

National Testing Agency

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Analytical Techniques

Group Number : 1
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Break time: 0
Group Marks: 100

Analytical Techniques-1

Section Id : 709597237
Section Number : 1
Section type : Online
Mandatory or Optional: Mandatory
Number of Questions: 20
Number of Questions to be attempted: 20
Section Marks: 20
Display Number Panel: Yes
Group All Questions: No

Sub-Section Number: 1
Sub-Section Id: 709597332
Question Shuffling Allowed : No

Question Number : 1 Question Id : 70959721302 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If an eyepiece lens with a magnification of 10X is combined with a 100X objective lens, the respective magnification will be:

- 1) 10000X.
- 2) 1000X.
- 3) 100X.
- 4) 10X.

Question Number : 2 Question Id : 70959721303 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

With reference to centrifugation, what does the term RPM stand for?

- 1) Revolution per millimetre
- 2) Revolution per minute
- 3) Rounds per millimetre
- 4) Rounds per minute

Question Number : 3 Question Id : 70959721304 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is TRUE regarding density gradient centrifugation?

- 1) Density of the medium used in this centrifugation technique is uniform.
- 2) In suspension, particles that are denser than the solvent will float.
- 3) Used for the isolation of biomolecules and cell structures.
- 4) Does not depend upon the density

Question Number : 4 Question Id : 70959721305 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following statement about reagents used in DNA isolation is INCORRECT?

- 1) K in proteinase K stands for Keratin
- 2) Tris buffer maintains acidic pH during DNA isolation
- 3) EDTA is used to chelate magnesium ions required for nucleases
- 4) Sodium dodecyl sulphate (SDS) is a detergent

Question Number : 5 Question Id : 70959721306 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In which of the following technique, melting curve analysis is done?

- 1) Density gradient centrifugation
- 2) High-Performance Liquid Chromatography
- 3) Mass spectrometry
- 4) Realtime Polymerase chain reaction

Question Number : 6 Question Id : 70959721307 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which organism has the highest number of vectors?

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

Question Number : 7 Question Id : 70959721308 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Limitations of Cell-free protein system:

- 1) Lack of post translational modification
- 2) Making proteins that are toxic to expression hosts *in vivo*
- 3) Expression of proteins with modified amino acids
- 4) process is slow

Question Number : 8 Question Id : 70959721309 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Technique used to analyze proteins associated with specific DNA sequences

- 1) RNAi
- 2) snRNP
- 3) MALDI-TOF
- 4) ChIP

Question Number : 9 Question Id : 70959721310 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is the correct order of organization of genetic material from largest to smallest?

- 1) Genome, chromosome, gene, nucleotide
- 2) Nucleotide, gene, chromosome, genome
- 3) Gene, nucleotide, chromosome, genome
- 4) Chromosome, genome, nucleotide, gene

Question Number : 10 Question Id : 70959721311 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is NOT termed as hybridization?

- 1) DNA and cDNA
- 2) DNA and mRNA
- 3) DNA from different species
- 4) DNA from male and females of same species

Question Number : 11 Question Id : 70959721312 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following techniques is NOT ideal for sequences with multiple single base repeats?

- 1) Illumina sequencing
- 2) Roche 454 sequencing
- 3) SOLiD sequencing
- 4) PacBio SMRT sequencing

Question Number : 12 Question Id : 70959721313 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Adsorption in chromatography is a process of:

- 1) Attenuation
- 2) Partitioning
- 3) Retention
- 4) Transmission

Question Number : 13 Question Id : 70959721314 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The principle of electrophoresis is based on the following property of the molecule:

- 1) Size
- 2) Shape
- 3) Charge
- 4) Density

Question Number : 14 Question Id : 70959721315 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

pH of a 0.01M NaOH solution is:

- 1) 3
- 2) 11
- 3) 10
- 4) 12

Question Number : 15 Question Id : 70959721316 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

One of the following procedures is NOT utilized in the study of proteins?

- 1) Mass spectrometry
- 2) PCR
- 3) Isotope analysis
- 4) Reverse phase columns

Question Number : 16 Question Id : 70959721317 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Western blot assay used to test serum samples for the presence of antibodies to infectious agents, such as HIV, is particularly useful as diagnostic assay because

- 1) It is more sensitive than ELISA
- 2) Multiple antigenic epitopes can be detected
- 3) It provides qualitative data for sample analysis
- 4) It is less expensive and takes less time to perform as compared with ELISA.

Question Number : 17 Question Id : 70959721318 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A sample containing mixture of different lipids was separated on a TLC plate. The nature of the lipid that appears at the bottom is:

- 1) Non-polar
- 2) Polar
- 3) Charged
- 4) Uncharged

Question Number : 18 Question Id : 70959721319 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following types of ELISA is most suitable for a hapten detection?

