



**ISLAMIAH MAT HR SEC SCHOOL,  
KILAKARAI, RAMANATHAPURAM DT.**

**XII COMMON PUBLIC EXAMINATION, MARCH -2024 (22-03-2024)**

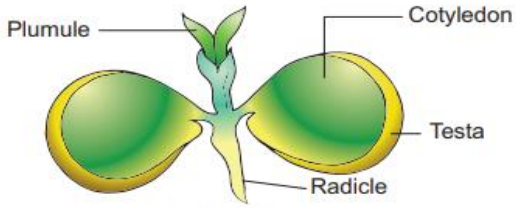
**TENTATIVE ANSWER KEY  
Question type A**

**SUB: BOTANY**

**MARKS: 70**

Q.NO	CONTENT	MARKS	MODE OF QUESTION
<b>PART -I</b>			
I.	<b>CHOOSE THE CORRECT ANSWER</b>	<b>15 X 1 =15</b>	<b>BOOK BACK / BOOK INSIDE/ CREATIVE</b>
1	(b) Paddy	1	<b>BOOK BACK</b>
2	(b) 1-(iii), 2-(i), 3-(iv), 4-(ii)	1	<b>BOOK BACK</b>
3	(a) (i) and (ii)	1	<b>BOOK BACK</b>
4	(b) Splicing	1	<b>BOOK BACK</b>
5	(d) 2 celled stage	1	<b>BOOK BACK</b>
6	(b) (i) Holard (ii) Echard (iii) Chresard	1	<b>BOOK BACK</b>
7	(a) Both Assertion and Reason are correct	1	<b>BOOK BACK</b>
8	(c) Co-dominance	1	<b>BOOK BACK</b>
9	(a) Norin 10	1	<b>BOOK BACK</b>
10	(d) 1:1:1:1	1	<b>BOOK INSIDE</b>
11	(d) Both (b) and (c)	1	<b>BOOK BACK</b>
12	(c) September 16	1	<b>BOOK INSIDE</b>
13	(c) Agarose Gel Electrophoresis	1	<b>BOOK BACK</b>
14	(a) CH <sub>4</sub> and CO <sub>2</sub>	1	<b>BOOK INSIDE</b>
15	(a) Marijuana	1	<b>BOOK BACK</b>

Q.NO	CONTENT	MARKS	MODE OF QUESTION				
II.	<b>PART -II</b> ANSWER ANY SIX OF THE FOLLOWING QUESTION NUMBER 24 IS COMPULSORY	6 X 2 = 12	BOOK BACK / BOOK INSIDE/ CREATIVE				
16	<b><u>Chemicals used in gene transfer</u></b> Polyethylene Glycol (PEG) and Dextran Sulphat	2	BOOK BACK				
17	<b><u>Plants cultivated in commercial agroforestry (any 2)</u></b> Casuarina, Eucalyptus, Malai Vembu, Teak and Kadambu	2	BOOK BACK				
18	<b><u>Phytoremediation</u></b> Use of plants to bring about remediation of environmental pollutants.	2	BOOK BACK				
19	<b><u>Construct the food chain</u></b> Plants → Grasshopper → Frog → Snake → Hawk	2	BOOK BACK				
20	<b><u>Back cross</u></b> Back cross is a cross of F 1 hybrid with anyone of the parental genotypes	2	BOOK BACK				
21	<b><u>Dioscorea reproduce vegetatively</u></b> Axillary bulbils  (or) The axillary buds from the nodes of rhizome and eyes of tuber give rise to new plants	2	BOOK BACK				
22	<b><u>Differentiate primary introduction from secondary introduction</u></b> <table border="1"> <thead> <tr> <th>Primary introduction</th> <th>Secondary introduction</th> </tr> </thead> <tbody> <tr> <td>When the introduced variety is well adapted to the new environment without any alternation to the original genotype.</td> <td>When the introduced variety is subjected to selection to isolate a superior variety and hybridized with a local variety to transfer one or a few characters to them</td> </tr> </tbody> </table>	Primary introduction	Secondary introduction	When the introduced variety is well adapted to the new environment without any alternation to the original genotype.	When the introduced variety is subjected to selection to isolate a superior variety and hybridized with a local variety to transfer one or a few characters to them	2	BOOK BACK
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23	<b><u>Difference between missense and nonsense mutation</u></b> <table border="1"> <thead> <tr> <th>Missense</th> <th>Nonsense mutation</th> </tr> </thead> <tbody> <tr> <td>The mutation where the codon for one amino acid is changed into a codon for another</td> <td>The mutations where codon for one amino acid is changed into a termination or stop</td> </tr> </tbody> </table>	Missense	Nonsense mutation	The mutation where the codon for one amino acid is changed into a codon for another	The mutations where codon for one amino acid is changed into a termination or stop	2	BOOK BACK
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	amino acid is called Missense or non-synonymous mutations	codon is called Nonsense mutation		
24	<b>Cut opened Dicot seed</b> 		2	BOOK INSIDE

