



Indian School Al Wadi Al Kabir

Assessment 1 (2026-27)- MS

Sub: BIOLOGY

Class: XII

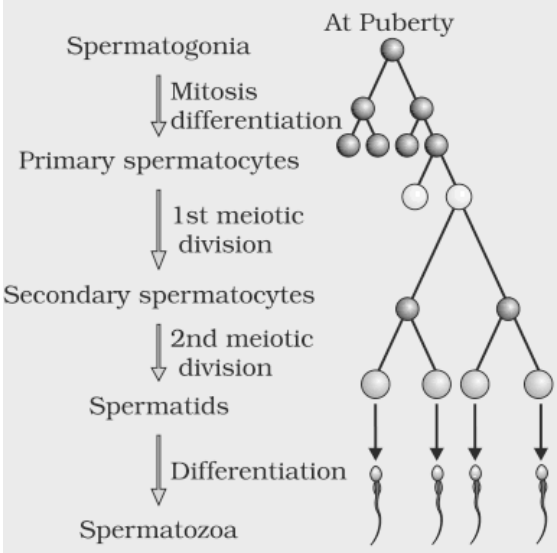
Date: 17.09.2026

SET-1

Max. Marks:70

Time: 3Hours

	SECTION	
Q. No.	Question	Marks
1.	(b) (ii), (v), (iii), (vi), (iv), (i)	1
2.	(c) Body of the ovule and the funicle	1
3.	(d) (i) and (iii)	1
4.	(b) Increase phagocytosis of sperm and reduce sperm motility	1
5.	(b) Primary Oocyte — Arrested in Prophase I of meiosis until puberty — 2n (46)	1
6.	(a) Up to 12 weeks	1
7.	(c) AaBb x aabb	1
8.	(b) XO type of sex chromosomes determines male sex in grasshoppers.	1
9.	(b) 5' (upstream) end and 3' (downstream) end, respectively, of the transcription unit	1
10.	(c) 100% Hybrid/Intermediate DNA ($^{14}\text{N}/^{15}\text{N}$)	1
11.	(a) <u>Homo habilis</u>	1
12.	(a) Convergent Evolution	1
13.	(d) A is false, but R is true	1
14.	(a) Both A and R are true, and R is the correct explanation of A.	1
15.	(c) A is true, but R is false.	1
16.	(c) A is true, but R is false.	1
	SECTION B	
17.	(a) (i) The endosperm develops first to ensure that a steady, ready-made supply of nutrients is available to the zygote. (ii) The triploid Primary Endosperm Nucleus (PEN) undergoes successive free-nuclear divisions without cell wall formation, creating thousands of free nuclei suspended in liquid (the coconut water). Later, cellularization occurs from the periphery toward the center, forming the white, solid coconut meat (cellular endosperm). OR (b) Upon fertilization, the parts of the ovule change into the following structures to form a seed: Integuments: Develop into the protective seed coat (Outer testa and inner tegmen). Zygote: Divides and develops into the diploid embryo. Primary Endosperm Cell (PEC): Develops into the nutrient-rich endosperm tissue. Micropyle: Remains as a small pore in the seed coat to allow oxygen and water entry during germination.	1+1 $\frac{1}{2} \times 4 = 2$

