	Erythroxylum coca	Affects central nervous system and interferes with transport of dopamine.									
Opioids/ Heroin/Smack	Latex of Papaver somniferum (poppy plant)	Slows down body functions.									

	Cannabinoids	Cannabis sativa	Affects cardiovascular system	
	(c) Awareness can be promoted by organising poster making competitions, street plays, talks by experts and interviews of experts.			
10	1. (a) Innate Immunity 2. (a) T-cells 3. primary lymphoid organs- bone marrow and thymus secondary lymphoid organs- spleen, lymph nodes, tonsils, Peyer's patches of small intestine. 4. (a) IgE (b) IgA			4

### Chapter-7 Human Health And Disease Worksheet - 1

Max. Marks.: 20

TIME: - 20 min.

S.NO	QUESTIONS	MARKS
1	<p>Enzyme-linked immuno sorbent assay (ELISA) is used for testing if the patient is suffering from AIDS or not. In this test, the enzyme-linked antibodies bind to _____ in the blood sample and help in their detection. Fill in the blank –</p> <p>A. HIV DNA      B. HIV RNA      C. HIV antigen      D. HIV reverse transcriptase</p>	1
2	<p>Antibiotics are most effective against which type of infection?</p> <p>A. Filaria      B. Ringworm      C. Tuberculosis      D. Rheumatoid arthritis.</p>	1
3.	<p>Which enzyme is required for transcription of viral RNA to Viral DNA in replication of retrovirus?</p> <p>A. DNA ligase      B. Restriction enzyme      C. Reverse transcriptase      D. None of these</p>	1
4	<p>A patient presents with persistent fatigue, weight loss and night sweats. Further investigation reveals the presence of mycobacterium tuberculosis in their sputum.</p> <p>What is the most likely diagnosis and the primary prevention strategy?</p> <p>A. Diagnosis: Tuberculosis: Prevention: Vaccination with BCG</p> <p>B. Diagnosis: HIV/AIDS; Prevention: Regular HIV testing and adherence to treatment.</p> <p>C. Diagnosis: Influenza: Prevention: Annual influenza vaccination.</p> <p>D. Diagnosis: Malaria: Prevention: Mosquito net and insecticide spraying.</p>	1
	<p><b>Directions:</b> In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:</p> <p>(A) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.</p>	

	<p>(B) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.</p> <p>(C) If Assertion is true but Reason is false.</p> <p>(D) If Assertion is false and Reason are true.</p>	
5	<p><b>Assertion:</b> <i>Streptococcus pneumoniae</i> and <i>Haemophilus influenzae</i> are responsible for causing infectious diseases in human beings.</p> <p><b>Reason:</b> A healthy person acquires the infection by inhaling the droplets/aerosols released by an infected person.</p>	1
6	<p><b>Assertion:</b> Cancer is contagious and cells can spread from one person to other.</p> <p><b>Reason:</b> Cancerous cells are highly dedifferentiated cells.</p>	1
7	<p>A. Sometimes , due to genetic and other unknown reasons, the body attacks self cells.This results in damage to the body. Give the name of disease with example.</p> <p>B. Cells sloughed from such tumors reach distant sites through blood, and where ever the get lodged in body, they start new tumor there. Give name of property this type of tumors.</p>	2
8	Expand the following- MALT,BCG,NACO,MRI	2
9	<p>An infection with <i>Wuchereria bancrofti</i> leads to symptoms such as swollen lymph nodes.</p> <p>(a) What are the hosts that <i>Wuchereria bancrofti</i> resides in?</p> <p>(b) Give TWO reasons why the lymphatic system provides a better environment for <i>Wuchereria bancrofti</i> than the circulatory system.</p>	2
10	<p>Mark the following statements as TRUE or FALSE, and support your answer with a reason.</p> <p>(i) Vector-borne diseases are caused only by protozoans.</p> <p>(ii) All infectious diseases caused by bacteria spread through air.</p> <p>(iii) Only infectious diseases are caused by virus.</p>	3
11	<p>A patient is suffering from fatigue, high fever, and weight loss, and has been observing an increasing number and size of lumps in various regions of her body over a very short time.</p> <p>21. What could she be suffering from?</p> <p>22. Mention FOUR ways in which the disease identified in (a) is caused and FOUR techniques that can be used to diagnose it.</p>	<p>1+2</p> <p>+2=5</p>