Q.NO	CONTENT	MARKS	MODE OF QUESTION
III.	<b>PART -III</b> ANSWER ANY SIX OF THE FOLLOWING QUESTION NUMBER 33 IS COMPULSORY	6 X 3 = 18	BOOK BACK / BOOK INSIDE / CREATIVE
25	<b><u>Vivipary</u></b> <ul style="list-style-type: none"> <li>• When seeds or embryos begin to develop before they detach from the parent</li> <li>• Vivipary mode of seed germination is found in halophytes</li> <li>• Seeds germinate in the fruits of mother plant itself</li> </ul>	3	BOOK BACK
26	<b><u>Agro-chemical</u></b> An agro-chemical is useful in managing agriculture in farming area which is one of the major issues of the environment. Agro chemicals includes fertilizers liming and acidifying agents, soil conditioners, pesticides and chemicals used in animal husbandry, such as antibiotics and hormones.	3	BOOK BACK
27	<b><u>Plants are found in sub alpine forest (any three)</u></b> Abies, Pinus, Betula, Quercus, Salix, Rhododendron with plenty of epiphytic orchids, mosses and lichens	3	BOOK BACK
28	<b><u>Salient features of Sutton and Boveri concept (any 3 points)</u></b> <ul style="list-style-type: none"> <li>• Somatic cells of organisms are derived from the zygote by repeated cell division (mitosis). These consist of two identical sets of chromosomes. One set is received from female parent (maternal) and the other from male parent (paternal). These two</li> </ul>	3	BOOK BACK

	<p>chromosomes constitute the homologous pair.</p> <ul style="list-style-type: none"> <li>• Chromosomes retain their structural uniqueness and individuality throughout the life cycle of an organism.</li> <li>• Each chromosome carries specific determiners or Mendelian factors which are now termed as genes.</li> <li>• The behaviour of chromosomes during the gamete formation (meiosis) provides evidence to the fact that genes or factors are located on chromosomes.</li> </ul>																														
29	<p><b><u>Advantages of seed dispersal (any 3 points)</u></b></p> <ul style="list-style-type: none"> <li>• Seeds escape from mortality near the parent plants due to predation by animals or getting diseases and also avoiding competition.</li> <li>• Dispersal also gives a chance to occupy favourable sites for growth.</li> <li>• It is an important process in the movement of plant genes particularly this is the only method available for self-fertilized flowers and maternally transmitted genes in outcrossing plants.</li> <li>• Seed dispersal by animals help in conservation of many species even in human altered ecosystems.</li> <li>• Understanding of fruits and seed dispersal acts as a key for proper functioning and establishment of many ecosystems from deserts to evergreen forests and also for the maintenance of biodiversity conservation and restoration of ecosystems.</li> </ul>	3	BOOK BACK																												
30	<p><b><u>Suggestion for alternative for chemical Dye</u></b></p> <ol style="list-style-type: none"> <li>1. An orange dye “henna” obtained from leaves and young shoots is used to dye skin, hair and fingernails.</li> <li>2. It is also used for colouring leather, tails of horses and hair</li> </ol>	3	BOOK BACK																												
31	<p><b><u>Compare the various types of Blotting techniques (any 3 points)</u></b></p> <table border="1"> <thead> <tr> <th></th> <th>Southern blotting</th> <th>Northern blotting</th> <th>Western blotting</th> </tr> </thead> <tbody> <tr> <td>Name</td> <td>Southern name of the inventor</td> <td>Northern a misnomer</td> <td>Western a misnomer</td> </tr> <tr> <td>Separation of</td> <td>DNA</td> <td>RNA</td> <td>Proteins</td> </tr> <tr> <td>Denaturation</td> <td>Needed</td> <td>Not needed</td> <td>Needed</td> </tr> <tr> <td>Membrane</td> <td>Nitrocellulose/ nylon</td> <td>Amino benzyloxymethyl</td> <td>Nitrocellulose</td> </tr> <tr> <td>Hybridisation</td> <td>DNA-DNA</td> <td>RNA-DNA</td> <td>Protein-antibody</td> </tr> <tr> <td>Visualising</td> <td>Autoradiogram</td> <td>Autoradiogram</td> <td>Dark room</td> </tr> </tbody> </table>		Southern blotting	Northern blotting	Western blotting	Name	Southern name of the inventor	Northern a misnomer	Western a misnomer	Separation of	DNA	RNA	Proteins	Denaturation	Needed	Not needed	Needed	Membrane	Nitrocellulose/ nylon	Amino benzyloxymethyl	Nitrocellulose	Hybridisation	DNA-DNA	RNA-DNA	Protein-antibody	Visualising	Autoradiogram	Autoradiogram	Dark room	3	BOOK BACK
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32