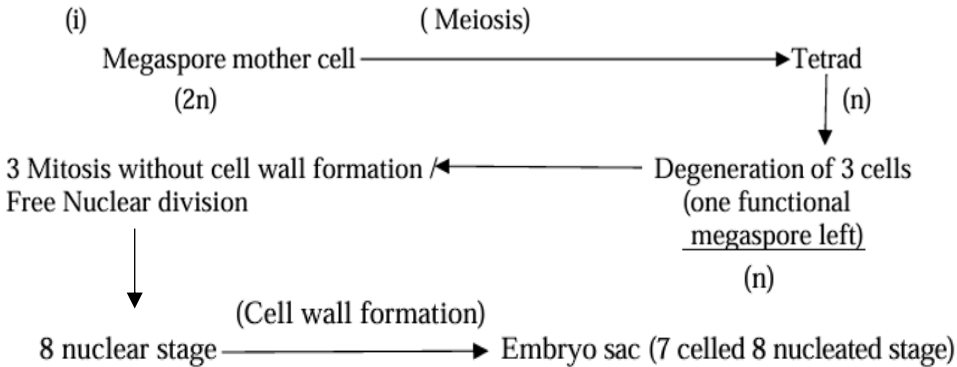
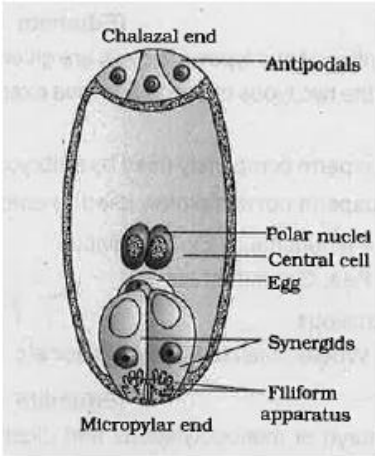
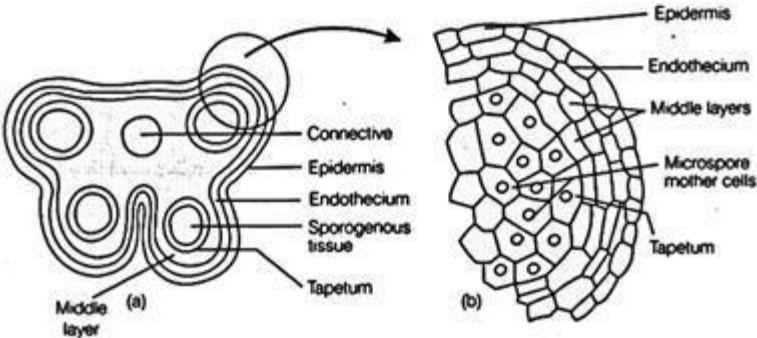
18.	 STEPS OF SPERMATOGENESIS	$\frac{1}{2} \times 4 = 2$
19.	(a) - Creating awareness among the people about various reproductive-related aspects. - Providing facilities and support for building up a reproductively healthy society. (b) - The ban is meant to legally check female foeticide, following the sex determination of the unborn child. - Since the technique involves the analysis of the cells from the amniotic fluid surrounding the foetus in the womb, it is called amniocentesis.	$\frac{1}{2} \times 4 = 2$
20.	<u>Attempt either option (a) or (b).</u> (a) (i) The strength of linkage between the genes is higher in Cross A. In Cross A, the genes (y) and (w) are located very closely on the same X chromosome, showing a tight physical association. In Cross B, the genes (w) and (m) are located far apart. (ii) The physical association of genes on chromosomes. OR (b) (i) Klinefelter's Syndrome- 44+XXY (ii) Individuals with this chromosomal disorder typically develop masculine features but display distinct abnormalities: • Gynaecomastia: Development or enlargement of breast tissue. • Sterility: Individuals are usually sterile due to underdeveloped testes. • Stature: A characteristically tall stature with longer limbs. • Feminine Traits: Sparse body hair and a high-pitched feminine voice pitch.(Any 2)	$\frac{1}{2}$ 1 $\frac{1}{2}$ 1 $\frac{1}{2} + \frac{1}{2}$
21.	<u>Attempt either option (a) or (b).</u> (a) They purified proteins, RNA, and DNA from heat-killed S-strain bacteria and added them to live R-strain bacteria to see which could transform them. They found that treating the mixture with proteases (protein-digesting enzymes) and RNases (RNA-digesting enzymes) did not affect transformation, proving that proteins and RNA were not the genetic material.	$\frac{1}{2}$ $\frac{1}{2}$