### **ANSWETR KEY -WORK SHEET -1 (2025-26)**

S.NO	Answer key and Marking Scheme	MARKS
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1	C. HIV antigen	1
2	C. Tuberculosis	1
3.	C Reverse transcriptase	1
4	A. Diagnosis: Tuberculosis: Prevention: Vaccination with BCG	1
5	(A) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.	
6	(D) If Assertion is false and Reason is true.	1
7	A. Autoimmune disease, Rheumatoid arthritis B. Metastasis	2
8	Expend the following-  MALT—MUCOSA ASSOCIATED LYMPHOID TISSUE  BCG-BACILLUS CALMETTE GUERIN  NACO—NATIONAL AIDS CONTROL ORGANISATION  MRI—MAGNETIC RESONANCE IMAGING	2
9	(a) The hosts that Wuchereria bancrofti resides in, are as follows [0.5 marks each for the following]: - Humans - Mosquitoes  (b) The lymphatic system offers a more favourable environment for Wuchereria bancrofti as compared to the circulatory system because of the following reasons [0.5 mark each for any two of the following reasons]: -  -The slower flow rate of the lymphatic system as compared to the circulatory system makes it a more stable environment for the parasite to thrive in.  - As the lymphatic system contains fewer immune cells than the circulatory system, parasites residing in it can evade detection by the immune system.  - As compared to blood, the lymphatic fluid is a more constant source of lipids, proteins and other essential nutrients needed for the growth of Wuchereria bancrofti.  [Accept any other valid answer]	2
10	(i) <b>FALSE</b> -Vector-borne diseases are not caused only by protozoans. They can be caused by parasites, bacteria or viruses.  (ii) <b>FALSE</b> - Not All infectious diseases caused by bacteria spread through air. While some bacterial infections like tuberculosis.  (iii) <b>FALSE</b> - Only infectious diseases are NOT caused by virus. Some by bacteria , fungi and protozoa.	3
11	23. Lymphoma.	

	<p>(b) <b>FOUR causes</b>- genetic mutation, immune system deficiencies, exposure to certain infections and exposure to certain chemicals or radiation.</p> <p><b>FOUR diagnose</b> - genetic exam, blood test, lymph node biopsy and CT scans</p>	<p>1+2+2 =5</p>
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### CHAPTER – 8 (Microbes in Human Welfare)

**Max. Marks – 20**

**Time Allotted : 20 min.**

Sl. No.	Questions	Marks
1.	Which one of the following is not true about antibiotics? A. First antibiotic was discovered by Alexander Flemming. B. The term 'antibiotic' was coined by S. Waksman in 1942. C. Some persons can be allergic to a particular antibiotic. D. Each antibiotic is effective only against one particular kind of germ.	1
2.	Statins, a bioactive molecule, inhibiting the enzyme responsible for synthesis of A. carbohydrate B. protein C. Vitamin D. cholesterol	1
3.	Lactobacillus mediated change of milk to curd occurs due to A. coagulation and partial digestion of milk fats. B. coagulation and partial digestion of milk proteins. C. coagulation of milk fats and complete digestion of proteins. D. coagulation of milk proteins and complete digestion of milk fats.	1
	<p>Directions: In the following questions ( 4 and 5), a statement of assertion is followed by a statement of reason. Mark the correct choice as:</p> <p>A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion. B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion. C. If Assertion is true but Reason is false. D. If both Assertion and Reason are false.</p>	
4.	<p>Assertion: Secondary treatment of sewage is also called biological treatment while primary treatment is called physical treatment.</p> <p>Reason: Primary sewage treatment depends only upon sedimentation properties of materials present in sewage and filtration.</p>	1
5.	<p>Assertion: An organ transplant patient if not provided with cyclosporin A , may reject the transplanted organ.</p> <p>Reason: Cyclosporin A inhibits activation of T-cells and interferes with destruction of non-self cells.</p>	1
6.	Do you think microbes can also be used as source of energy? If yes, how?	2
7.	Three water samples namely river water, untreated sewage water and secondary effluent	2

	discharged from a sewage treatment plant were subjected to BOD test. The samples were labelled A, B and C; but the laboratory attendant did not note which was which. The BOD values of the three samples A, B and C were recorded as 20 mg/L, 8 mg/L and 400 mg/L, respectively. Which sample of the water is most polluted? Can you assign the correct label to each assuming the river water is relatively clean?	
8.	Describe how do 'flocs' and 'activated sludge' help in Sewage Treatment.	2
9.	Microbes can be used to decrease the use of chemical fertilizers and pesticides. Explain how this can be accomplished.	3
10.	Baculoviruses are good example of biocontrol agents. Justify giving three reasons.	3
11.	(a) Organic farmers prefer biological control of diseases and pests to the use of chemicals for the same purpose. Justify. (b) Give an example of a bacterium, a fungus and an insect that are used as biocontrol agents.	(1.5 +1.5)

