Chhatrapati Shahu Ji Maharaj University, Kanpur

Answer Script Details
Barcode 5652250

Roll No. 24080022030
Total Mark 47/75.00

Exam MASTER OF SCIENCE _ODD EXAM-DEC-24
Subject B050704T - QUANTITATIVE BIOLOGY RESEARCH ME

Question wise Mark Summary

Q.No	Mark	Q.No	Mark	Q.No	Mark	Q.No	Mark
1A	3/5						
1B	2/5						
1C	3/5						
1D	3/5						
1E	3/5						
1F	3/5						
1G	3/5						
1H	3/5						
1I	2/5						
2	0/15						
3	0/15						
4	0/15						
5	11/15						
6	0/15						
7	11/15						
8	0/15						
9	0/15						

Chhatrapati Shahu Ji Maharaj University
Kanpur, Uttar Pradesh

Date of Exam: 25/01/2025 Shift: 1st Room No.: 34
Paper Code: B050704T Subject: Zoology Year/Sem: 1st
Name of Candidate: ALSHIFA ALAM
Roll No. 2 4 0 8 0 0 2 2 0 3 0

Signature of Candidate

Signature of Invigilator

COE Facsimile

PART-II

Q	1	2	3	4	5	6	7	8	9	10
(a)										
(b)										
(c)										
(d)										
(e)										
(f)										
(g)										
(h)										
(i)										
(j)										
Total										

MARKS OBTAINED

Total Marks in Figures | Max. Marks

Total Marks in Words

B050704T
Paper Code

Signature of Evaluator

Course: M.SC ZOOLOGY (PREVIOUS)
Session: 2024-25 Year/Semester: 1st
Subject Name: Zoology Paper IV
Medium: English ● Hindi ○

Paper Code: B 0 5 0 7 0 4 T

Exam Date: 25 01 2025

Name of Candidate: ALSHIFA ALAM

Father's Name: MOHD ALAM

महाविद्यालय का कोड
College Code: K N 0 4

परीक्षा केंद्र का कोड
Exam Centre Code: K N 0 4

परीक्षा का प्रकार
Type of Exam
नियमित Regular ● भूतपूर्व छात्र Ex-Student ○
व्यक्तिगत Private ○ बैक पेपर परीक्षा Back Paper Exam ○

ANSWER BOOKLET NO.
5652250

B050704T
Paper Code

नामांकन संख्या
Enrollement Number: C S J M A 2 4 0 0 0 0 1 3 7 8 9

परीक्षार्थी अनुक्रमांक संख्या Candidate's Roll Number: 2 4 0 8 0 0 2 2 0 3 0

पेपर कोड Paper Code: B 0 5 0 7 0 4 T

Signature of Candidate

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नोट- 1. परीक्षार्थी को निर्देशित किया जाता है कि आवरण पत्र के पृष्ठ भाग पर अंकित सभी निर्देशों को सावधानी पूर्वक पढ़ें।
2. गोलों में भरी जाने वाली प्रविष्टियाँ काली स्याही से शुरू की जाएँ। 3. गोलों को काले या नीले बालपेन से भरा जाए।

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-I

1. Read the instructions carefully given on the answer script and admit card.
2. Write Date of Exam, Shift, Paper Code & Name of Subject Correctly.
3. Write Name & Roll No. Correctly.
4. Write Semester & Branch Correctly.

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-III

1. Use blue or black ball point pen for writing alphabets & numerals in ..... boxes.
2. Carefully study the example before you start marking.
3. As shown in the example below, blacken the circles completely.

4. Make no Stray marks on this sheet.
5. **DO NOT WRITE OR MARK ON THE BAR CODE.**

IN ORDER TO AVOD UFM (UNFAIR MEANS) :

1. The Roll No. and Answer Book no. found elsewhere or any other symbol found in the answer book will be treated as unfair means.
2. Any tempering of Bar Code and Booklet no shall be treated as Unfair Means.
3. Do Not bring the materials like slip of paper/mobile/digital diaries/ study material/ revision notes in examination hall. Possession of the mobiles/ digital diaries/electronic/digital/ watch and any other electronic gadget except memory less scientific calculator shall be considered as UFM case.
4. Do not keep or paste currency note in answer script it shall be consider as UFM.

