

# National Testing Agency

<b>Question Paper Name :</b>	Analytical Techniques 30 Sep 2020 Shift 1
<b>Subject Name :</b>	Analytical Techniques
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<b>Display Marks:</b>	Yes

## Analytical Techniques

<b>Group Number :</b>	1
<b>Group Id :</b>	89951449
<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

## Section A

<b>Section Id :</b>	89951451
<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 :** 89951473  
**Question Shuffling Allowed :** Yes

**Question Number : 1 Question Id : 8995144405 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

The physiological blood pH in humans is :

1. 6.0-6.50
2. 6.8-7.0
3. 7.4-7.5
4. 7.8-8.0

**Options :**

89951417555. 1  
89951417556. 2  
89951417557. 3  
89951417558. 4

**Question Number : 2 Question Id : 8995144406 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

Which of the following wavelength range is used in UV spectroscopy?

1. 0.8 - 500 $\mu\text{m}$
2. 100 - 380nm
3. 380 - 750nm
4. 0.01 - 10nm

**Options :**

89951417559. 1  
89951417560. 2  
89951417561. 3  
89951417562. 4

**Question Number : 3 Question Id : 8995144407 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

Absorption peak at wavelength of 280 nm in a protein comes from:

1. Peptide bonds
2. Disulphide bonds
3. Aromatic amino acids
4. Hydrophobic amino acids

**Options :**

89951417563. 1

89951417564. 2

89951417565. 3

89951417566. 4

**Question Number : 4 Question Id : 8995144408 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

Non-essential amino acids are:

1. Threonine, isoleucine, leucine
2. Aspartic acid, glutamic acid, alanine
3. Methionine, valine, histidine
4. Lysine, valine, histidine

**Options :**

89951417567. 1

89951417568. 2

89951417569. 3

89951417570. 4

**Question Number : 5 Question Id : 8995144409 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

What will be the final magnification of a microscope which has an eye piece lens of 10X and objective lens of 40X?

1. 50 times
2. 40 times
3. 400 times
4. 4000 times

**Options :**

89951417571. 1

89951417572. 2

89951417573. 3

89951417574. 4

**Question Number : 6 Question Id : 8995144410 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 :**

89951417575. 1

89951417576. 2

89951417577. 3

89951417578. 4

**Question Number : 7 Question Id : 8995144411 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

All the following statements are correct related to basic principle of sedimentation

**EXCEPT :**

1. Denser biological structure sediments faster in a centrifugal field.
2. Massive biological structure moves slower in a centrifugal field.
3. The denser the buffer system is, the slower the particle will move in a centrifugal field.
4. The greater the centrifugal force is, the faster the particle sediments.

**Options :**

89951417579. 1

89951417580. 2

89951417581. 3

89951417582. 4

**Question Number : 8 Question Id : 8995144412 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following techniques would be most useful to identify and quantify the presence of a known impurity in a drug substance?

1. NMR spectroscopy
2. Two dimensional gel electrophoresis
3. Infra red spectroscopy
4. HPLC

**Options :**

89951417583. 1  
89951417584. 2  
89951417585. 3  
89951417586. 4

**Question Number : 9 Question Id : 8995144413 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Iso-electric focusing of proteins is done on the basis of the property:

1. Molecular weight
2. Number of aromatic residues
3. PI
4. Number of cysteine residues

**Options :**

89951417587. 1  
89951417588. 2  
89951417589. 3  
89951417590. 4

**Question Number : 10 Question Id : 8995144414 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following chromatography separation procedures is best suited for purification of an antigen:

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

**Options :**

89951417591. 1

89951417592. 2

89951417593. 3

89951417594. 4

**Question Number : 11 Question Id : 8995144415 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

The technique of “Western blotting” is used to study:

1. DNA expression
2. RNA expression
3. Protein expression
4. Binding of DNA-RNA with protein

**Options :**

89951417595. 1

89951417596. 2

89951417597. 3

89951417598. 4

**Question Number : 12 Question Id : 8995144416 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

What is the role of goat anti-rabbit IgG horseradish peroxidase conjugate in western blotting experiment?

1. Substrate
2. Primary antibody
3. Secondary antibody
4. Antigen

**Options :**

89951417599. 1

89951417600. 2

89951417601. 3

89951417602. 4

**Question Number : 13 Question Id : 8995144417 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No**

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

DNA foot-printing technique is best suitable for checking .....

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

**Options :**

- 89951417603. 1
- 89951417604. 2
- 89951417605. 3
- 89951417606. 4

**Question Number : 14 Question Id : 8995144418 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Polymerase Chain Reaction in a thermocycler occur due to the presence of

1. Template DNA, primers, dNTPs, magnesium ions and Taq polymerase
2. Template DNA, dNTPs,
3. RNA
4. Template DNA, primers, dNTPs, and magnesium ions

**Options :**

- 89951417607. 1
- 89951417608. 2
- 89951417609. 3
- 89951417610. 4

**Question Number : 15 Question Id : 8995144419 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which is/are the property of Real-Time PCR assays?