**Seven Contrasting characters of studied by Mendel**  
**(Without diagram)**

Character	Dominant Trait	Recessive Trait
Stem length	 Tall	 Dwarf
Pod shape	 Inflated	 Constricted
Seed shape	 Round	 Wrinkled
Seed colour	 Yellow	 Green
Flower position	 Axial	 Terminal
Flower colour	 Purple	 White
Pod colour	 Green	 Yellow

3

BOOK BACK

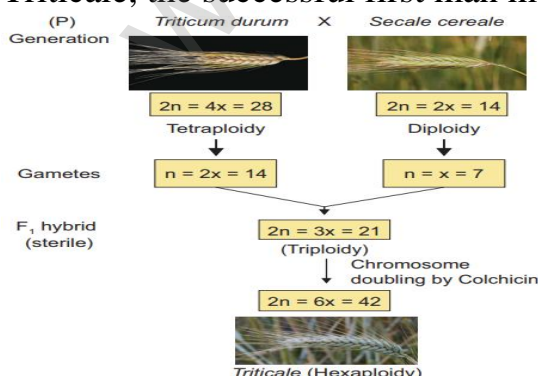
33

**Sterilization of Explants**

The plant materials to be used for tissue culture should be surface sterilized by first exposing the material in running tap water and then treating it in surface sterilization agents like 0.1% mercuric chloride, 70% ethanol under aseptic condition inside the Laminar Air Flow Chamber.

3

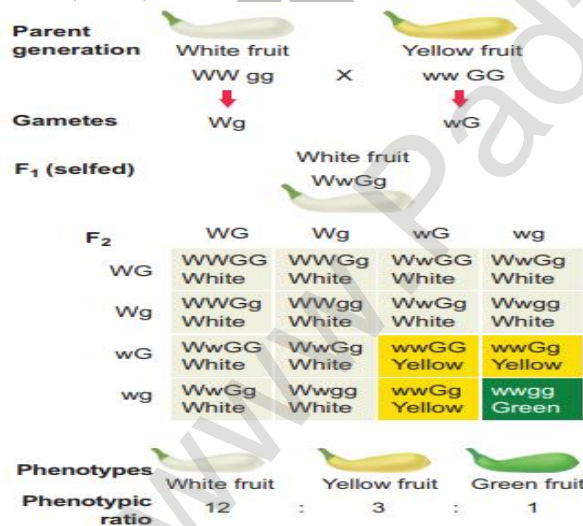
BOOK INSIDE

Q.NO	CONTENT	MARKS	MODE OF QUESTION
IV.	<b>PART-IV</b> ANSWER ALL THE QUESTION	5 X 5 = 25	BOOK BACK / BOOK INSIDE CREATIVE
34 (a)	<p><b>Formation of Man-made cereal</b> Triticale, the successful first man made cereal</p> 	5	BOOK BACK

34 (b)

**Dominant Epistasis**

In the summer squash the fruit colour locus has a dominant allele 'W' for white colour and a recessive allele 'w' for coloured fruit. 'W' allele is dominant that masks the expression of any colour. In another locus hypostatic allele 'G' is for yellow fruit and its recessive allele 'g' for green fruit. In the first locus the white is dominant to colour where as in the second locus yellow is dominant to green. When the white fruit with genotype WWgg is crossed with yellow fruit with genotype wwGG, the F1 plants have white fruit and are heterozygous (WwGg). When F1 heterozygous plants are crossed they give rise to F2 with the phenotypic ratio of 12 white : 3 yellow : 1 green. Since W is epistatic to the alleles 'G' and 'g', the white which is dominant, masks the effect of yellow or green. Homozygous recessive ww genotypes only can give the coloured fruits (4/16). Double recessive 'wwgg' will give green fruit (1/16). The Plants having only 'G' in its genotype (wwGg or wwGG) will give the yellow fruit(3/16).