अनुचित साधन से बचने हेतु :

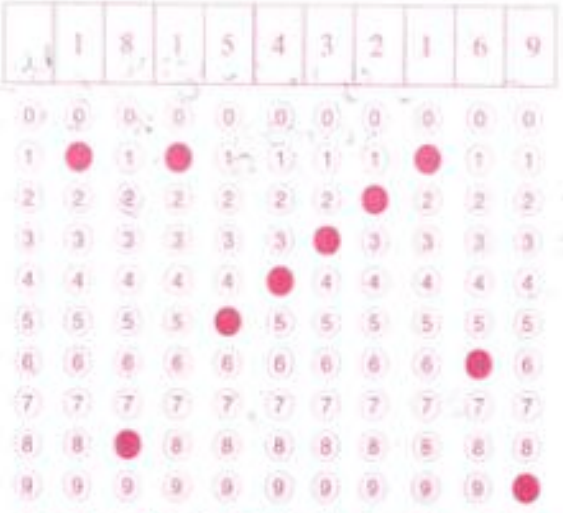
1. उत्तर पुस्तिका के निर्देशित स्थान को छोड़कर अनुक्रमांक एवं उत्तरपुस्तिका का कूटांक कहीं और न लिखे तथा कोई भी चिन्ह न बनायें अन्यथा यह अनुचित साधन प्रयोग की परिधि में आता है।
2. उत्तर पुस्तिका से सम्बन्धित अन्य उत्तर पुस्तिका संख्या पर ऐसा प्रयास करने पर अनुचित साधन प्रयोग माना जायेगा।
3. परीक्षा कक्ष में ऐसी वस्तुएं साथ न रखें, जैसे लिखे हुए कागज के टुकड़े, मोबाईल, डिजिटल डायरी, डिजिटल घड़ी, घड़ी, पुस्तक एवं अन्य वस्तुएं जो अनुचित साधन के अन्तर्गत आती है। छोड़कर संबंधित प्रश्नपत्र में ही उपयोग लेय साइंटिफिक कैलकुलेटर ले जाने की अनुमन्यता होगी।
4. उत्तर पुस्तिकाओं में रुपये न रखें न ही उत्तर पुस्तिका में चिपकायें। ऐसा करना अनुचित साधन प्रयोग की परिधि में आता है।

INSTRUCTION TO THE CANDIDATE

1. Read the instructions carefully given on the Question Paper, Admit Card & Answer Script.
2. Do not write anything on back side of the cover page.
3. Write on both sides of pages of answer book.
4. Do not write anything on question paper except Roll Number.
5. Write Paper Code & Question Paper Id carefully.
6. CHECK the number of pages (1-24) or any other kind of damage in your answer script, if found than change the answer script immediately before the commencement of examination.
7. CHECK the Question Paper for any kind of discrepancy e.g. Subject Code, S Name, and Question of the Question Paper during first THIRTY MINUTES of commencement of the exam, so that it can be corrected in TIME. After that no corrections shall be entertained by the university.
8. Do not use pencil for answering the question.
9. Write status correctly e.g. those appearing in carry over papers should fill in sta as Carry Over. Those appearing as Ex- Students should fill in status as ex.
10. No supplementary answer book & graph paper will be provided.

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-IV

1. Use blue or black ball point pen for writing alphabets & numerals in ..... Boxes.
2. Use blue or black ball point pen for filling the circles.



Note- If your Roll No. is of 10 digits. Please leave first three columns .

Paper Code
B050704T

1

(SECTION-A)

Ans. 1(a)