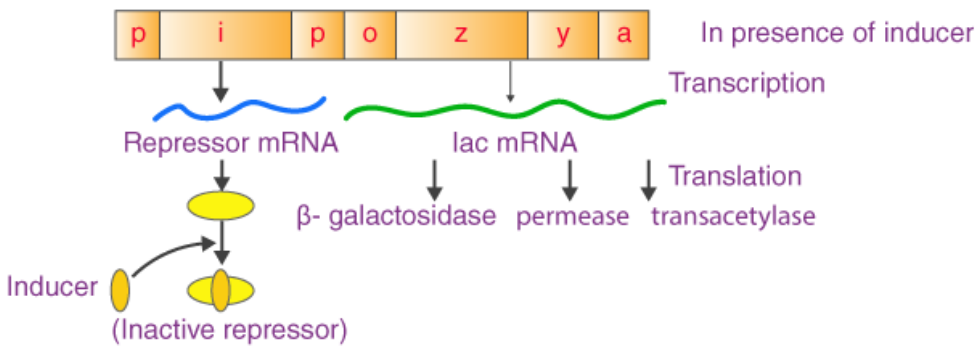
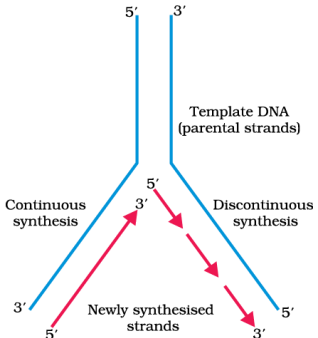
	Digestion with DNases (DNA-digesting enzymes) completely inhibited transformation. This proved that DNA was the transforming principle and the genetic material. OR (i) RNA Splicing (post-transcriptional processing of hnRNA). It removes non-functional introns and joins functional exons in a defined order to form mature mRNA. (ii) Eukaryotes have mRNA interrupted by non-functional introns. Prokaryotes have a continuous gene arrangement and lack introns entirely, so their mRNA becomes active immediately without any post-transcriptional processing.	1 $\frac{1}{2} \times 4 = 2$
	SECTION C	
22.	(a) Each tubule is lined on the outside by a thin basement membrane and a layer of connective tissue. The inside of the tubule is lined by a specialized epithelium containing two distinct types of cells: • Spermatogenic Cells (Male Germ Cells): These cells undergo meiotic divisions to progressively mature from spermatogonia into primary spermatocytes, secondary spermatocytes, spermatids, and finally, mature spermatozoa (sperm). • Sertoli Cells (Nurse Cells): Large, elongated cells interspersed among the germ cells. They provide structural support, protection, and nourishment to the developing sperm cells. The Interstitial Space (Outside the Tubules): The regions outside and between the seminiferous tubules contain connective tissue, blood vessels, and specialized Leydig cells (interstitial cells), which secrete the male hormone testosterone. OR (b) (i) FSH stimulates the growth and development of primary ovarian follicles into fully mature Graafian follicles as well as secretion of oestrogen by the growing follicles. (ii) LH Surge: It is the rapid, maximum secretion of Luteinizing Hormone (LH) by the pituitary gland that occurs right in the middle of the cycle (around day 14). This massive peak induces the mature Graafian follicle to rupture, thereby releasing the secondary oocyte into the fallopian tube (Ovulation). (iii) The remaining parts of the ruptured follicle transform into the Corpus Luteum, which secretes large amounts of Progesterone. Progesterone makes the inner uterine lining (endometrium) highly vascular and glandular (secretory) to prepare for a potential embryo. If Fertilization Fails: The corpus luteum degenerates, causing a sharp drop in progesterone levels. This withdrawal of progesterone causes the disintegration and shedding of the endometrium, leading to bleeding (Menstruation) and the start of a new cycle.	1+1+1 1+1+1
23.	(i) X: GTG Y: CAC (ii) Z: Valine (Val)	$\frac{1}{2} + \frac{1}{2}$ 1