5

BOOK BACK

35 (a)

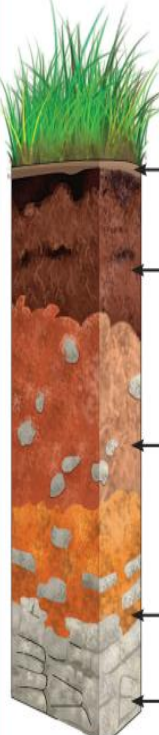
**Characteristic features of entomophilous flowers**  
**(any 5 points)**

- Flowers are generally large or if small they are aggregated in dense inflorescence. Example: Asteraceae flowers.
- Flowers are brightly coloured. The adjacent parts of the flowers may also be brightly coloured to attract insect. For example in Poinsettia and Bougainvillea

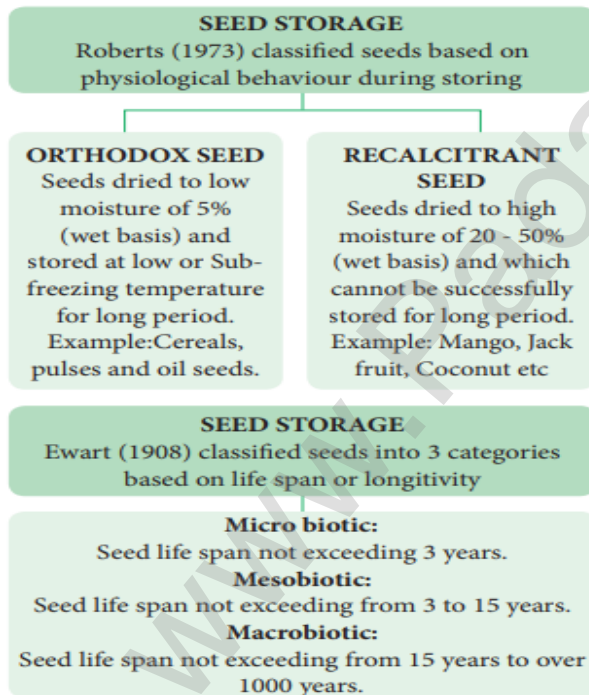
5

BOOK BACK

	<p>the bracts become coloured.</p> <ul style="list-style-type: none"> <li>• Flowers are scented and produce nectar.</li> <li>• Flowers in which there is no secretion of nectar, the pollen is either consumed as food or used in building of its hive by the honeybees. Pollen and nectar are the floral rewards for the visitors.</li> <li>• Flowers pollinated by flies and beetles produce foul odour to attract pollinators.</li> <li>• In some flowers juicy cells are present which are pierced and the contents are sucked by the insects.</li> </ul>		
35 (b)	<p><b><u>Afforestation with case studies</u></b></p> <p>The Man who Single Handedly Created a Dense Forest                  Jadav "Molai" Payeng (born 1963) is an environmental activist has single-handedly planted a forest in the middle of a barren wasteland. This Forest Man of India has transformed the world's largest river island, Majuli, located on one of India's major rivers, the Brahmaputra, into a dense forest, home to rhinos, deers, elephants, tigers and birds. And today his forest is larger than Central Park. Former vice-chancellor of Jawahar Lal Nehru University, Sudhir Kumar Sopory named Jadav Payeng as Forest Man of India, in the month of October 2013. He was honoured at the Indian Institute of Forest Management during their annual event 'Coalescence'. In 2015, he was honoured with Padma Shri, the fourth highest civilian award in India. He received honorary doctorate degree from Assam Agricultural University and Kaziranga University for his contributions.</p>	5	BOOK BACK
36 (a)	<p><b><u>Soil Profile</u></b></p> <p>Soil is commonly stratified into horizons at different depth. These layers differ in their physical, chemical and biological properties. This succession of super-imposed horizons is called soil profile.</p> <p><b><u>Different soil horizons</u></b></p>	5	BOOK BACK

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36 (b) **Seeds can be stored for longer duration.** 5 BOOK BACK