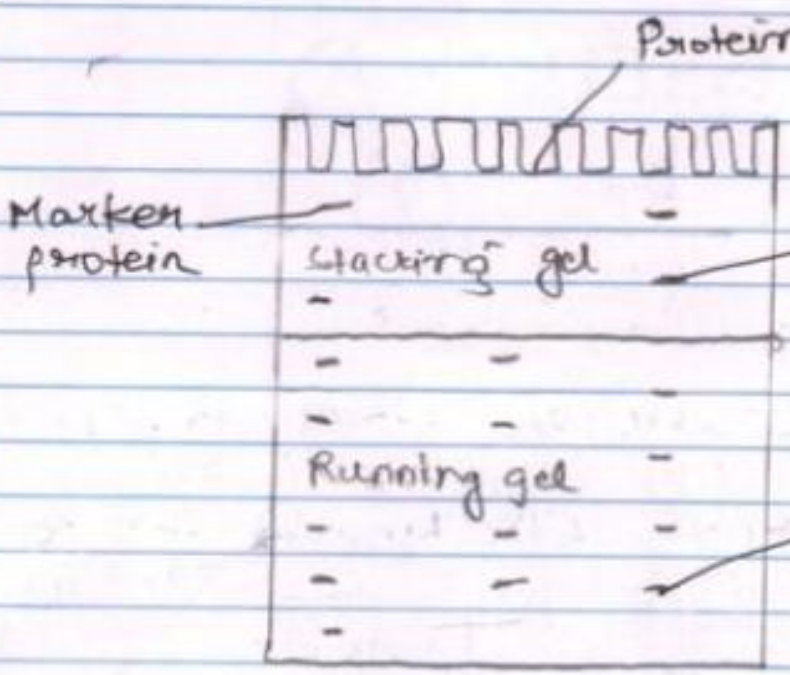
SDS- PAGE

SDS- PAGE is a type of gel electrophoresis which is used to separate proteins according to their molecular weight.
In this technique polyacrylamide gel is used and SDS detergent is used.
SDS (sodium Dodecyl sulphate) is a detergent that imparts the proteins a net negative charge so that they move towards anode and are used according to their size or molecular weight.

Gel :- Polyacrylamide formed by the crosslinking agent N,N' methylene bis acrylamide
Catalyst used for Polymerisation :-
N,N,N',N' tetramethylenediamine (TEMED)

Buffer ⇒
1. Gel casting buffer
2. Sample buffer
3. Running buffer.

Uses :- 1) To separate proteins of different molecular
2) Used in Western Blotting
3) Helps to determine the size of proteins.



Ans. 1(b)

2, 4, 6, 8, 3, 5, 7, 2, 4, 9, 1, 4

Arrange the data :-

1, 2, 2, 3, 4, 4, 4, 5, 6, 7, 8, 9

Mean = $\frac{\text{sum of all observations}}{\text{Total no. of observations}}$

$= \frac{1+2+2+3+4+4+4+5+6+7+8+9}{12}$

$= \frac{55}{12} = 4.5$

Median = Size of $\left(\frac{n+1}{2}\right)^{th}$ term

$= \text{Size of } \left(\frac{12+1}{2}\right)^{th} \text{ term}$

$= \text{Size of } (6.5^{th}) \text{ term.}$

$\text{Median} = \frac{5^{th} \text{ term} + 7^{th} \text{ term}}{2}$

$= \frac{4+4}{2}$

$= \frac{8}{2}$

Median = 4 Ans ✓

MODE ⇒ 4 comes highest number of times

Hence

MODE = 4 Ans

Ans. 1(c)

Null hypothesis

- Null hypothesis claims that the situation assumed for the population parameter is true until it is declared as false.
- It states that there is no difference between the assume value and natural value of the parameter.
- It is represented by H_0.

For example ⇒ Our hypothesis is –

Out of 100 covid positive patients 90 must be recovered after taking the vaccine.

Then, if the 90 patients recovered out of 100 covid positive patients, at then it will be a Null hypothesis.

$$H_0 : \mu = 90$$

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Ans. 1(d)

- Non-parametric tests are the tests that test the null hypothesis when the population is not normally distributed.
- It does not require information about the population such as median, S.D etc.
- Chi-square test is used to determine whether the Observed data (O) is equivalent to expected data (E).
- It is non-parametric test because it does not require informations from the population such as S.D, mean, etc.
- It tests two hypothesis—

(i) Null hypothesis:— It states there is no significant association between the variables.

(ii) Alternate hypothesis:— There is significance association b/w the variables.

$$\text{Expected frequency} = \frac{\text{row total} \times \text{column total}}{\text{Grand Total}}.$$

$$X^2 = \sum \frac{(O-E)^2}{E}$$

$$\text{Degree of freedom} = (\text{number of column} - 1) \times (\text{number of row} - 1)$$

Level of significance ⇒ generally 5% or 0.05.