	(iii) Point mutation -Effect on RBCs: It causes the mutant hemoglobin molecules to undergo polymerization under low oxygen levels, changing the shape of the RBC from a normal biconcave disc to an elongated, sickle-like shape.	$\frac{1}{2} + \frac{1}{2}$
24.	(a) (i) It is a process where amino acids are activated in the presence of ATP and linked to their cognate (specific) tRNA. This is considered the very first phase because if two such charged tRNAs are brought close enough within the ribosome, the formation of a peptide bond between them is energetically favored. (ii) small sub unit -It binds to the mRNA transcript to initiate the process of translation. Large Subunit Function: It contains two sites for subsequent amino acids (carried by incoming tRNAs) to bind to and thus be close enough to each other for the formation of a peptide bond. (iii) Start Codon: AUG UAA, UAG, and UGA (which do not code for any amino acids and serve to terminate the translation process). OR (i) Suspect-3, DNA fingerprinting Steps: i) Isolation of DNA & Digestion of DNA by restriction endonuclease enzymes ii) Separation of DNA fragments by electrophoresis iii) Transfer of separated DNA fragments to a synthetic membrane such as nitrocellulose or nylon. iv) Hybridization using a labelled VNTR probe. v) Detection of hybridized DNA fragments by autoradiography	1+1+1 $\frac{1}{2} \times 6=3$
25.	(a) A negative hCG result means the hormone is not in the blood. This confirms that pregnancy or embryo implantation has not taken place. It is produced by the trophoblast cells of the young embryo, which quickly grow to form the placenta. (b) hCG, hPL and relaxin are produced in women only during pregnancy. Increased production of these hormones is essential for supporting the fetal growth, metabolic changes in the mother and maintenance of pregnancy. (c) The neuroendocrine mechanism of parturition is called the fetal ejection reflex. It is initiated by signals from the fully developed fetus and placenta, which induce mild uterine contractions, triggering the release of oxytocin from the maternal posterior pituitary to cause stronger contractions for childbirth.	1+1+1
26.	(a) It prevents inbreeding depression and increases genetic variation, which helps the plant adapt better to environmental changes. (b) No, it cannot show geitonogamy. The plants are dioecious (male and female flowers on different plants). Geitonogamy requires the transfer of pollen between two flowers on the same plant; since the receptive stigma and the shedding anthers are on different individual plants, only xenogamy is possible. (c) In the given method, the male and female parts mature at different times. Self-incompatibility is a genetic mechanism. Even if the parts mature simultaneously and pollen lands on the stigma, the plant rejects its own pollen by inhibiting pollen tube growth.	1+1+1
27.	(a) Lactational Amenorrhoea Method	2+1

	This is a natural contraceptive method based on the fact that ovulation (and therefore the menstrual cycle) does not occur during the period of intense lactation following childbirth. As long as the mother fully breastfeeds the child, the risk of conception is almost zero. However, this method is highly effective only for a maximum period of six months post-parturition. (b) Advantages of 'Saheli' 'Saheli' is a non-steroidal oral contraceptive pill developed in India. It is considered highly effective for spacing children because it is a "once-a-week" pill with high contraceptive value and minimal to no side effects.	
28.	(a) Type of Evolution: Divergent Evolution - It is the evolutionary process in which structures of animals sharing a common ancestor develop in different directions, modifying their external appearance to adapt to different needs and environments. (b) Organs and Ancestry: - These organs are called Homologous Organs. - They indicate a clear common ancestry. Although these forelimbs perform completely different functions in frogs, lizards, humans, and birds, they share a fundamentally identical internal structural design of bones (comprising humerus, radius, ulna, carpals, metacarpals, and phalanges), proving they arose from a shared ancestor.	½ 1 ½ 1
	SECTION D	
29.	(a) Congenital diseases, drugs, immunological, or psychological (b) GIFT (Gamete Intra-Fallopian Transfer): Unfertilized eggs and sperm are transferred directly into the fallopian tube, allowing fertilization to occur naturally inside the woman's body. ZIFT (Zygote Intra-Fallopian Transfer): Fertilization is completed outside the body in a lab, and the resulting early embryo (zygote) is then transferred into the fallopian tube. <u>Attempt either subpart C or D.</u> (c) GIFT (Gamete Intra Fallopian Transfer) This technique takes a healthy egg from a donor and transfers it into the female's fallopian tube, where fertilization can happen naturally. OR (d) AI (Artificial Insemination) In this technique, semen collected from the husband or a donor is directly introduced into the vagina or the uterus (IUI) of the female to overcome the low sperm count.	1 2 1 1
30.	(a) The early primitive Earth atmosphere was strictly reducing in nature and completely lacked free molecular oxygen. The presence of oxygen would oxidize the intermediate chemicals and prevent the synthesis of organic molecules like amino acids. (b) In 1953, S. L. Miller simulated primitive Earth conditions in a closed laboratory setup using the following elements: - He created an airtight, closed flask system to ensure a completely oxygen-free, reducing environment. - He used electric discharges (sparks) generated between tungsten electrodes to simulate the intense lightning of early Earth.	

