University of Salahaddin

College of Science

Biology Department

1st Trial

Subject: Biotechnology & Cytogenetics – Theory

Stage: 4th stage

Time: 3 hours

Date: 01/ 06/ 2022

Q1/ / Choose the correct answer of the following (Multiple Choice Questions): **5 MARKS**

1. **The analysis and determining molecular weight of protein fragments is one purpose of:**

a) Gene sequencing.
b) RFLP-PCR.
c) Agarose gel electrophoresis.
d) SDS PAGE.

2. **The type of Next Generation Sequencing can be used to identify epigenetic changes is called:**

a) Ribo-seq.
b) ChIP-seq.
c) RNA-seq.
d) WTSS.

3. **The dual hybridization probe is carried out based on:**

a) Hybridize between a donor flourophore RNA probe and an acceptor flourophore RNA probe.
b) Hydrolyze between a donor flourophore DNA probe and an acceptor flourophore DNA probe.
c) Hybridize between a donor flourophore DNA probe and an acceptor flourophore DNA probe.
d) Hydrolyze between a donor flourophore protein probe and an acceptor flourophore protein probe.

4. **An enzyme that cleavage and recognize relatively short sequences of bases within a strand of DNA is:**

a) *DNA polymerase* Enzyme.
b) *RTase* Enzyme.
c) *DNA Ligase* Enzyme.
d) *REase* Enzyme.

5. **Which of the following statements describing the red biotechnology is NOT False?**

a) Making wine, cheese, and beer by fermentation.
b) Managing of arid lands and deserts.
c) Production of vaccines and antibiotics and development of diagnostic tests.
d) Making the rapid organization and analysis of biological data possible.

16 MARKS

Q2/ Briefly Compare the following:

1. *E. coli DNA Ligase* and *T4 DNA Ligase*.
2. Linkage mapping and Physical mapping
3. Protein gel electrophoresis and Agarose Gel Electrophoresis.
4. first strand reaction and second strand reaction in RS-PCR.

8 MARKS

Q3/ What is the meaning NGS and mention the steps to the preparation of NGS library with illustrating by figures?

Q4/ Enumerate each the following: **16 MARKS**

1. Methods used for DNA sequencing.
2. Detection in real time PCR Products.
3. Types DNA polymorphisms.
4. Inserting of DNA fragment to vector.

5 MARKS

Q5/ Explain the essential of DNA photocopier reaction components?

Q6/ Give the reason(s) for <u>ONLY THREE</u> of the following, mark the one you left out: (9 M)

1. Treatment of diseases with epigenetics therapies is not easy to be done and be successful.
2. Polyploidy might have advantages and have role in blood coagulation process in human.
3. The continuous shortening of telomeres have role in cancer prevention.
4. Epigenetic modifications such as DNA methylation have significant effects on inherited mental retardations in males more than females especially in regards to FMR1 gene.

Q7/ Indicate True or False, then correct the false sentence(s) if there is any. (14 M) (2 M each) (1 M for correction)

1. One of the tumor suppressor genes which is became mutated in most cancers is p53 protein.
2. In cancer, PGCCs cells can be seen and considered as a hallmark of oncovirus infection.
3. Among the factors which affect epigenetic modifications and then disease formation, is life style Factor such as alcohol consumption.
4. Histone acetylation occurs on the C-terminal tail on lysine amino acid.
5. If a deletion occurs in one allele of a homozygous wild type organism, it may result in an abnormal phenotype (disease).
6. Loss or gain of one or more particular chromosomes within a set is called euploidy.
7. *Cryptococcus neoformans* increases cell size during human lung infection, these huge cells are polyploid cells and called wound healing cells.

Q8/ Define the following: (10 M)

Transgenerational inheritance, Cytogenetics, HAT, Trophoblasts, Turner syndrome

Q9/ Compare between the following: (8 M)

1. Partial trisomy **VS** Trisomy
2. Epigenetics **VS** Genetics

Q10/ Fill in the blanks with the suitable word(s). (9 M)

1. An example of DNA methylation inhibitor drugs is ……. .
2. …….. is a general term which is often used to describe the generations or the production of polyploid cells.
3. Molecular genetic deals with ……. .
4. Cytogenetics as it is a brunch of genetics, it also link other sciences like …….. and …….
5. The …….. is considered as a type of ……. heterochromatin which can be seen in the nucleus of women's cells.
6. Hypermethylation of the promoter of ……. gene causes number of G to A mutation to increase, where this gene helps in DNA repair.
7. Telomeres contain tandem repeats of the nitrogenous base sequence which are …….. over 3–20 kb at the chromosome ends.

Good Luck

Lecturer:
Dr. Mukhlis Hamad Aali

Lecturer:
Dr. Trefa Salih Mohamad