If $X^2_{cal} < X^2_{tab} \Rightarrow H_0$ is accepted.

If $X^2_{cal} > X^2_{tab} \Rightarrow H_0$ is rejected.

Ans. 1(c)

x	$x-\bar{x}$	$(x-\bar{x})^2$
2	$2-5 = -3$	9
4	$4-5 = -1$	1
6	$6-5 = 1$	1
8	$8-5 = 3$	9
		$\Sigma(x-\bar{x})^2 = 20$

Mean

$$S.D = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

$$\text{Mean } (\bar{x}) = \frac{\Sigma x}{N}$$

$$= \frac{2+4+6+8}{4}$$

$$= \frac{20}{4}$$

$$\bar{x} = 5$$

$$S.D = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

$$= \sqrt{\frac{20}{4-1}}$$

$$= \sqrt{\frac{20}{3}} = \sqrt{6.66} \simeq 2.5$$ Ans

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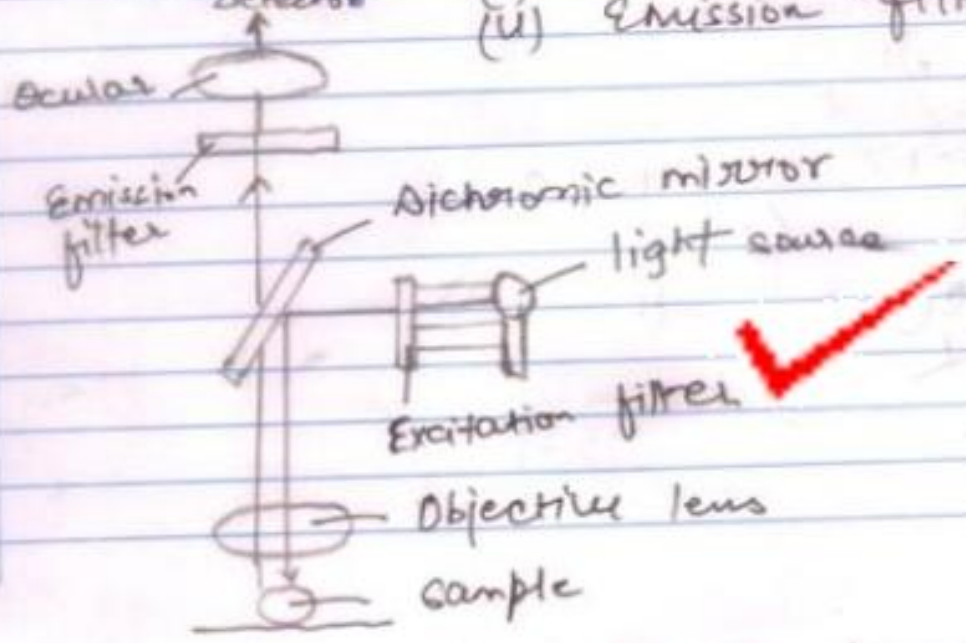
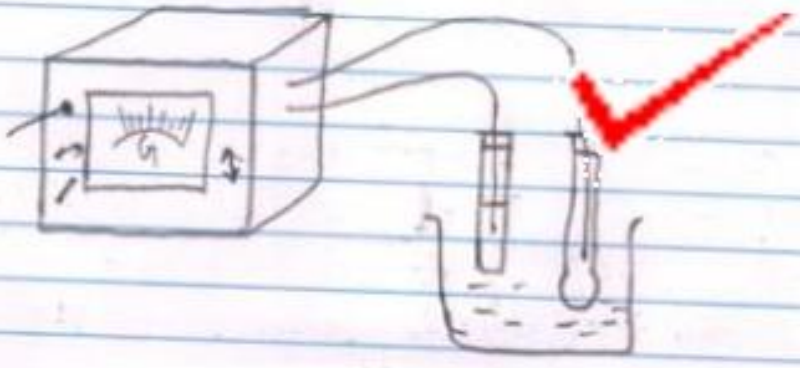
Ans. 1 (f)

- Principle of Fluorescene Microscopy :-
- Fluorescene microscopy is based on the principle of Fluorescence.
- Fluorescence is a phenomenon where the fluorescent material absorbed light at a particular wavelength and emit light at higher and particular wavelength.
- In this the sample is fluorescently labelled with fluorescent dye such as Fluorescin or Rhodomine.
- Sample absorb light at particular wavelength and absorbed light is emitted at higher wavelength which passes through the emission filter and finally detected by the detector.
- Two band filters are used in this microscopy – (i) Excitation filter
  (ii) Emission filter.