	• He mixed specific gases—Methane, Ammonia, Hydrogen, and Water vapour. • He maintained the reaction chamber at a high temperature of 800°C. <u>Attempt either subpart C or D.</u> (c) The primary compounds collected were amino acids. OR (d) Stanley Miller's experiment provided direct evidence for chemical evolution, suggesting life originated from non-living organic molecules formed from inorganic constituents. This supports the concept that life's formation was preceded by the creation of diverse organic molecules.	
	SECTION E	
31	(a) (i) In <i>Pisum sativum</i> (garden pea), a single gene (B) controls both seed shape and starch grain size. This phenomenon, where one gene influences multiple phenotypic traits, is called pleiotropy. (Deviation from Mendelian Law of Dominance) : The trait of seed shape follows Law of Dominance and the hybrid will show only dominant trait. 5 (iii) However, the specific inheritance pattern observed depends entirely on which phenotypic trait you examine: • Seed Shape: Displays complete dominance, where round seeds are dominant over wrinkled seeds. • Starch Grain Size: Displays incomplete dominance, where the heterozygote shows an intermediate phenotype (intermediate-sized starch grains). OR (i) Individual 1- $I^B i$, Individual 2- $I^A i$ (ii) Individual 5- antigens for both A and B; Individual 9- lacks any of the antigens. (iii) An analysis of inherited traits in several generations of a family is called pedigree analysis. In this method, the inheritance pattern of a particular trait is represented as a family tree across multiple generations. 1. It acts as a powerful tool used in human genetics to trace the inheritance of a specific trait, abnormality, or disease (such as Hemophilia or Sickle-cell anemia).	1+2+2 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ 1

	2. Genetic Counseling: It helps medical professionals and genetic counselors predict the probability or potential risk of transmitting harmful genetic disorders to future generations of a family. (iv) Mendelian disorders are mainly determined by alteration or mutation in a single gene. The chromosomal disorders, on the other hand, are caused by the absence or excess, or abnormal arrangement of one or more chromosomes.	2
32.	(a) (i)  (ii)  OR (b) Four wall layers surround a typical microsporangium: 1. The epidermis is the outermost protective layer. 2. The endothecium is the layer below the epidermis that helps in the dehiscence of the anther to release pollen. 3. The middle layers are situated between the endothecium and tapetum and also perform a protective function. 4. The tapetum is the innermost layer which nourishes the developing pollen grains and possesses dense cytoplasm with more than one nucleus. 	3+2

	(ii) The process of development is as follows: 1. Microsporogenesis: Cells of the sporogenous tissue undergo meiosis to form a tetrad of four microspores. 2. Maturation: As the anther matures and dehydrates, the microspores dissociate and develop into pollen grains. 3. Male Gametophyte: The mature pollen grain consists of a large vegetative cell and a small generative cell. 4. The generative cell later divides to form two male gametes, completing the development of the male gametophyte.	
33.	(a) (i) Lactose enters the cell via permease and acts as an inducer. The inducer binds to the repressor protein, making it inactive. The inactive repressor fails to bind to the operator region. RNA polymerase binds to the promoter and transcribes the structural genes. The operon turns "on," translating the polycistronic mRNA into (beta)-galactosidase, permease, and transacetylase to digest lactose.  (ii) ESTs and Sequence annotation OR (b) (i)  Replication does not initiate randomly; it begins at specific sites on the DNA molecule known as the origin of replication. The enzyme DNA helicase breaks the hydrogen bonds between complementary nitrogenous bases, unwinding the double helix and creating a Y-shaped structure called the replication fork. The main enzyme, DNA-dependent DNA polymerase, catalyzes the polymerization of deoxynucleotides. It can only add nucleotides in a strict (5' --- 3') direction. On the template strand with polarity 3'---5', replication moves smoothly and continuously toward the replication fork. This newly synthesized strand is called the leading strand. Discontinuous Synthesis (Lagging Strand): On the template strand with polarity 5'—3', the polymerase must work moving away from the replication fork. This forces the DNA to be synthesized discontinuously in short stretches known as Okazaki fragments.	2+2+1 2+2+1

	Joining Fragments: The discontinuously synthesized Okazaki fragments are later joined together into a unified strand by the enzyme DNA ligase. (ii) It is semi-conservative because during replication, the two parental strands separate to act as templates, resulting in daughter DNA molecules that each contain one original parental strand and one newly synthesized strand.	
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All the Best