## Chapter – 8 (Microbes in Human Welfare)

Sl. No.	Answers	Marks
1.	D	1
2.	D	1
3.	C	1
4.	B	1
5.	A	1
6.	Yes, microbes can be used to produce energy indirectly. - Methanogens (bacteria) like <i>Methanobacterium</i> are involved in the production of biogas which is used as source of energy.	2
7.	Sample C is most polluted (Highest BOD). Sample A-River water Sample B- Secondary effluent (Least BOD) Sample C- Untreated sewage (Highest BOD)	2
8.	Flocs - Aerobic microbes consume the major part of the organic matter in the effluent, significantly reduces BOD. Activated sludge - Small part of activated sludge is used as inoculum and pumped back to aeration tank and pumped into anaerobic sludge digesters where microbes or bacteria grow anaerobically to produce CH <sub>4</sub> or H <sub>2</sub> S or CO <sub>2</sub> or biogas.	2
9.	Microbes can be used both as fertilizers and pesticides called biofertilizers and biopesticides respectively. Microbes are used as biofertilisers to enrich the soil nutrients, eg <i>Rhizobium</i> , <i>Azotobacter</i> , <i>Azospirillum</i> , etc. which can fix atmospheric nitrogen in the soil. <i>Bacillus thuringiensis</i> bacteria act as biopesticide to control the growth of insect pests. <i>Trichoderma</i> , fungal species, is an effective biocontrol agent of several plant pathogens. <i>Baculoviruses</i> used as control agents in genus <i>Nucleopolyhedrovirus</i> are excellent for species-specific, narrow spectrum insecticidal applications.	3
10.	Baculoviruses are pathogens that attack insects and other arthropods. – Most of these bio control agents belongs to the genus Nucleopolyhedrovirus. – These are species-specific, narrow spectrum insecticides. – They do not harm plants, mammals, birds, fish and other non-target insects. – Baculoviruses are helpful in integrated pest management(IPM) programme, in which	3

	beneficial insects are conserved and there is no negative impact on plant mammals, birds, fish or non target insects. ( Any three).	
11.	(a) – Reduces dependence on toxic chemicals. – Protects our ecosystem or environment. – Protects and conserves non-target organisms / they are species – specific. – These chemicals being non-biodegradable may pollute the environment permanently. – These chemicals being non-biodegradable may cause biomagnifications (b) Bacteria – Bacillus thuringiensis Fungus – Trichoderma Insect – Ladybird / Dragonfly / Moth or any other correct example.	(1.5 +1.5)

## Chapter – 9 (Biotechnology- Principles and Processes)

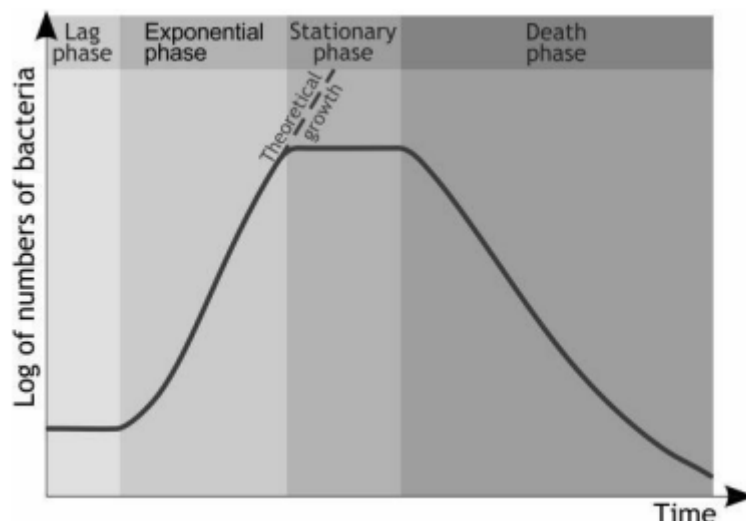
**Max. Marks – 20**

**Time Allotted : 20 min.**

Sl. No.	Questions	Marks
1.	The separated bands of desired DNA are cut out from the agarose gel and extracted from the gel piece is known as A. Southern blotting B. Centrifugation C. Elution D. Gel electrophoresis	1
2.	Genetic engineering is:- A. Study of extra nuclear gene B. Manipulation of genes by artificial method C. Manipulation of RNA D. Manipulation of enzymes	1
	Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as: A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion. B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion. C. If Assertion is true but Reason is false. D. If both Assertion and Reason are false.	
3.	Assertion: Retroviruses in animals have the ability to transform normal cells into cancerous cells. Reason: The retrovirus should have been disarmed whenever it will be used to deliver desirable genes into animal cells.	1
4.	Assertion : Vector DNA and foreign DNA are cut by same restriction endonuclease. Reason: Digestion of vector DNA and foreign DNA with same enzyme produces complementary sticky ends.	1
5.	Besides better aeration and mixing properties, what other advantages do stirred-tank bioreactors have over shake flasks?	2
6.	Can you think and answer how a reporter enzyme can be used to monitor transformation of host cells by foreign DNA in addition to a selectable marker?	2
7.	Why must a cell be made 'competent' in biotechnology experiments? How does calcium ion help in doing so?	3
8.	The large-scale production of an organism is generally done in a bio-processor unit. Given	4



below is the growth curve of a bacteria that is being used for the production of a recombinant molecule. Maintaining sterile conditions is of utmost importance in a bio-processor unit.



- (a) In which phase the cells are likely to be producing a larger concentration of the recombinant molecule? Why?
- (b) In cases where the culture in the bio-processor unit reaches the death phase, identify ONE strategy that can help revive the bio-processing to restart production of the recombinant molecule.
- (c) What does a sterile condition mean?
- OR
- (d) State ONE reason why the bacteria that are producing the recombinant molecule are not harmed during the process of sterilisation.

