

National Testing Agency

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Analytical Techniques

Group Number :	1
Group Id :	603489148
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Break time :	0
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Is this Group for Examiner? :	No

Analytical Techniques-1

Section Id :	603489208
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory

Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	603489420
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 60348911357 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Calculate the pH of a mixture of 0.1 M acetic acid and 0.1 M sodium acetate (pKa of acetic acid is 4.76)

1. 4.76
2. 5.76
3. 5.06
4. 4.06

Options :

60348943233. 1

60348943234. 2

60348943235. 3

60348943236. 4

Question Number : 2 Question Id : 60348911358 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

All the following are components of colorimeter, **EXCEPT**

1. Colored glass filters
2. Cuvette
3. Grating
4. Tungsten bulb

Options :

60348943237. 1

60348943238. 2

60348943239. 3

60348943240. 4

Question Number : 3 Question Id : 60348911359 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 :

60348943241. 1

60348943242. 2

60348943243. 3

60348943244. 4

Question Number : 4 Question Id : 60348911360 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

What is the role of β -mercaptoethanol in SDS-PAGE?

1. Cross-linking agent
2. To reduce the disulphide bonds
3. To stain the protein
4. To give negative charge

Options :

60348943245. 1

60348943246. 2

60348943247. 3

60348943248. 4

Question Number : 5 Question Id : 60348911361 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

All the following are used in a PCR reaction, EXCEPT

1. Taq polymerase
2. Deoxy NTPs
3. Oligonucleotide Primers
4. Radiolabeled probe

Options :

60348943249. 1

60348943250. 2

60348943251. 3

60348943252. 4

Question Number : 6 Question Id : 60348911362 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

At which of the following wavelength does the nucleic acids absorb light maximally?

1. 260 nm
2. 280 nm
3. 340 nm
4. 400 nm

Options :

60348943253. 1

60348943254. 2

60348943255. 3

60348943256. 4

Question Number : 7 Question Id : 60348911363 Question Type : MCQ Option Shuffling : No Is

Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Presence of which of the following molecule is detected by northern blot technique?

1. DNA
2. RNA
3. Proteins
4. Lipids

Options :

60348943257. 1

60348943258. 2

60348943259. 3

60348943260. 4

Question Number : 8 Question Id : 60348911364 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 :

60348943261. 1

60348943262. 2

60348943263. 3

60348943264. 4

Question Number : 9 Question Id : 60348911365 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Who got the Noble prize for sequencing of nucleic acids as well as of proteins?

1. Sanger
2. Edman
3. Akabori
4. Russel

Options :

60348943265. 1

60348943266. 2

60348943267. 3

60348943268. 4

Question Number : 10 Question Id : 60348911366 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Which DNA intercalating agent is added to agarose gel to visualise DNA molecules after electrophoresis?

1. Doxorubicin
2. Ethidium Bromide
3. Mitoxantrone
4. Pixantrone

Options :

60348943269. 1

60348943270. 2

60348943271. 3

60348943272. 4

**Question Number : 11 Question Id : 60348911367 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

All of the following are priming strategies for cDNA synthesis, **EXCEPT**

1. Gene-specific primer
2. Oligo d(A) primer
3. Random decamer
4. Random hexamer

Options :

60348943273. 1

60348943274. 2

60348943275. 3

60348943276. 4

**Question Number : 12 Question Id : 60348911368 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

Which of the following separation technique is based on the ability of amino acid/proteins to behave like zwitterions?

1. Gel permeation chromatography
2. Mass spectrometry
3. Isoelectric focusing
4. Ion exchange chromatography

Options :

60348943277. 1

60348943278. 2

60348943279. 3

60348943280. 4

**Question Number : 13 Question Id : 60348911369 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

A protein shows a band corresponding to 100 kD in native-PAGE but two bands of 20 kD and 30 kD in SDS-PAGE. What is your inference about the nature of protein?

1. Homodimer
2. Homotetramer
3. Heterodimer
4. Heterotetramer

Options :

60348943281. 1

60348943282. 2

60348943283. 3

60348943284. 4

**Question Number : 14 Question Id : 60348911370 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

Which of the following is used in the second direction of two-dimensional electrophoresis?

1. Polyampholytes
2. Sodium dodecyl sulphate
3. Carboxymethylcellulose sodium
4. Polystyrene beads

Options :

60348943285. 1

60348943286. 2

60348943287. 3

60348943288. 4

Question Number : 15 Question Id : 60348911371 Question Type : MCQ Option Shuffling : No

Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Which of the following technique is the most suitable for purifying a recombinant protein with His-tag?

1. Salting out
2. SDS-PAGE
3. Affinity chromatography
4. Isoelectric focusing

Options :

60348943289. 1

60348943290. 2

60348943291. 3

60348943292. 4

Question Number : 16 Question Id : 60348911372 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 :

60348943293. 1

60348943294. 2

60348943295. 3

60348943296. 4

**Question Number : 17 Question Id : 60348911373 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

Yeast two-hybrid system is used for detection of:

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

Options :

60348943297. 1

60348943298. 2

60348943299. 3

60348943300. 4

**Question Number : 18 Question Id : 60348911374 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

RNAse inhibitor Diethyl Pyro Carbonate (DEPC) acts by covalent modification of which of the following catalytic residues of the ribonuclease enzyme?

1. Arginine
2. Histidine
3. Glutamate
4. Aspartate

Options :

60348943301. 1
60348943302. 2
60348943303. 3
60348943304. 4

**Question Number : 19 Question Id : 60348911375 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

Which of the following occurs during pyrosequencing?

