

Q. 1) All questions are compulsory.

- 2) Draw diagram wherever necessary.
- 3) Figures to the right indicate full marks.

a) Fill in the blanks with appropriate answer from the given alternatives (Any four) 4

- 1) Synthesis of new DNA take place in the _____ direction. (5' to 3', 3' to 5', 4' to 5')
- 2) In Messelson and Stahl's experiment _____ is the heavy isotope used as nitrogen source in growth medium for E.coli (^{14}N , ^{15}N , ^{13}N)
- 3) The new DNA strand being made in the 5' to 3' direction same as movement of the replication fork is called the _____ strand. (leading, lagging, template)
- 4) DNA replication takes place in the form of _____ type of replication. (semi conservative, conservative, dispersive)
- 5) _____ enzyme is a form of topoisomerase which relaxes the tension produced in the DNA a head of the replication fork. (Gyrase, Helicase, Amylase)
- 6) DNA polymerase I removes RNA primer with its _____ activity (5'-3' exonuclease, 5'-3' polymerase, 3'-5' polymerase)
- 7) To synthesis DNA the initiation of DNA chain is carried out by using _____ primer. (DNA, RNA, double stranded DNA)
- 8) _____ enzyme is used to untwists the DNA to produce single stranded template strand. (Helicase, Polymerase, Amylase)

b) Explain (any two) of the following terms. 4

- 1) Okazaki fragments
- 2) Conservative DNA Replication
- 3) Unidirectional DNA Replication
- 4) Dispersive DNA Replication

c) Answer (any two) of the following. 12

- 1) Explain Looped Rolling Circle Model of DNA replication.
- 2) Explain Bidirectional DNA replication.
- 3) Explain Messelson - Stahl experiment.
- 4) Explain the process of Initiation of DNA replication in E.coli.

Q. 2 a) State whether the following statements are True or False (Any two). 2

- 1) In depurination a purine, either adenine or guanine is removed from the DNA.
- 2) DNA polymerase removes wrong nucleotide by its exonuclease proofreading activities.
- 3) A common base analogy mutagen is 5-bromouracil.
- 4) Photo reactivation occurs when and enzyme called amylase is activated by a photon of light.

b) Explain (any three) of the following terms.

- | | |
|---------------------|-------------------------|
| 1) Somatic mutation | 2) Germ line mutation |
| 3) Induced mutation | 4) Frame shift mutation |
| 5) Silent mutation | 6) Reverse mutation |

c) Explain (any two) of the following.

- 1) SOS Response
- 2) Repair by Methyl - Directed mismatch repair
- 3) Mutation caused by Base analog mutagen 5-Bromouracil
- 4) Mismatch repair by DNA polymerase proof reading activity

Q.3 a) Define the terms (Any two).

- | | |
|----------------------|-------------------|
| 1) Pedigree analysis | 2) Linked genes |
| 3) Heterokaryon | 4) Syntenic genes |

b) Give symbols used in pedigree for (any four) of the following.

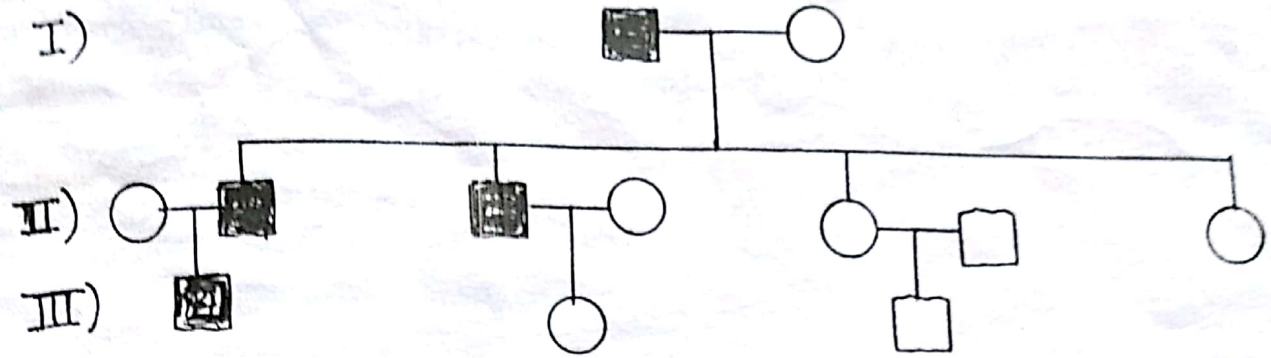
- | | |
|----------------------|--------------------|
| 1) Mating | 2) Normal female |
| 3) Male | 4) Death |
| 5) Monozygotic twins | 6) Carrier female |
| 7) Proposita | 8) Dizygotic twins |

c) Attempt (any two) of the following.

- 1) Describe the formation of PD, NPD and TT tetrads at four strand chromatid stage for linked genes.
- 2) How will you establish gene order using a three point cross, explain with a suitable example.
- 3) Solve : A Neurospora strain that required arginine (arg) but can synthesize methionine (met+) for growth was mated to a strain (arg+ and met) following products was obtained. Compute the gene and centromere distance for the two genes.

	1	2	3	4	5	6	7
Spore pair 1	arg +	arg met	arg met	arg +	arg +	arg met	arg met
Spore pair 2	arg +	arg met	arg +	+ met	+ met	++	arg +
Spore pair 3	+ met	++	+ met	arg met	arg +	arg met	+ met
Spore pair 4	+ met	++	++	++	+ met	++	++
	45	10	10	5	15	5	10

4) Observe the following pedigree and answer the following questions.



- i) Which individual is the proband?
- ii) What is the mode of inheritance?
- iii) What is holandric trait?
- iv) What are the characteristics of the condition hypertrichosis?
- v) The hormone found in males for expressing secondary sexual characteristics?
- vi) What is hemizyosity?

Q. 4 Write short notes on (any three) of the following.

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- 1) Life cycle of Neurospora crassa
- 2) Importance of pedigree analysis
- 3) Thymine dimmers.
- 4) Role of DNA polymerase III during DNA replication.
- 5) Sigma mode of DNA replication
- 6) Physical and chemical mutagens.

— The End —