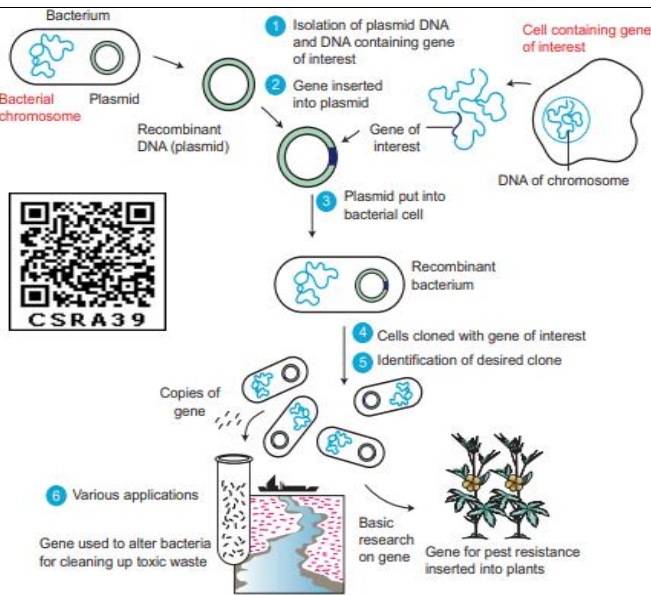


37 (a) **Artificial Seed** 5 BOOK BACK

Artificial seeds or synthetic seeds (synseeds) are produced by using embryoids (somatic embryos) obtained through in vitro culture. They may even be derived from single cells from any part of the plant that later divide to form cell mass containing dense cytoplasm, large nucleus, starch grains, proteins, and oils etc., To prepare the artificial seeds different



	<p>inert materials are used for coating the somatic embryoids like agrose and sodium alginate.</p> <p><b><u>Advantages of Artificial seeds</u></b></p> <ul style="list-style-type: none"> <li>• Artificial seeds have many advantages over the true seeds</li> <li>• Millions of artificial seeds can be produced at any time at low cost.</li> <li>• They provide an easy method to produce genetically engineered plants with desirable traits.</li> <li>• It is easy to test the genotype of plants.</li> <li>• They can potentially stored for long time under cryopreservation method.</li> <li>• Artificial seeds produce identical plants</li> <li>• The period of dormancy of artificial seeds is greatly reduced, hence growth is faster with a shortened life cycle.</li> </ul>		
37 (b)	<p><b><u>The steps involved in recombinant DNA technology</u></b></p> <ul style="list-style-type: none"> <li>• Isolation of a DNA fragment containing a gene of interest that needs to be cloned. This is called an insert.</li> <li>• Generation of recombinant DNA (rDNA) molecule insertion of the DNA fragment into a carrier molecule called a vector that can self-replicate within the host cell.</li> <li>• Selection of the transformed host cells that is carrying the rDNA and allowing them to multiply thereby multiplying the rDNA molecule.</li> <li>• The entire process thus generates either a large amount of rDNA or a large amount of protein expressed by the insert.</li> <li>• Wherever vectors are not involved the desired gene multiplied by PCR technique. The multiple copies are injected into the host cell protoplast or it is shot into the host cell protoplast by shot gun method</li> </ul>	5	BOOK INSIDE



38 (a)

**Differences between primary and secondary succession**

5

BOOK BACK

	Primary succession	Secondary succession
1	Developing in an barren area	Developing in disturbed area
2	Initiated due to a biological or any other external factors	Starts due to external factors only
3	No soil, while primary succession starts	It starts where soil covers is already present
4	Pioneer species come from outside environment	Pioneer species develop from existing environment
5	It takes more time to complete	It takes comparatively less time to complete

38 (b)