1. Dideoxynucleotides release fluorescent bases
2. Dideoxynucleotides are incorporated and terminate DNA synthesis
3. Released dideoxynucleotide generates a fluorescent signal
4. Released pyrophosphate generates a fluorescent signal

Options :

60348943305. 1
60348943306. 2
60348943307. 3
60348943308. 4

**Question Number : 20 Question Id : 60348911376 Question Type : MCQ Option Shuffling : No
Is Question Mandatory : No**

Correct Marks : 1 Wrong Marks : 0

What is Yeast Artificial Chromosome?

1. DNA probe
2. DNA library
3. Vector
4. Microarray

Options :

60348943309. 1

60348943310. 2

60348943311. 3

60348943312. 4

Analytical Techniques-2

Section Id :	603489209
Section Number :	2
Section type :	Offline
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
Section Marks :	30
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	603489421
Question Shuffling Allowed :	No

Question Number : 21 Question Id : 60348911377 Question Type : SUBJECTIVE

Correct Marks : 3

Mention the role of the following in ELISA:

- a. Bovine Serum Albumin (BSA)
- b. Sulphuric Acid (H_2SO_4)
- c. Tetra methyl benzidine

Question Number : 22 Question Id : 60348911378 Question Type : SUBJECTIVE

Correct Marks : 3

List at least **THREE major points** to be kept in mind during primer designing for polymerase chain reaction.

Question Number : 23 Question Id : 60348911379 Question Type : SUBJECTIVE

Correct Marks : 3

What do 'forward scatter' and 'side scatter' measure in flow cytometry? Illustrate with a diagram.

Question Number : 24 Question Id : 60348911380 Question Type : SUBJECTIVE

Correct Marks : 3

What is the full form of PET technique? Why is 18-Fluoro deoxyglucose (FDG) is used in PET for medical diagnosis.

Question Number : 25 Question Id : 60348911381 Question Type : SUBJECTIVE

Correct Marks : 3

What are the precautions to be taken during RNA isolation?

Question Number : 26 Question Id : 60348911382 Question Type : SUBJECTIVE

Correct Marks : 3

You are inserting your gene of interest into the *Lac Z* gene in a plasmid also containing a tetracycline resistant gene. You plate your transformed bacteria on media containing tetracycline and X-gal.

- a. What will be colour of colonies?
- b. Will the colony tetracycline resistant?

Question Number : 27 Question Id : 60348911383 Question Type : SUBJECTIVE

Correct Marks : 3

What is the difference between "DNA footprinting" and "DNA finger printing" techniques ?

Question Number : 28 Question Id : 60348911384 Question Type : SUBJECTIVE

Correct Marks : 3

Give in 1 or 2 lines with an examples of the following:

- a.Surface tension
- b.Osmosis
- c. Diffusion

Question Number : 29 Question Id : 60348911385 Question Type : SUBJECTIVE

Correct Marks : 3

Name **ANY 3** methods used in protein estimation for determining its concentration .

Question Number : 30 Question Id : 60348911386 Question Type : SUBJECTIVE

Correct Marks : 3

What is the principle on which "paper chromatography" is based? What are three solvents used to separate a mixture of amino acids. And what is the chemical used to visualize the spots?

Analytical Techniques-3

Section Id :	603489210
Section Number :	3
Section type :	Offline
Mandatory or Optional :	Mandatory
Number of Questions :	7
Number of Questions to be attempted :	5
Section Marks :	50
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	603489422
Question Shuffling Allowed :	No

Question Number : 31 Question Id : 60348911387 Question Type : SUBJECTIVE

Correct Marks : 10

Write briefly on the following:

- State Beer-Lambert's law.
- What are the major components of a colorimeter / Show with the help of a diagram
- Give major differences in "Colorimetry" and "UV-Vis Spectrophotometry"

Question Number : 32 Question Id : 60348911388 Question Type : SUBJECTIVE

Correct Marks : 10

Explain the Recombinant DNA technology and its application in medicine /biology.

Question Number : 33 Question Id : 60348911389 Question Type : SUBJECTIVE

Correct Marks : 10

Describe the application of differential centrifugation by giving various steps involve in separation of subcellular fractions.

Question Number : 34 Question Id : 60348911390 Question Type : SUBJECTIVE

Correct Marks : 10

(a) What do you understand by the following terms in relation to real time PCR reaction?

- i. Baseline
- ii. Threshold cycle
- iii. ΔC_t
- iv. $\Delta\Delta C_t$
- v. Fold change

(b) What is reverse transcription? Describe the different types of primers used in reverse transcription briefly.

Question Number : 35 Question Id : 60348911391 Question Type : SUBJECTIVE

Correct Marks : 10

(a) Why DNA isolation is done under slightly alkaline conditions whereas RNA isolation is done under slightly acidic condition?

(b) Mention the role of following components in DNA isolation:

- i. Proteinase K
- ii. Phenol
- iii. Chloroform
- iv. Isoamyl alcohol
- v. 70% ethanol

(c) What is the ideal 260/280 ratio for DNA sample to be used for DNA sequencing? Can nanodrop technique differentiate DNA and RNA?

Question Number : 36 Question Id : 60348911392 Question Type : SUBJECTIVE

Correct Marks : 10

- a. Give examples of protein-nucleic interactions
- b. What are the methods used to study protein-DNA interactions? Explain briefly **ANY 2 methods**

Question Number : 37 Question Id : 60348911393 Question Type : SUBJECTIVE

Correct Marks : 10

With suitable schematic diagrams, **explain the following**

- a. Give names of different types of ELISA and their advantages
- b. Difference between ELISA and RIA