

# National Testing Agency

<b>Question Paper Name :</b>	Analytical Techniques 25th March 2021 Shift 1
<b>Subject Name :</b>	Analytical Techniques
<b>Creation Date :</b>	2021-03-25 13:44:15
<b>Duration :</b>	180
<b>Number of Questions :</b>	37
<b>Total Marks :</b>	100
<b>Display Marks:</b>	Yes

## Analytical Techniques

<b>Group Number :</b>	1
<b>Group Id :</b>	86435181
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	120
<b>Show Attended Group? :</b>	No
<b>Edit Attended Group? :</b>	No
<b>Break time :</b>	0
<b>Group Marks :</b>	100
<b>Is this Group for Examiner? :</b>	No

## Analytical Techniques-1

<b>Section Id :</b>	864351471
<b>Section Number :</b>	1
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	20
<b>Number of Questions to be attempted :</b>	20

**Section Marks :** 20  
**Mark As Answered Required? :** Yes  
**Sub-Section Number :** 1  
**Sub-Section Id :** 864351482  
**Question Shuffling Allowed :** Yes

**Question Number : 1 Question Id : 8643517221 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the statement is TRUE with reference to physiological pH in humans?

1. The physiological pH in humans is approximately 6.5
2. The physiological pH in humans is approximately 7.4
3. In humans cannot be estimated
4. The physiological pH in humans is not constant

**Options :**

- 86435121845. 1
- 86435121846. 2
- 86435121847. 3
- 86435121848. 4

**Question Number : 2 Question Id : 8643517222 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following biomolecule absorbs maximum at wavelength 280 nm?

1. Protein
2. Nucleic Acid
3. Carbohydrate
4. Lipid

**Options :**

- 86435121849. 1

86435121850. 2

86435121851. 3

86435121852. 4

**Question Number : 3 Question Id : 8643517223 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

The purity of isolated DNA can be checked with the help of

1. Absorbance ratio at 280/260 nm
2. Absorbance ratio at 260/280 nm
3. Absorbance ratio at 260/230 nm
4. Absorbance ratio at 280/320 nm

**Options :**

86435121853. 1

86435121854. 2

86435121855. 3

86435121856. 4

**Question Number : 4 Question Id : 8643517224 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following statements is TRUE ?

1. Threonine, isoleucine, leucine are required from outside as they are essential amino acids.
2. Alanine and aspartic acid are required from outside as they are essential amino acids.
3. Methionine, valine, histidine can be synthesized by humans.
4. All statements are correct.

**Options :**

86435121857. 1

86435121858. 2

86435121859. 3

86435121860. 4

**Question Number : 5 Question Id : 8643517225 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

The final magnification of a microscope is calculated on the basis of:

1. Eye piece lens X objective lens
2. Eye piece lens
3. Objective lens
4. Specimen size

**Options :**

- 86435121861. 1
- 86435121862. 2
- 86435121863. 3
- 86435121864. 4

**Question Number : 6 Question Id : 8643517226 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

In transmission electron microscopy, electron opacity can be improved by treatment of specimen by

1. Ferrous ammonium sulfate
2. Safranin
3. Sodium chloride
4. Methylene blue

**Options :**

- 86435121865. 1
- 86435121866. 2
- 86435121867. 3
- 86435121868. 4

**Question Number : 7 Question Id : 8643517227 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following is utilized for biomolecule quantification using spectrophotometer?

1. Newton's law
2. Beer-Lambert's law
3. Chargaff's law
4. Energy law

**Options :**

- 86435121869. 1
- 86435121870. 2
- 86435121871. 3
- 86435121872. 4

**Question Number : 8 Question Id : 8643517228 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following is NOT utilized by High performance liquid chromatography?

1. Identification of an analyte in a mixture
2. Checking the purity of enantiomeric molecules in pharmaceutical assays.
3. Identification of secondary structures in a protein.
4. Identification and quantification of a known impurity in a drug substance

**Options :**

- 86435121873. 1
- 86435121874. 2
- 86435121875. 3
- 86435121876. 4

**Question Number : 9 Question Id : 8643517229 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

2-DE gel electrophoresis of proteins is based on

1. pI and molecular weight of the proteins
2. Molecular weight of the proteins
3. pI of the proteins
4. Relative migration of the proteins

**Options :**

- 86435121877. 1
- 86435121878. 2
- 86435121879. 3
- 86435121880. 4

**Question Number : 10 Question Id : 8643517230 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

If three proteins have a broad molecular difference and are needed to separate on the basis of their molecular weight, Which of the following chromatography separation procedures is best suited for their purification?