9. Polymerase chain reaction (PCR) is an in-vitro technique used to amplify nucleic acid sequences. The conditions and duration of each step in PCR are as follows:
- Step 1 at 94 °C for 2 min
- Step 2 at 50-65 °C for 30 seconds
- Step 3 at 72 °C for 5 min

- (a) Give TWO reasons why amplification using PCR can be better than amplification in-vivo using plasmids.
- (b) At which step does the denaturation of DNA take place? How does this occur?
- (c) What would be the result of the PCR reaction if step 2 does not occur?
- (d) At what step would PCR be important in rDNA technology?

(1+1+2  
)

5  
(2+1+  
1+1)

## Chapter – 9 (Biotechnology- Principles and Processes)

Sl. No.	Answers	Marks
1.	C	1
2.	B	1
3.	B	1
4.	C	1
5.	Shake flask is used for a small-scale production but the stirred-tank bioreactors are used for large scale production of biotechnological products. Advantages of stirred tank bioreactors over shake flasks are that these facilitate - Temperature control system, pH control system, Foam control system and Sampling ports from where small, volume of the cultures can be obtained and tested time to time	2
6.	A reporter gene is used to monitor the transformation of host cells by foreign DNA. They act as a selectable marker to determine whether the host cell has taken up the foreign DNA or the foreign gene gets expressed in the cell. Here, the reporter gene is used as a selectable marker to find out the successful uptake of gene of interest. An example of reporter gene includes lac Z gene which encodes $\beta$ - galactosidase enzyme.	2
7.	To take up the (hydrophilic) DNA from the external medium. Divalent calcium ions increase the efficiency of DNA entering the cell through pores in the cell wall.	3
8.	(a) 1 mark each for the following: - exponential growth phase 5 Competency Focused Practice Questions   Biology   Grade 12 110 - that is the phase where biomass is highest and so each cell produces the recombinant molecule causing its overall concentration to be the highest in the unit (b) 1 mark for any ONE of the following: - addition of more microbes in the growth phase - adding fresh medium while removing the used-up medium [Accept any other valid answer] (c) A sterile condition refers to the absence of contaminating organisms in a system. [Accept any other valid answer] <div style="text-align: center;">OR</div> (d) 1 mark for any one of the following: - bacterial culture of interest is added after the sterilisation process - if the bacteria of interest is thermophilic/die at higher temperature than that used for sterilisation [Accept any other valid answer]	4 (1+1+2)
9.	(a) 1 mark each for the following: - PCR is faster than the generation time of many microbes. - An origin of replication is not required for PCR as is required in plasmids. [Accept any other valid answer] (b) 0.5 marks each for the following: - Step 1 - Heat causes denaturation of DNA. (c) No DNA would be amplified OR the reaction would stop. (d) PCR would be an important step just before the process of ligation, done before transformation into the required host.	5 (2+1+1+1)

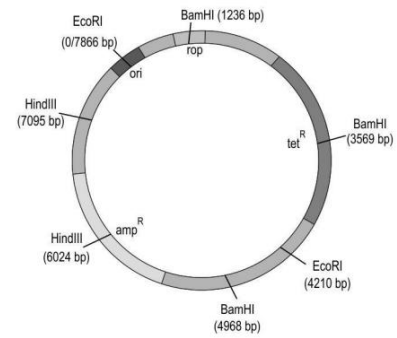
## Chapter – 10 (Biotechnology and Its Application)

Max. Marks – 20

Time Allotted : 20 min.

Sl. No.	Questions	Marks
1.	Which step proved to be the main challenging obstacle in the production of human insulin by genetic engineering? A. Splitting A and B polypeptide chains. B. Addition of C-peptide to pro-insulin. C. Getting insulin assembled into mature form. D. Removal of C-peptide from active insulin.	1
2.	Why insulin not administered orally to diabetic patient? A. Insulin is bitter in taste B. Insulin is sour in taste C. Insulin leads to peptic ulcer if given orally D. Insulin will lead to sudden increase in blood sugar if given orally	1
	Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as: A. If both Assertion and Reason are true and Reason is the correct explanation of Assertion. B. If both Assertion and Reason are true but Reason is not the correct explanation of Assertion. C. If Assertion is true but Reason is false. D. If both Assertion and Reason are false.	
3.	Assertion: Organs of pig such as heart, pancreas, etc., for human use can be grown through transgenic animals. Reason : Transgenic pigs show improved growth and meat production.	1
4.	Assertion (A): Transposons cause insertional mutations that can be treated using gene silencing. Reason (R): Transposons are mobile genetic elements that self-replicate via an RNA intermediate	1
5.	Suggest and explain a procedure for possible life-long for a child is born with ADA-deficiency.	2
6.	Give the steps involved in synthesis of genetically engineered insulin?	2
7.	Give any two examples of products, how transgenic animals can be used to produce biological compounds?	2
8.	"RNA interference has been used to produce transgenic tobacco plants to protect them from the infestation by specific nematodes." Explain the novel strategy exploited by the biotechnologists.	3
9.	A corn farmer has perennial problem of corn-borer infestation in his crop. Being environmentally conscious he does not want to spray insecticides. Suggest solution based on your knowledge of biotechnology. Write the steps to be carried out to achieve it.	3

