Printed Page:- Subject Code:- ABT0303

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B,Tech.

SEM: III - THEORY EXAMINATION (2022 - 2023)

Subject: Genetics and Molecular Biology

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A 20

1. Attempt all parts:-

1-a. Which of the following gives information about the phenotype but not the genotype? (CO1) 1

(a) XHY.

(b) Hemophiliac man.

(c) Tall pea plant.

(d) Female carrier for colour-blindness.

1-b. How many chromosomes are present in Human cell? (CO1) 1

(a) 46

(b) 43

(c) 48

(d) 41

1-c. In prokaryotes the single copy DNA is present. (CO2) 1

(a) 40% per genome

(b) 30% per genome

(c) 20% per genome

(d) 10% per genome

1-d. Where does mutation occurs ? (CO2) 1

(a) DNA

(b) Ribosome

(c) Cellwall

(d) Cytoplasm

1-e. According to Chargaff's rule the two strands of DNA has.(CO3) 1

(a) Same molecular weight

(b) Same amount of A and G

(c) Different amount of A and G

(d) Different molecular weight

1-f. From where does DNA polymerase III builds new strands during DNA replication. (CO3) 1

(a) End

(b) Scratch

(c) Middle

(d) DNA polymerase does not builds new strands.

1-g. Which of the following is not a type of RNA processing? (CO4) 1

(a) Polyadenylation at the 3' end

(b) Capping of 5' end

(c) Removal of exons

(d) Splicing

1-h. Capping of RNA is necessary as_____ (CO4) 1

(a) It helps us distinguish 5' from 3' end

(b) It has a rolling action and condenses the transcript as it is produced

(c) To protect the transcript from exonuclease

(d) To prevent the transcript from sticking to DNA

1-i. What regulatory element promotes RNA polymerase II binding as well as binding of factors that facilitate the unwinding of DNA prior to translation? (CO5) 1

(a) 3' untranslated region

(b) 5' untranslated region

(c) Translation start site

(d) TATA box

1-j.	Human Genome Project led to the development of (CO5)	1

(a) Biotechnology

(b) Bioinformatics

(c) Biosystematics

(d) Bioengineering

2. Attempt all parts:-

2.a.	What is the principle of dominance? (CO1)	2
2.b.	What is the main cause of thalassemia? (CO2)	2
2.c.	Role of DNA polymerase-III. (CO3)	2
2.d.	What are the role of sigma factor in transcription? (CO4)	2
2.e.	How many types of operon are there? (CO5)	2

SECTION B 30

3. Answer any five of the following:-

3-a.	How quantitative traits are genetically controlled? (CO1)	6
3-b.	How does sex determination in the XX-XY system differ from sex determination in the ZZ-ZW system? (CO1)	6
3-c.	What type of mutation is caused by radiation? (CO2)	6
3-d.	What is a radiation induced mutation? (CO2)	6
3.e.	Name three essential structural elements of a functional eukaryotic chromosome and describe their functions. (CO3)	6
3.f.	How does the process of initiation differ in bacterial and eukaryotic cells? (CO4)	6
3.g.	Explain an operon structure with diagram. (CO5)	6

SECTION C 50

4. Answer any one of the following:-

4-a.	Diffentiate between linkage and crossing over with suitable examples. (CO1)	10
4-b.	How to calculate genotypic as well as allelic frequencies? (CO1)	10

5. Answer any one of the following:-

5-a.	What are the different types of chromosome disorders? (CO2)	10
5-b.	How are gene mutations detected? Explain any molecular based technique. (CO2)	10

6. Answer any one of the following:-

6-a.	Describe the overview of apoptosis and explain Intrinsic pathway of apoptosis. (CO3)	10
6-b.	List the different proteins and enzymes taking part in bacterial replication. Give the function of each in the replication process. (CO3)	10

7. Answer any one of the following:-

7-a.	Give the names of the three RNA polymerases found in eukaryotic cells and the types of RNA that they transcribe. (CO4)	10
7-b.	What are the four basic stages of transcription? Describe what happens at each stage.(CO4)	10

8. Answer any one of the following:-

8-a.	What are the mechanisms of gene regulation? (CO5)	10
8-b.	What is catabolite repression? How does it allow a bacterial cell to use glucose in preference to other sugars? (CO5)	10