1. It requires the reverse transcription reaction.
2. Cyber green dye binds double-stranded DNA.
3. This technique is used for differential gene expression analysis
4. All of the above

**Options :**

- 89951417611. 1
- 89951417612. 2
- 89951417613. 3

89951417614. 4

**Question Number : 16 Question Id : 8995144420 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following is correct in reference to 'Sanger sequencing' method

1. Utilization of chemicals for base specific cleavage
2. Deoxy NTPs utilization for chain termination
3. Di-deoxy NTPs Utilization for chain termination
4. Use of  $^{32}\text{P}$  for chain termination

**Options :**

- 89951417615. 1
- 89951417616. 2
- 89951417617. 3
- 89951417618. 4

**Question Number : 17 Question Id : 8995144421 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the following enzyme is used to cleave DNA molecules at a specific site

1. Ligase
2. Phosphatase
3. Restriction enzymes
4. Ribonuclease

**Options :**

- 89951417619. 1
- 89951417620. 2
- 89951417621. 3
- 89951417622. 4

**Question Number : 18 Question Id : 8995144422 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**



RNA is very susceptible to degradation by ubiquitous RNases. In order to protect RNA from degradation, all the equipments and reagents must treated with:

1. Sodium hypochlorite
2. 1% Sodium Chloride
3. 70% ethanol
4. 0.1% diethyl pyrocarbonate

**Options :**

- 89951417623. 1
- 89951417624. 2
- 89951417625. 3
- 89951417626. 4

**Question Number : 19 Question Id : 8995144423 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Enzyme-linked immunosorbent assay (ELISA) is utilized to screen and quantification of:

1. Carbohydrate
2. DNA
3. Antigen
4. RNA

**Options :**

- 89951417627. 1
- 89951417628. 2
- 89951417629. 3
- 89951417630. 4

**Question Number : 20 Question Id : 8995144424 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0**

Which of the material is used for detector of PET?

1. Silver
2. Gadolinium
3. Tungsten
4. Lead

**Options :**

- 89951417631. 1

89951417632. 2

89951417633. 3

89951417634. 4

## Section B

<b>Section Id :</b>	89951452
<b>Section Number :</b>	2
<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>	30
<b>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	89951474
<b>Question Shuffling Allowed :</b>	No

**Question Number : 21 Question Id : 8995144425 Question Type : SUBJECTIVE**

**Correct Marks : 6**

What do you understand by buffer solution? How you can utilize 'Henderson-Hassel batch equation' for preparation of a buffer?

**Question Number : 22 Question Id : 8995144426 Question Type : SUBJECTIVE**

**Correct Marks : 6**

Explain the principle of 'chain termination method' for DNA sequencing.

**Question Number : 23 Question Id : 8995144427 Question Type : SUBJECTIVE**

**Correct Marks : 6**

Explain, how two dimensional gel electrophoresis (2DE) is better than conventional Sodium dodecyl sulphate Polyacrylamide gel electrophoresis (SDS-PAGE) in analyzing a mixture of proteins?

**Question Number : 24 Question Id : 8995144428 Question Type : SUBJECTIVE**

**Correct Marks : 6**

Explain the Beer-Lambert's law and its usage in DNA quantification using UV -VIS spectrophotometer.

**Question Number : 25 Question Id : 8995144429 Question Type : SUBJECTIVE**

**Correct Marks : 6**

What are advantages and applications of bacterial protein expression system?

**Question Number : 26 Question Id : 8995144430 Question Type : SUBJECTIVE**

**Correct Marks : 6**

How Radio-immunoassay (RIA) can be employed for quantifying hormone concentration in blood. Justify your answer with suitable example.

**Question Number : 27 Question Id : 8995144431 Question Type : SUBJECTIVE**

**Correct Marks : 6**

What do you understand by 'reverse transcription'? Explain the application of this method in gene expression analysis.

## **Section C**

<b>Section Id :</b>	89951453
<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>	89951475
<b>Question Shuffling Allowed :</b>	No

**Question Number : 28 Question Id : 8995144432 Question Type : SUBJECTIVE**

**Correct Marks : 10**

What is the full form of the technique PET in clinical diagnosis and mention 3 diseases where it is commonly used. What is biochemical metabolism basis that is applied in its usage and explain briefly with examples.

**Question Number : 29 Question Id : 8995144433 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Explain the principle of Confocal microscopy and give some of its applications in biology. What are important factors that need to be considered for successful confocal microscopy experiment?

**Question Number : 30 Question Id : 8995144434 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Electron microscopy is a technique for obtaining high resolution images using two type of instruments i.e., transmission electron microscope (TEM) and scanning electron microscope (SEM). On what basis the principle and instrumentation of TEM and SEM varies from each other? Explain with the help of examples.

**Question Number : 31 Question Id : 8995144435 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Explain, the principle, procedure and applications of a). Sandwich ELISA and b). Competitive ELISA

**Question Number : 32 Question Id : 8995144436 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Amplification of a target DNA using Polymerase chain reaction requires several components. Explain the usage and optimum conditions of following components for a successful PCR reaction.

- a) Primers
- b) Taq polymerase
- c) Magnesium ions
- d) Template DNA

**Question Number : 33 Question Id : 8995144437 Question Type : SUBJECTIVE**

**Correct Marks : 10**

Discuss the principle for separation of proteins using:

- (a) Gel-filtration chromatography
- (b) Ion-exchange chromatography

**Question Number : 34 Question Id : 8995144438 Question Type : SUBJECTIVE**

**Correct Marks : 10**

What is the principle of phenomenon “fluorescence”. How is it useful in Cell biology experiments? Give major steps involved in studying live cell imaging.