Ans. 1(g)

- pH meter is calibrated by standard buffers of known pH.
- First the electrode is rinsed and immersed in the standard buffer of known pH such as pH with 4, 7, 10 with the accuracy of ±0.02 pH units.
- Adjust the calibration dial until proper pH is indicated.
- Then the electrode is removed and rinsed against with wash bottle then dried and immersed in the another standard buffer. Turn the meter to on or read adjust the meter with the help of calibration Knob or until the proper pH of the standard buffer is indicated on the dial. If it is not, then against check the pH of first buffer and rinse the electrode and immerse the electrode in the test Solution. and record the pH.



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9

Ans. 1 (h)

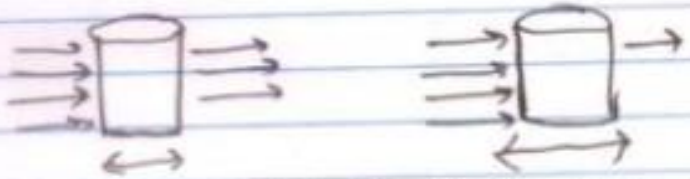
Beer Lamber law :-

① Beer law :- When a parallel beam of monochromatic light is passed through a solution, the absorbance of the solution is directly proportional to the concentration of the sample in the solution.

$$A = KC.$$

② Lambert's law :- When a parallel beam of monochromatic light is pased through the solution, the absorbance of the solutionis directly proportional to the path length of the medium.

$$A = KI$$



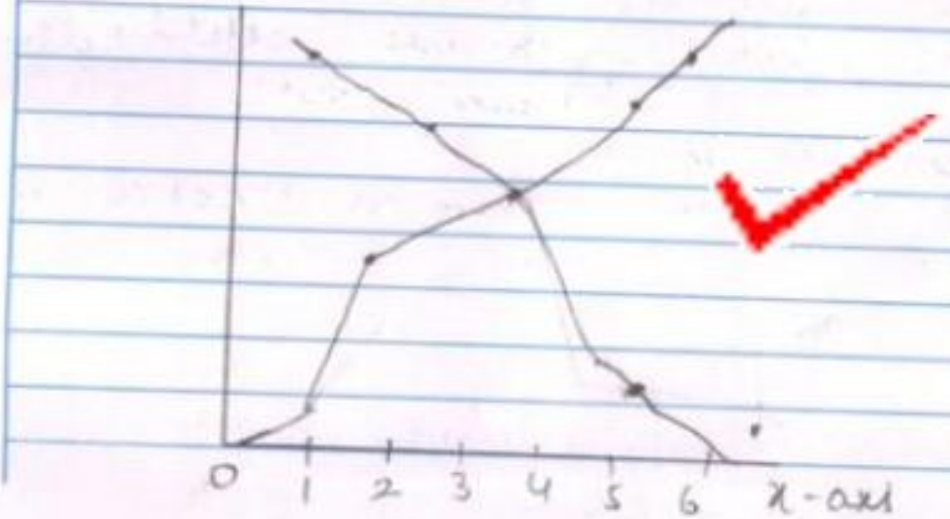
On combining both laws, we get

$$A = KCI.$$

Ans. 1(i)

Ogive:-

- It is a type of graphical representation of data which comes under cumulative frequency distribution.
- The ogive formed from the data cumulated upward is called more than ogive
- The ogive formed from the data cumulated downward is called less than ogive.
- In cumulative frequency distribution graph the y-axis will have high to low low data points and x-axis have low to high data points. Middle value will point ~~together~~ separately where the co-relate togeth
It has two axis - More than axis
- Less than axis.