1. Affinity chromatography
2. Paper chromatography
3. Gel filtration chromatography
4. Ion-exchange chromatography

**Options :**

- 86435121881. 1
- 86435121882. 2
- 86435121883. 3
- 86435121884. 4

**Question Number : 11 Question Id : 8643517231 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the technique is utilized to detect specific DNA molecule from many other DNA molecules?

1. Southern blot
2. Northern blot
3. Western blot
4. None of the above

**Options :**

- 86435121885. 1
- 86435121886. 2
- 86435121887. 3
- 86435121888. 4

**Question Number : 12 Question Id : 8643517232 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the technique is utilized to detect specific protein from mixture of other protein molecules with the help of an antibody?

1. Southern blot
2. Northern blot
3. Western blot
4. None of the above

**Options :**

- 86435121889. 1
- 86435121890. 2
- 86435121891. 3
- 86435121892. 4

**Question Number : 13 Question Id : 8643517233 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Chromatin immunoprecipitation (ChIP) assay is best suitable for checking

1. DNA-lipid interactions
2. DNA-RNA interactions
3. DNA-Protein interactions
4. Protein-drug interactions

**Options :**

- 86435121893. 1
- 86435121894. 2
- 86435121895. 3
- 86435121896. 4

**Question Number : 14 Question Id : 8643517234 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following can be studied using yeast two-hybrid system ?

1. DNA-protein interaction
2. Promoter location
3. Protein-Protein interaction
4. Protein-Lipid interaction

**Options :**

- 86435121897. 1
- 86435121898. 2
- 86435121899. 3
- 86435121900. 4

**Question Number : 15 Question Id : 8643517235 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**



Which of the technique is best suited for detection of coronavirus- 2019 (COVID-19) in a clinical specimen?

1. Western blot
2. Real-Time PCR
3. 2DE gel electrophoresis
4. ELISA

**Options :**

- 86435121901. 1
- 86435121902. 2
- 86435121903. 3
- 86435121904. 4

**Question Number : 16 Question Id : 8643517236 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

A protein with 3 subunits (trimeric) when run on a native polyacrylamidegel electrophoresis (PAGE), gave a band at 60 kD. The same protein was again run on SDS-PAGE, showed 2 distinctly different band. All the following can be the possible molecular weights of the two bands, EXCEPT :

1. 10kD and 40kD
2. 15kD and 30kD
3. 20kD and 40kD
4. 25kD and 10kD

**Options :**

- 86435121905. 1
- 86435121906. 2
- 86435121907. 3
- 86435121908. 4

**Question Number : 17 Question Id : 8643517237 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

A colligative property of a solution depends on the solute on its

1. Chemical composition
2. Charge
3. Molecular weight
4. Concentration

**Options :**

- 86435121909. 1
- 86435121910. 2
- 86435121911. 3
- 86435121912. 4

**Question Number : 18 Question Id : 8643517238 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which organism has the highest number of vectors?

1. Yeast
2. Mammalian cells
3. E.coli
4. Fungi

**Options :**

- 86435121913. 1
- 86435121914. 2
- 86435121915. 3
- 86435121916. 4

**Question Number : 19 Question Id : 8643517239 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following microscopy techniques relies on the specimen interfering with the wavelength of light to produce a high contrast image without the need for dyes or any damage to the sample?

1. Bright field light microscopy
2. Phase contrast microscopy
3. Electron microscopy
4. Fluorescence microscopy

**Options :**

- 86435121917. 1
- 86435121918. 2
- 86435121919. 3
- 86435121920. 4

**Question Number : 20 Question Id : 8643517240 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

All the following enzymes are used in recombinant DNA technology, EXCEPT:

1. Alkaline phosphatase
2. Alanine transaminase
3. Reverse transcriptase
4. DNA ligase

**Options :**

- 86435121921. 1
- 86435121922. 2
- 86435121923. 3
- 86435121924. 4

## **Analytical Techniques-2**

**Section Id :**

864351472

<b>Section Number :</b>	2
<b>Section type :</b>	Offline
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	10
<b>Number of Questions to be attempted :</b>	10
<b>Section Marks :</b>	30
<b>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	864351483
<b>Question Shuffling Allowed :</b>	No

**Question Number : 21 Question Id : 8643517241 Question Type : SUBJECTIVE**

**Correct Marks : 3**

Define Antibody and Antigen? Give an example of each.