10.	<p>Given below is the diagram of a artificially designed plasmid. Observe the plasmid and answer the following questions -</p> <p>24. Which two Restriction enzyme will you choose to produce recombinant DNA?</p> <p>25. What will happen if rop gene is cleaved?</p> <p>26. Which Restriction enzyme will not be used to make rDNA?</p> <p style="text-align: center;">OR</p> <p>27. Give the role of two antibiotic resistant gene mentioned in the diagram.</p>	4 (1+1+2)
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### Chapter – 10 (Biotechnology and Its Application)

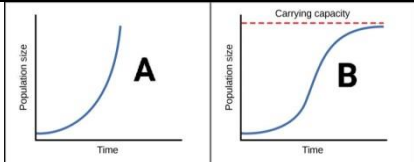
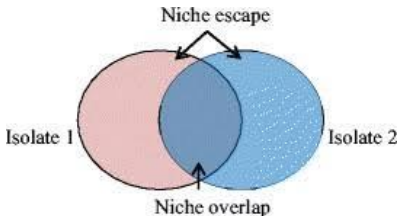
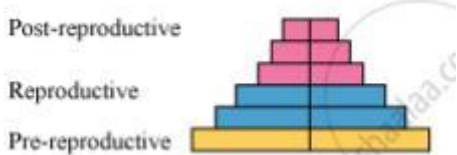
Sl. No.	Answers	Marks
1.	C	1
2.	D	1
3.	B	1
4.	A	1
5.	Gene therapy at early embryonic stage.	2
6.	1. isolation of gene encoding insulin. 2. Separation of A and B encoding region from insulin gene. 3. Insertion of A and B encoding region of gene into vector separately. 4. Insertion of rDNA into <i>E.coli</i> . 5. Extraction of recombinant protein. 6. Formation of disulphide bridge between A and B polypeptide chain.	2
7.	Any two correct examples	2
8.	<p>A novel strategy was adopted to prevent this infestation which was based on the process of RNA interference (RNAi). RNAi takes place in all eukaryotic organisms as a method of cellular defence.</p> <ul style="list-style-type: none"> <li>· This method involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of the mRNA (silencing).</li> <li>· The source of this complementary RNA could be from an infection by viruses having RNA genomes or mobile genetic elements (transposons) that replicate via an RNA intermediate.</li> <li>· Using <i>Agrobacterium</i> vectors, nematode-specific genes were introduced into the host plant.</li> <li>· The introduction of DNA was such that it produced both sense and anti-sense RNA in the host cells. These two RNA's being complementary to each other formed a double stranded (dsRNA) that initiated RNAi and thus, silenced the specific mRNA of the nematode. The consequence was that the parasite could not survive in a transgenic host expressing specific interfering RNA. The transgenic plant therefore got itself protected from the parasite.</li> </ul>	3
9.	Isolation of Bt toxin genes from <i>Bacillus thuringiensis</i> , incorporated into corn, toxin coded by gene cry I Ab in corn, kills the pests/ pest dies.	3
10.	(a) HindIII (b) Plasmid will not replicate. (c) BamHI and EcoRI	4 (1+1+2)

	28. Act as selectable marker.	OR	
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### Chapter – 11 (Organism and Population) Worksheet - 1

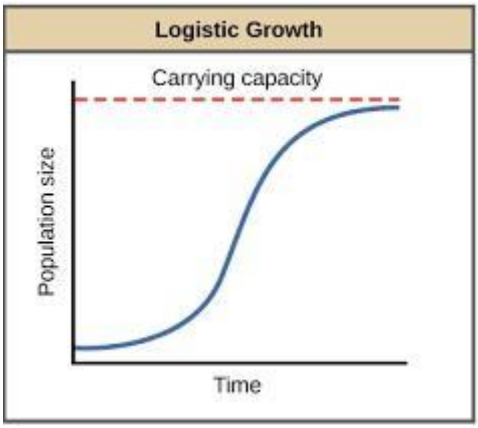
Max. Marks – 20





Time – 20 min

Q.No.	Questions	Marks
Q1	Which one of the following is an example of a commensalism relationship? 29. Cuckoo laying eggs in crow's nest      B. Sea anemone and clown fish AA. Tick on dog      D. Lichen formation	1
Q2	In a population growing in a habitat with limited resources, the growth pattern eventually becomes: 30. Exponential      B.Declining      C.Logistic      D.Linear	1
Q3	Which of the following is not a feature of a population? 31. Birth rate 32. Death rate 33. Age pyramid 34. Organism's organ system	1
Q4	<b>FOR QUESTION NO. 4 AND 5 CHOOSE THE RIGHT OPTION FROM FOLLOWING:</b> 35. Both A and R are true, and R is the correct explanation of A 36. Both A and R are true, but R is not the correct explanation of A 37. A is true, but R is false 38. A is false, but R is true Assertion (A): Some organisms suspend their metabolic activities under adverse conditions. Reason (R): This is a strategy to survive extreme environmental stress.	1
Q5	Assertion (A): Logistic growth curve is S-shaped. Reason (R): Logistic growth occurs when resources are unlimited.	1
Q6	Identify the type of growth shown in each curve A and B. What key environmental factor differentiates these two patterns?	2
		