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B050704T

11

(SECTION - B)

Ans. 5

Data :- Raw facts and figures.
Research data are those data which have been collected, observed, generated or created to generalise the or validate the orlgival data.

Data are of two types-

① Primary data :- Primary data is the data that have been collected for the first time and primary data is original in nature and directly related to the problem or issue or current data.

Methods of collecting Primary data -

(i) Observation (Structural and Unstructured)
(ii) Interview (Personal / telephonic)
(iii) Schedule (Enumerator)
(iv) Questainnaire
(v) Other methods (use of mechanical devices audits etc)

Secondary data :-

Secondary data are those data which are already collected by someone else and have been already passed through the statistical process.

Sources of Secondary data

External sources

- → Published articles
- → Census, CSO, NSS
- → Books
- → Magazines
- → Newspapers
- → Journal articles
- → Websites.

Internal sources

- → Company records
- → Sales records
- → Financial records
- → Employ records
- → Other records.

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Organisation and Presentation of data :-

Data can be organised by :-

Classification of data :-

It is a method of arranging the data into separate classes, groups, subgroups according to the characteristics they carry.

Features of classification of data :-

1. Classification of data into groups (Such as employed and unemployed)
2. Homogenity as the basis of classification
3. Unity in diversity.

Objectives of classification of data :-

1) To condense data.
2) To bring out the points of similarities and dissimilarities in the data.
3) To highlight the features of data

Tabulation of data :-

Way of summerizing and presentating the data in the systematic manner in the forms of Columns and rows.

Objectives Of Tabulation of Data:-

1) To simply and condense data.
2) To make comparison.
3) To depict trends
4) TO economize size
5) For statistical comparison.

A table should contain the following features / parts. —

(i) Title of the table
(ii) Table number
(iii) Captions and stubs
(iv) Body of the table should be arranged according to the ~~facts~~ description given for each row & column.
(v) Footnote

Features of good tabulation of data -

1) Proper size
2) Clean and clear
3) According to the objective
4) Attractive
5) Suitibility for the purpose
6) Use of Rule of tabulation.

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B0507041

15

Basic research

Basic research is a type of research which develops the initial understanding of the data.

- Its scope is wide as it deals with any kind of problem.
- It is abstract in presentation
- It help to make and understand the problem in the better way.
- Its importance is realised in the long run.
- Its helps make practice better.
- Application of research is not a primary purpose
- It cannot be cost bound
- Evaluation of research claims very difficult in the basic research.

(SECTION-C)

(Ans. 7)

ELISA (Enzyme Linked Immunosorbent Assay) is a laboratory method used to detect specific proteins - antigens or antibodies in the sample.
It is carried out in the microtitle plate.
It of four types -

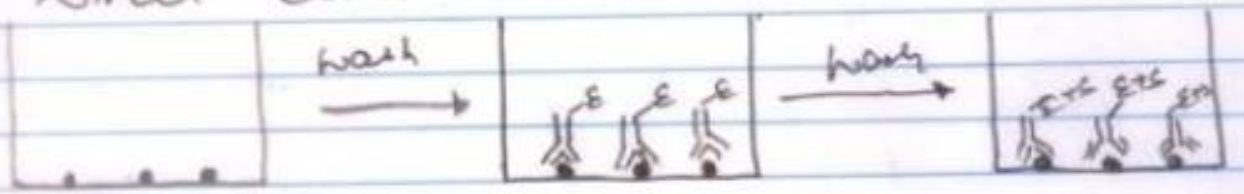
1) Direct ELISA
2) Indirect ELISA
3) Sandwitch ELISA
4) Competitive ELISA.

- It is an invitro type antigen-antibody reaction.

It is used to detect :-

1) Protein or interest from the sample.
2) Antigen identification.
3) Antibodies characteristics
4) Tumour detection by Sandwitch ELISA
5) HIV detect with Direct ELISA.

(i) Direct ELISA

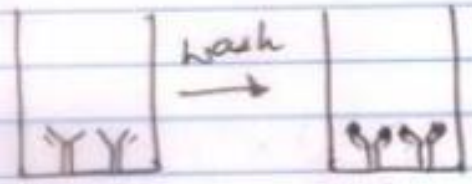


Antigen coated well | Add Enzyme linked antibody to be measured | Add substrate and measure colour.