- 1) Direct
- 2) Indirect
- 3) Indirect Sandwich
- 4) Competitive

Question Number : 19 Question Id : 70959721320 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a competitive binding assay; when a labelled antigen, i.e. conjugated to a radio-isotope (Ag^*) competes with unknown unlabeled antigens (different amounts in different samples) for binding sites of the fixed amount of antibody (Ab), then after washing of the unbound fractions

- 1) There is decrease in the radioactivity in the sample having with higher concentration of the unlabeled Ag
- 2) There is increases in the radioactivity in the sample with higher concentration of the unlabeled Ag
- 3) There is no difference of radioactivity in different samples
- 4) There is decrease in the radioactivity in the sample having with least concentration of the unlabeled Ag

Question Number : 20 Question Id : 70959721321 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a Gel based clinical proteomics experiment, one can see

- 1) Bands on the gel
- 2) Chequered boxes on the gel
- 3) Spots on the gel
- 4) Stripes on the gel

Analytical Techniques-2

Section Id :	709597238
Section Number :	2
Section type :	Offline
Mandatory or Optional:	Mandatory
Number of Questions:	10
Number of Questions to be attempted:	10
Section Marks:	30
Display Number Panel:	Yes
Group All Questions:	No

Sub-Section Number:	1
Sub-Section Id:	709597333
Question Shuffling Allowed :	No

Question Number : 21 Question Id : 70959721322 Question Type : SUBJECTIVE Display Question Number : Yes
Correct Marks : 3

What is an antibody? How is it different from an antigen? Give an example of each.

Question Number : 22 Question Id : 70959721323 Question Type : SUBJECTIVE Display Question Number : Yes
Correct Marks : 3

Write briefly the terms used in chromatography: a) Retention time b) Void volume.

Question Number : 23 Question Id : 70959721324 Question Type : SUBJECTIVE Display Question Number : Yes
Correct Marks : 3

Staining of specimen often performed to enhance images acquired by bright-field microscopy, but phase contrast microscopy does not require cell staining. How is this advantageous?

Question Number : 24 Question Id : 70959721325 Question Type : SUBJECTIVE Display Question Number : Yes
Correct Marks : 3

Define the terms "Magnification" and "Resolution" used in microscopy.

Question Number : 25 Question Id : 70959721326 Question Type : SUBJECTIVE Display Question Number : Yes
Correct Marks : 3

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

Question Number : 26 Question Id : 70959721327 Question Type : SUBJECTIVE Display Question Number : Yes
Correct Marks : 3

Show the UV-VIS absorption spectrum of hemoglobin (globin and heme). Label X-Y axis. Show approximate maximum wavelength.

Question Number : 27 Question Id : 70959721328 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 3

Name ANY 3 applications of Western blotting in biology or medicine.

Question Number : 28 Question Id : 70959721329 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 3

Why DNA isolation is done under slightly alkaline conditions whereas RNA isolation is done under slightly alkaline condition?

Question Number : 29 Question Id : 70959721330 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 3

What is the advantage of real-time PCR over the conventional PCR?

Question Number : 30 Question Id : 70959721331 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 3

You are given the cDNA for expressing the Protein Z using E. coli as a host system.

Place the following steps in the correct order (a to f):

- a. Bacterial cell lysis
- b. PCR amplification of Z
- c. Transformation
- d. Affinity column chromatography
- e. Ligation
- f. Restriction digest of expression plasmid and insert

Analytical Techniques-3

Section Id :	709597239
Section Number :	3
Section type :	Offline
Mandatory or Optional:	Mandatory
Number of Questions:	7
Number of Questions to be attempted:	5
Section Marks:	50
Display Number Panel:	Yes
Group All Questions:	No

Sub-Section Number:	1
Sub-Section Id:	709597334
Question Shuffling Allowed :	No

Question Number : 31 Question Id : 70959721332 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 10

Explain the different steps involved in sub cellular fractionation with the help of a flow chart.

Question Number : 32 Question Id : 70959721333 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 10

A. With the help of neat diagram explain SDS-PAGE

B. You are given a mixture of proteins and if you run two different experiments: 1) SDS-PAGE and 2) Native PAGE. What would you expect to be different in both gels?

C. What is DIGE and its application

Question Number : 33 Question Id : 70959721334 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 10

Briefly explain the principle of Flow Cytometry OR CRISPR. Give its application in biology OR medicine.

Question Number : 34 Question Id : 70959721335 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 10

Discuss the various steps involved in recombinant DNA technology and its application in clinical diagnosis and therapy.

Question Number : 35 Question Id : 70959721336 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 10

Name the different methods used to estimate the protein concentration and which method do you think is more reliable for quantification. Discuss briefly the principle of ANY ONE method of protein estimation.

Question Number : 36 Question Id : 70959721337 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 10

Write Briefly: a) DNA-Protein Interactions b) What are the techniques used to study them

Question Number : 37 Question Id : 70959721338 Question Type : SUBJECTIVE Display Question Number : Yes Correct Marks : 10

A. Briefly explain the principle of ELISA with the help of diagrams.
B. Give four diagnostic applications of ELISA.
C. What is advantage of Sandwich ELISA.