Q7	How do desert plants adapt to high temperatures and scarcity of water?	2
Q8	What does the overlapping area represent? What ecological outcome might follow if overlap persists?	3
		
Q9	39. What type of population growth is represented in the given figure? Justify your answer based on pyramid shape. (2)	3
		
Q10	40. What does the bell-shaped age pyramid indicate about birth and death rates? (1) Q10. Read the passage below and answer the questions that follow: “A scientist is studying the growth of a population of deer in a protected forest area. Initially, the population grows rapidly. After a few years, the growth slows and then levels off.”	5

	BB. Name the type of population growth shown in this scenario. (1 mark)	
	CC. Draw and label the graph for this growth pattern. (2 marks)	
	DD. Explain the significance of the plateau phase in the graph. (2 marks)	

### MARKING SCHEME WORKSHEET (Chapter - 11 : Organism and Population)

<b>Q1</b>	B) Sea anemone and clown fish	<b>1</b>
<b>Q2</b>	C) Logistic	<b>1</b>
<b>Q3</b>	D) Organism's organ system	<b>1</b>
<b>Q4</b>	A) Both A and R are true, and R is the correct explanation	<b>1</b>
<b>Q5</b>	C) A is true, but R is false	<b>1</b>
<b>Q6</b>	Curve A: Exponential (J-shaped) growth – unlimited resources.(1) Curve B: Logistic (S-shaped) growth – limited resources with carrying capacity (K). (1)	<b>2</b>
<b>Q7</b>	Desert plants show adaptations such as thick cuticles, CAM (Crassulacean Acid Metabolism) photosynthesis, reduced leaf surface area (e.g., spines), and deep or widespread root systems to reduce water loss and survive high temperatures. (1+1)	<b>2</b>
<b>Q8</b>	It shows resource competition. Persistent overlap can lead to competitive exclusion or resource partitioning.(1+1+1=3)	<b>3</b>
<b>Q9</b>	A) It represents expanding population. Broad base shows high birth rate and a large proportion of young individuals.(1 ½ )  B) It indicates a stable population where birth and death rates are nearly equal; moderate proportion of young and old.(1 ½ )	<b>3</b>
<b>Q10</b>	EE. Logistic growth (1) FF. S-shaped curve X-axis: Time Y-axis: Population size (2) Initial lag phase, then exponential phase, then plateau phase   GG. The plateau phase represents the population reaching the carrying capacity of the habitat, where birth rate equals death rate and resources become limiting, stabilizing the population size. (2)	<b>5</b> <b>(1+2+2)</b>

S. No	Question	Marks
1	In a predator-prey relationship, the predator controls the population of the prey. This interaction is classified as: A. Commensalism      B. Parasitism      C. Predation      D. Competition	1
2	Which of the following is an example of mutualism? A. Cuscuta and host plant      B. Orchid and mango tree      C. Lichen      D. Tiger and deer	1
3	Mention the relationship where a species generates poisonous particles which harm other species. A. Amensalism      B. Commensalism      C. Mutualism      D. Parasitism	1
	Question 4 and 5 are assertion reason type question. Select correct option from following  A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, but R is not the correct explanation of A. C. A is true, but R is false. D. A is false, but R is true.	
4	Assertion: Parasitism is a type of interaction where one organism benefits at the cost of another. Reason: Parasites always kill their host immediately to obtain nutrients.	1
5	Assertion: Competition is most severe between closely related species. Reason: Closely related species have similar resource requirements.	1
6	Sonu replaced a fish from freshwater source to an aquarium containing marine water. Will the fish survive? Give reasons.	2
7	Mistletoe grows on oak and takes nutrients from it. Give one point of difference and similarity between this and predation.	2
8	Name the interaction that exists between sucker fish and shark. Give one more example of this type of interaction.	3
9	Name the two intermediate hosts on which the human liver fluke depends to complete its life cycle.	3
10	    <p>Fig. (A)      Fig. (C)      Fig. (D)      Fig. (B)</p> <p>Based on the given figures A, B, C, D:</p> <p>(i) Which figure displays mutualism? (1)  (ii) Name the interaction shown in figure D. (1)  (iii) What is the association and entity in figure C? (1)  (iv) State the role of the insect in B? (2)</p>	5

S. No.	Answers	Marks
1	C	1
2	C	1
3	D	1
	<p>Question 4 and 5 are assertion reason type question. Select correct option from following</p> <p>A. Both A and R are true, and R is the correct explanation of A.          B. Both A and R are true, but R is not the correct explanation of A.          C. A is true, but R is false.          D. A is false, but R is true.</p>	
4	C	1
5	A	1
6	No, as the body is adapted to survive in a close range of salinity and cannot survive in high salinity of seawater.	2
7	Relationship between both and one difference and similarity.	2
8	Sucker fish and shark show commensalism. Other example includes whale and barnacles growing on its back	3
9	The human liver fluke requires two intermediate hosts, i.e. freshwater snail and fish to complete its life cycle and facilitate parasitisation of its primary host.	3
10	(i) The interaction between the plant and the pollinator insect is termed as mutualism. (ii) Predation (iii) Commensalism – Grazing cattle. (iv) The insect is being a scavenger.	5