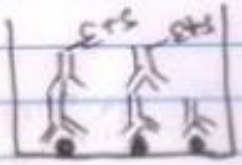
(ii) Indirect ELISA

Antigen coated well | Add primary Antibody | Add enzyme linked antibody

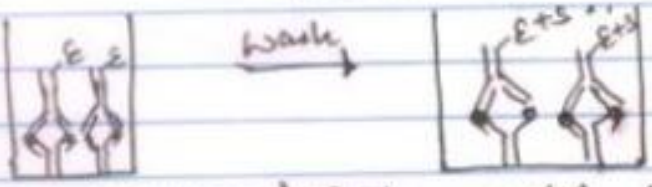
(iii) Sandwitch ELISA



Antibody coated well | Add antigen to be measured



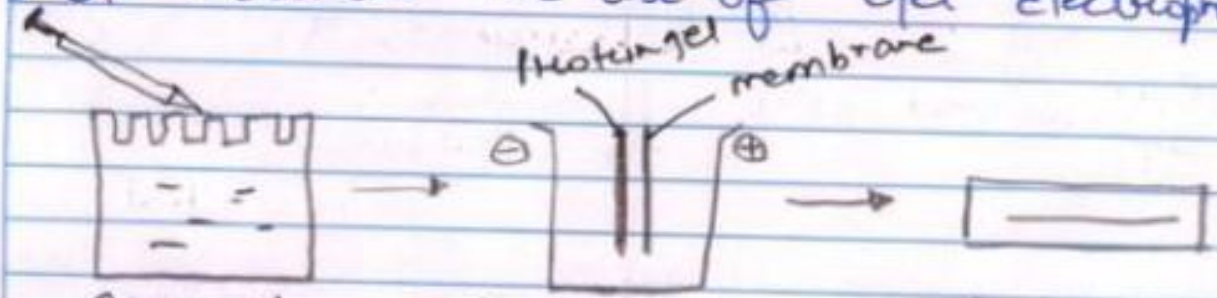
Add substrate and measure colour.



Add secondary antibody linked to enzyme | add substrate and measure colour.

Western blotting

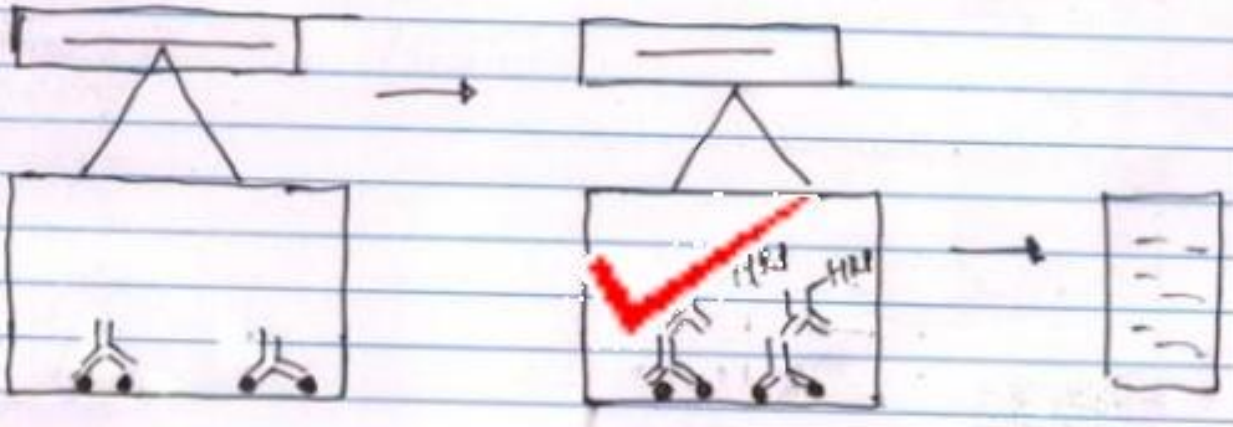
- It is the technique used for the detection of protein of interest in the sample.
- It includes the use of Gel Electrophoresis



Separate protein sample using SDS- PAGE

Transfer protein to nitrocellulose ~~gel~~ membrane

Incubate the membrane with surface blocking agent such as BSA or non-fat milk.