**Eukaryotic DNA replication**

5

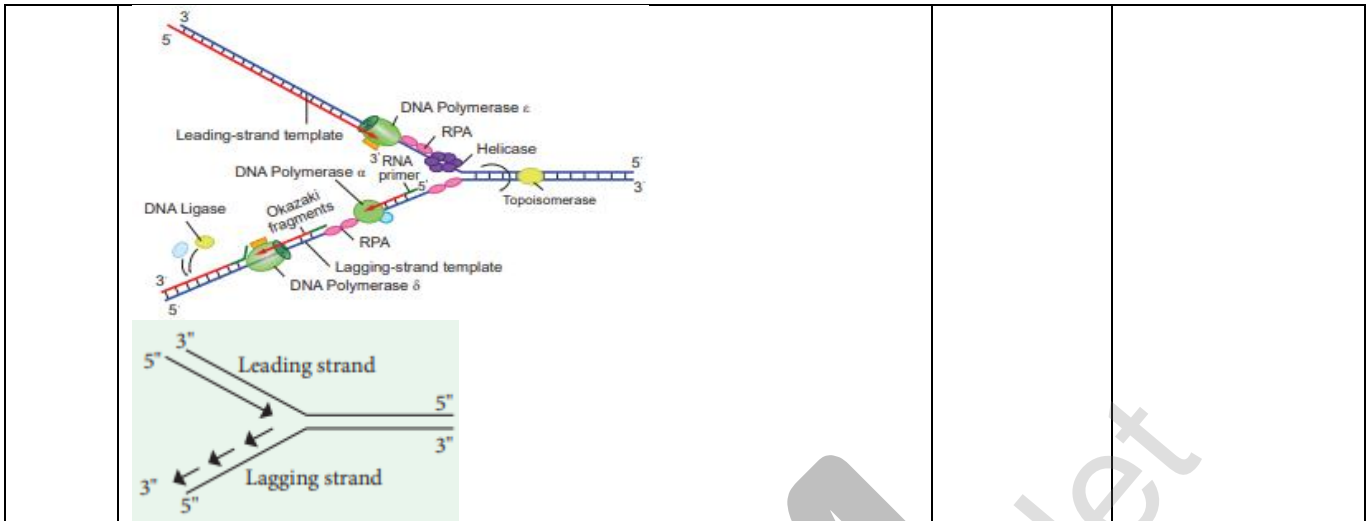
BOOK BACK

Replication starts at a specific site on a DNA sequence known as the Origin of replication. There are more than one origin of replication in eukaryotes. Saccharomyces cerevisiae (yeast) has approximately 400 origins of replication. DNA replication in eukaryotes starts with the assembly of a prereplication complex (preRC) consisting of 14 different proteins. Part of a preRC is a group of 6 proteins called the origin recognition complex (ORC) which acts as initiator in eukaryotic DNA replication. The origin of replication in yeast is called as ARS sites (Autonomously Replicating Sequences). In yeast, ORC was identified as a protein complex which binds directly to ARS elements. Replication

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fork is the site (point of unwinding) of separation of parental DNA strands where new daughter strands are formed. Multiple replication forks are found in eukaryotes.

The enzyme helicases are involved in unwinding of DNA by breaking hydrogen bonds holding the two strands of DNA and replication protein A (RPA) prevents the separated polynucleotide strand from getting reattached. Topoisomerase is an enzyme which breaks DNAs covalent bonds and removes positive supercoiling ahead of replication fork. It eliminates the torsional stress caused by unwinding of DNA double helix. DNA replication is initiated by an enzyme DNA polymerase  $\alpha$  / primase which synthesizes short stretch of RNA primers on both leading strand (continuous DNA strand) and lagging strands (discontinuous DNA strand). Primers are needed because DNA polymerase requires a free 3' OH to initiate synthesis. DNA polymerase covalently connects the nucleotides at the growing end of the new DNA strand. DNA Pol  $\alpha$  (alpha), DNA Pol  $\delta$  (delta) and DNA Pol  $\epsilon$  (Epsilon) are the 3 enzymes involved in nuclear DNA replication. DNA Pol  $\alpha$  – Synthesizes short primers of RNA DNA Pol  $\delta$  – Main Replicating enzyme of cell nucleus DNA Pol  $\epsilon$  – Extend the DNA Strands in replication fork DNA Synthesis takes place in 5'  $\rightarrow$  3' direction and it is semidiscontinuous. When DNA is synthesized in 5'  $\rightarrow$  3' direction, only in the free 3' end (OH end) DNA is elongated. In 1960s Reiji Okazaki and his colleagues found out that one of the new DNA strands is synthesized in short pieces called Okazaki fragments. In discontinuous strand where the Okazaki fragments are united by ligase is called Lagging strand where the replication direction 5'  $\rightarrow$  3' which is opposite to the direction of fork movement. The continuous strand is called Leading strand where the replication direction is 5'  $\rightarrow$  3' which is same to the direction to that of the replication fork movement. DNA ligase joins any nicks in the DNA by forming a phosphodiester bond between 3' hydroxyl and 5' phosphate group.



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