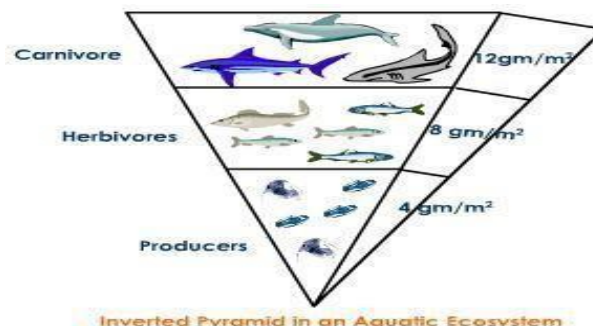


# Chapter 12: Ecosystem Worksheet - 1

Time: 20 Min

Marks: 20

Q. No.	Questions	Marks
1.	Which of the statement is not correct? 41. Pyramids of number and biomass may be either upright or inverted 42. Pyramid of biomass in sea is generally inverted as biomass of fish far exceeds that of phytoplankton 43. Food chains are generally short with few trophic levels as only 10% of the energy is transferred to higher trophic level from lower one 44. Pyramid of energy is mostly upright but sometimes it may be inverted	1
2	In an ecosystem, which of the following represents a grazing food chain? 45. Detritus → Earthworm → Bird B. Dead leaves → Bacteria → Fungi 46. Grass → Grasshopper → Frog → Snake D. Fallen fruit → Fungi → Worms	1
3.	What is the formula to calculate Net primary productivity (NPP) in an ecosystem? 47. $GPP - R = NPP$ B. $GPP + R = NPP$ C. $GPP - NPP = R$ D. $R - NPP = GPP$	1
4.	Assertion (A): Decomposers help in nutrient recycling. Reason (R): Decomposers convert organic matter into inorganic substances. A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, but R is not the correct explanation of A C. A is true, but R is false. D. A is false, but R is true	1
5.	Assertion (A): Energy flow in an ecosystem is cyclic. Reason (R): Energy is continuously lost as heat in the ecosystem. A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, but R is not the correct explanation of A. C. A is true, but R is false. D. A is false, but R is true.	1
6.	A farmer wants to increase the productivity of his crop field. Based on your understanding of productivity in ecosystems, what measures could he take to enhance Net Primary Productivity (NPP)? Justify your answer.	2
7.	If all decomposers are removed from a forest ecosystem, predict and explain the changes that would occur in the nutrient cycling and overall functioning of the ecosystem.	2
8.	In a lake ecosystem, if the population of small fish suddenly declines, what possible impacts can this have on other trophic levels? Explain with reference to energy flow and food webs.	3
9.	Evaluate the differences between food chains and food webs. How do they contribute to energy flow and ecosystem stability?	3
10.	The diagram below shows a simplified ecological pyramid of biomass for a pond ecosystem. Analyse the pyramid and answer the following questions. (i) What trophic level does each section of the pyramid represent? (ii) Explain why the pyramid is inverted? (iii) Identify one limitation of using ecological pyramids to understand this ecosystem.	5



## Chapter 12: Ecosystem Worksheet – 1

## MARKING SCHEME

1.	D	1
2	C	1

3.	A	1
4.	A	1
5.	A	1
6.	The farmer can use fertilizers to improve soil nutrients, ensure adequate irrigation, and select high-yield crop varieties. These measures increase Gross Primary Productivity (GPP), and minimizing plant stress can reduce respiration loss, thus improving NPP.	2
7.	Without decomposers, dead plant and animal matter would accumulate, and essential nutrients would not be recycled. This would halt nutrient cycling, reduce soil fertility, affect plant growth, and eventually disrupt the entire food web.	2
8.	A decline in small fish would reduce food availability for larger fish (higher trophic levels), possibly causing their population to decline. Conversely, the organisms eaten by small fish (like zooplankton) might increase, disturbing the energy flow and balance of the food web.	1.5+1.5
9.	Food chains represent a linear sequence of energy transfer from producers to top consumers, while food webs are interconnected networks of multiple food chains. Food webs show more realistic energy flow in ecosystems and contribute to stability by offering alternate feeding paths, which help maintain energy flow even if one species is removed.	1.5+1.5
10.	<p>48. Bottom section (widest): Producers (phytoplankton) ,Middle section: Primary consumers (zooplankton) Top section (narrowest): Secondary consumers (large fish)</p> <p>49. In a water body, the producers are tiny phytoplankton that grow and reproduce rapidly. Thus, the pyramid of biomass has a small base, providing support to consumer biomass which have large weight. Hence, it forms an inverted shape.</p> <p>(iii) Limitation: This ecological pyramid only represents a single food chain within the pond ecosystem. In reality, there's a complex food web with multiple feeding interactions.</p>	1+2+2