**Question Number : 22 Question Id : 8643517242 Question Type : SUBJECTIVE**

**Correct Marks : 3**

What is the 'Edman degradation' method ?

**Question Number : 23 Question Id : 8643517243 Question Type : SUBJECTIVE**

**Correct Marks : 3**

What is full form of "SDS-PAGE"? What is it used for? And what is the function of SDS in this technique?

**Question Number : 24 Question Id : 8643517244 Question Type : SUBJECTIVE**

**Correct Marks : 3**

DNA isolation is done under slightly alkaline conditions whereas RNA isolation is done under slightly alkaline condition. What is the reason for this different experimental conditions?

**Question Number : 25 Question Id : 8643517245 Question Type : SUBJECTIVE**

**Correct Marks : 3**

What is the full form of PCR and RT PCR ? And when do you use PCR and when you have to do RT PCR in biological experiments?

**Question Number : 26 Question Id : 8643517246 Question Type : SUBJECTIVE**

**Correct Marks : 3**

Explain the principle of immobilized metal affinity chromatography (IMAC) with a suitable example.

**Question Number : 27 Question Id : 8643517247 Question Type : SUBJECTIVE**

**Correct Marks : 3**

Give **atleast 3 three** major structural or functional differences of Hemoglobin and Myoglobin

**Question Number : 28 Question Id : 8643517248 Question Type : SUBJECTIVE**

**Correct Marks : 3**

Name **ANY 3** hydrodynamic properties of water and their usage in biology

**Question Number : 29 Question Id : 8643517249 Question Type : SUBJECTIVE**

**Correct Marks : 3**

What is Beer-Lambert Law? Give equation and explain very briefly.

**Question Number : 30 Question Id : 8643517250 Question Type : SUBJECTIVE**

**Correct Marks : 3**

What are restriction enzymes? Give at least **three 3 main features**.

### **Analytical Techniques-3**

<b>Section Id :</b>	864351473
<b>Section Number :</b>	3
<b>Section type :</b>	Offline
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	7
<b>Number of Questions to be attempted :</b>	5
<b>Section Marks :</b>	50
<b>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	864351484
<b>Question Shuffling Allowed :</b>	No

**Question Number : 31 Question Id : 8643517251 Question Type : SUBJECTIVE**

**Correct Marks : 10**

The following are some cellular functions/ cellular events that take place in the body. Give **one/ two lines answer and give example of each**

- 1 ) Phagocytosis , 2) Osmosis, 3) Diffusion, 4 ) Active transport, 5) Plasmolysis  
6 ) Surface tension. 7) Apoptosis, 8) Senescence, 9) Neoplasticity, and 10 ) Necrosis

**Question Number : 32 Question Id : 8643517252 Question Type : SUBJECTIVE**

**Correct Marks : 10**

1. If you have to isolate and store DNA and RNA, then which molecule (DNA or RNA) is easier to handle? Justify your answer.
2. Explain a method to quantify and Integrity check **ANY ONE RNA Or DNA.**

**Question Number : 33 Question Id : 8643517253 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Name different types of ELISA. Explain with a suitable diagram, ANY one type of ELISA in detail and give its applications in biology/medicine.

**Question Number : 34 Question Id : 8643517254 Question Type : SUBJECTIVE**

**Correct Marks : 10**

What do you understand by "Proteomics" and what is its application in biology/medicine? Explain the principle of MALDI and how is it used for identification of a protein by this technique.

**Question Number : 35 Question Id : 8643517255 Question Type : SUBJECTIVE**

**Correct Marks : 10**

What do you understand by Recombinant DNA technology? Discuss the expression techniques of recombinant proteins **using ANY one in Bacteria Or yeast**

**Question Number : 36 Question Id : 8643517256 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Explain the following in brief.

1. Ion-exchange chromatography
2. High Performance Liquid Chromatography

**Question Number : 37 Question Id : 8643517257 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Describe **ANY ONE** of the the techniques : Flow Cytometry **OR** Fluorescence microscopy and its applications in biology /medicine