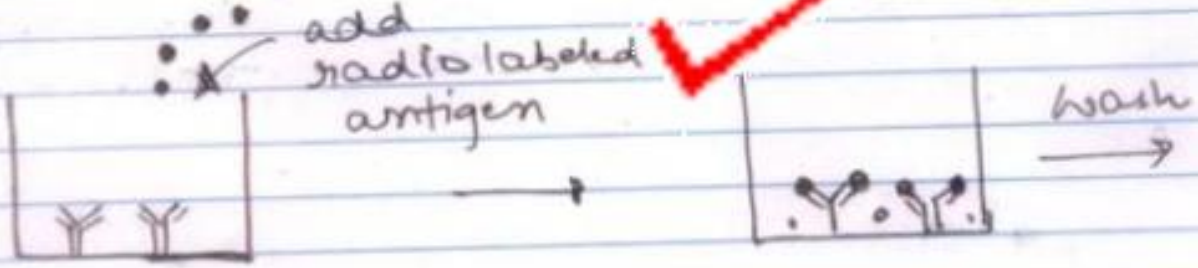


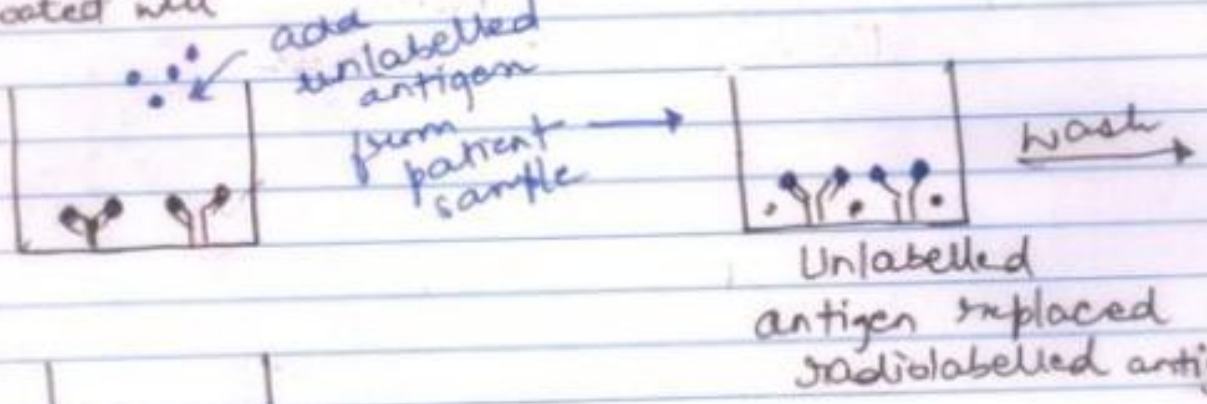
Add and incubate the membrane with primary antibody.

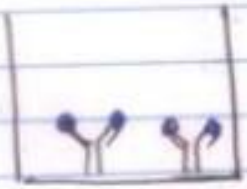
Add HRP linked ~~Ab~~ secondary antibody.

Radia Immuno assay

It is the detection of antigen by using radiolstopes.







Radioactivity of the cell is measured by GM Counter.

Radio immunoassay is based on the principle of competative binding. Here the unlabeled antigen competes with the radiolabeled antigen to bind to the specific antibody.

Hence, when the mixture of unlabelled and radiolabelled antigens are incubated with the specific antibodies then, the number of free radiolabelled antigens are directly proportional to the unlabelled antigen present in the sample.

Uses:-

1) To detect viral antigen.
2) To detect hormones and drugs
3) To detect cancer.

Paper Code
B05070417

21

X

X

X

Paper Code

22

Do Not Write anything in this Portion

Paper Code

23

X

25

Paper Code

24

Do Not Write anything in this Portion

X

X

$\frac{13}{9}$ 4.5

9)13

-12

10

5

2

4

5 5

4.5

12)54

-48

60

-60

00

X

$\frac{\Sigma(x-\bar{x})^2}{n-1}$

$(-3)^2$ $(-3)^2$

9

$= (-3)^2$

0