S. No.	Question	Marks
1	Which of the following is not a cause of biodiversity loss? A. Habitat destruction B. Pollution C. Overexploitation D. Afforestation	1
2	The IUCN Red List is a sourcebook for: A. Endemic species B. Fossil species C. Threatened species D. Domesticated species	1
3	The Amazon rain forest is referred to as the “lungs of the planet” because: A. It is the largest desert in the world B. It absorbs large amounts of carbon dioxide C. It is the largest producer of fossil fuels D. It contains glaciers	1
	Question 4 and 5 are assertion reason type question. Select correct option from following  A. Both A and R are true, and R is the correct explanation of A. B. Both A and R are true, but R is not the correct explanation of A. C. A is true, but R is false. D. A is false, but R is true.	
4	<b>Assertion (A):</b> In situ conservation involves protecting species in their natural habitats. <b>Reason (R):</b> Biosphere reserves, national parks, and wildlife sanctuaries are examples of ex situ conservation.	1
5	<b>Assertion (A):</b> Alien species invasions cause biodiversity loss. <b>Reason (R):</b> Exotic species often fail to adapt to new environments and die quickly	1
6	What are biodiversity hotspots? Name any two biodiversity hotspots in India.	2
7	Define ex situ conservation. Give two examples.	2
8	Describe three major causes of biodiversity loss.	3
9	Explain the importance of biodiversity in ecosystem functioning.	3
10	What is in situ conservation? Explain various types of in situ conservation methods used in India.	5
<b>Chapter 13- Biodiversity and its Conservation      Answer Key    Worksheet- 1</b>		
S. No.	Answers	Marks
1	D	1
2	C	1
3	B	1
4	C	1
5	C	1
6	<b>Answer Hint:</b> Biodiversity hotspots are regions rich in species diversity and endemism but under threat. E.g., Western Ghats, Himalayas.	2

7	<b>Answer Hint:</b> Conservation outside natural habitat. Examples: Zoos, gene banks.	2
8	<b>Answer Hint:</b> Habitat loss, over-exploitation, alien species invasion, pollution, climate change.	3
9	<b>Answer Hint:</b> Provides ecosystem services, enhances productivity, ensures sustainability, stability, and resilience.	3
10	<p>In situ = conserving in natural habitat</p> <p>Biosphere Reserves – e.g., Nilgiri</p> <p>National Parks – e.g., Jim Corbett</p> <p>Wildlife Sanctuaries – e.g., Bharatpur</p> <p>Sacred groves – traditionally protected forests (e.g., Meghalaya)</p> <p>Community reserves – locals involved in protection</p>	5

Sl. NO	QUESTION	MARKS
	Which of the following ecosystems typically has the highest species diversity? A.Coral reefs    B.Desert    C.Grasslands    D.Boreal forests	1
	What are the species called whose number of individuals is greatly reduced recently and is decreasing continuously? A.Endangered    B.Rare    C.Vulnerable    D.Indeterminate	1
	Which utilitarian states that humans derive countless direct economic benefits from nature? A.Big utilitarian    B.Broadly utilitarian    C.Narrow utilitarian D.Small utilitarian	1
	Assertion(A): Tropical regions are more diversity rich in comparison to temperate areas. Reason(R): Availability of more solar energy directly affects the presence of more species in those areas. 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.	1
	Assertion(A): Pristine forests are among insitu conservation strategies. Reason(R): These are sacred grooves where biota is protected on site. 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.	1
	What factors make a community stable?	2
	What is the significance of genetic variation in the <i>Rauwolfia vomitoria</i> plant?	2
	A.How does species diversity change along a latitudinal gradient? B.What does a regression coefficient (z) value of 0.25 indicate about the relationship between species richness and area?	3
	A. In 2004,IUCN listed how many species of animals and plants ? How much global species diversity did Robert May describe? B. Why is it difficult to evaluate global diversity for prokaryotes?	3
10	A. What is Sixth extinction and what are its causes? B. How does human activities contribute to this extinction event? C. Give 2 examples of species that are currently threatened or extinct due to human activities.	5

Chapter 13- Biodiversity and its Conservation      Worksheet - 2  
**ANSWER KEY**

	50. Coral reefs	1
	C. Vulnerable	1
	C. Narrowly utilitarian	1
	C. A is true , but R is false	1
	51. Both A and R are true and R is the correct explanation of A.	1
	The features that make a community stable- 52. Resistance to infrequent disturbances. 53. Lesser variations in productivity from year to year. 54. Impedance to invasions by alien species.	2
	This plant is a source of drug reserpine which serves as a tranquillizer , its genetic variation can be in terms of the concentration of reserpine and potency produced by the plants.	2
	55. It decreases from equator towards poles. 56. A regression coefficient (z) value of 0.25 indicates that as area increases species richness also tends to increase.	3
	57. 1.5 million species of animals and plants listed by IUCN in 2004. 58. Correct 3 differences	3
	59. Extinction occurring in present times caused by human activities. 60. Habitat destruction, Invasive species, climate change, Pollution, Overexploitation 61. examples are Passenger pigeon (extinct due to overhunting) , Sumatran tiger (threatened due to habitat loss and poaching)	5