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ROLL NO : 1047 GR. NO : 22010764
BATCH : A2.

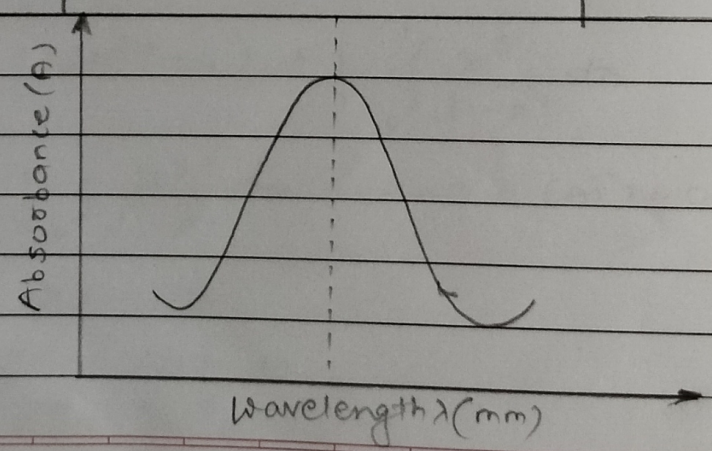
Experiment no : 07

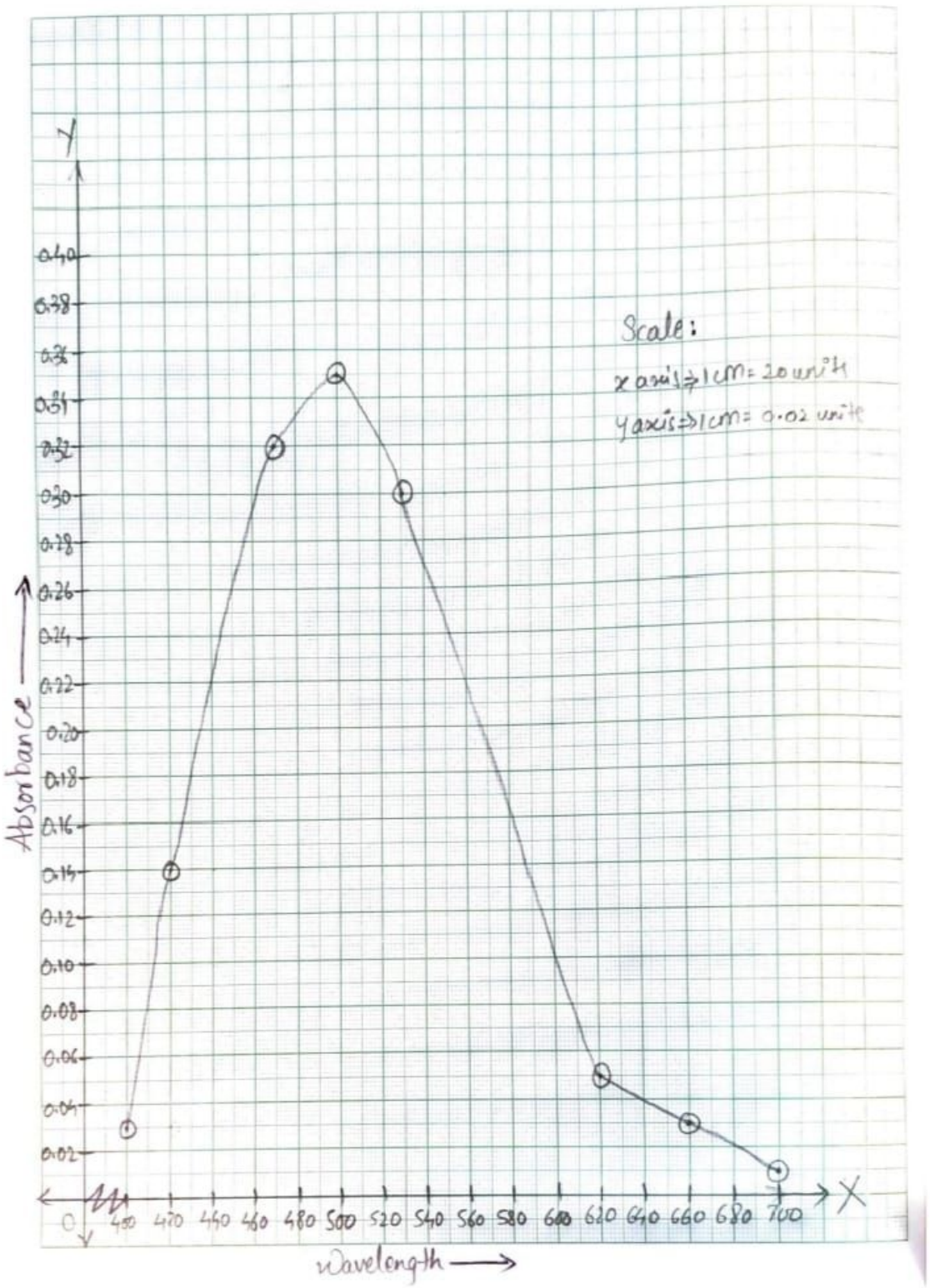
Aim : Spectrophotometric or colorimetric estimation of Fe^{3+} from a given solution.

Observation table :

i) Determination of λmax.
Concentration of solution = 0.005 mg/ml

Filter no.	Wavelength (mm)	Absorbance (A)
1.	400	0.03
2.	420	0.14
3.	470	0.32
4.	500	0.35
5.	530	0.30
6.	620	0.05
7.	660	0.03
8.	700	0.01




Y
0.40
0.38
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
Absorbance
Scale:
x axis ⇒ 1cm = 20 units
y axis ⇒ 1cm = 0.02 units
O
400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700
X
Wavelength

From graph I, λ_{max} = 500 nm

2) Determine the unknown concentration

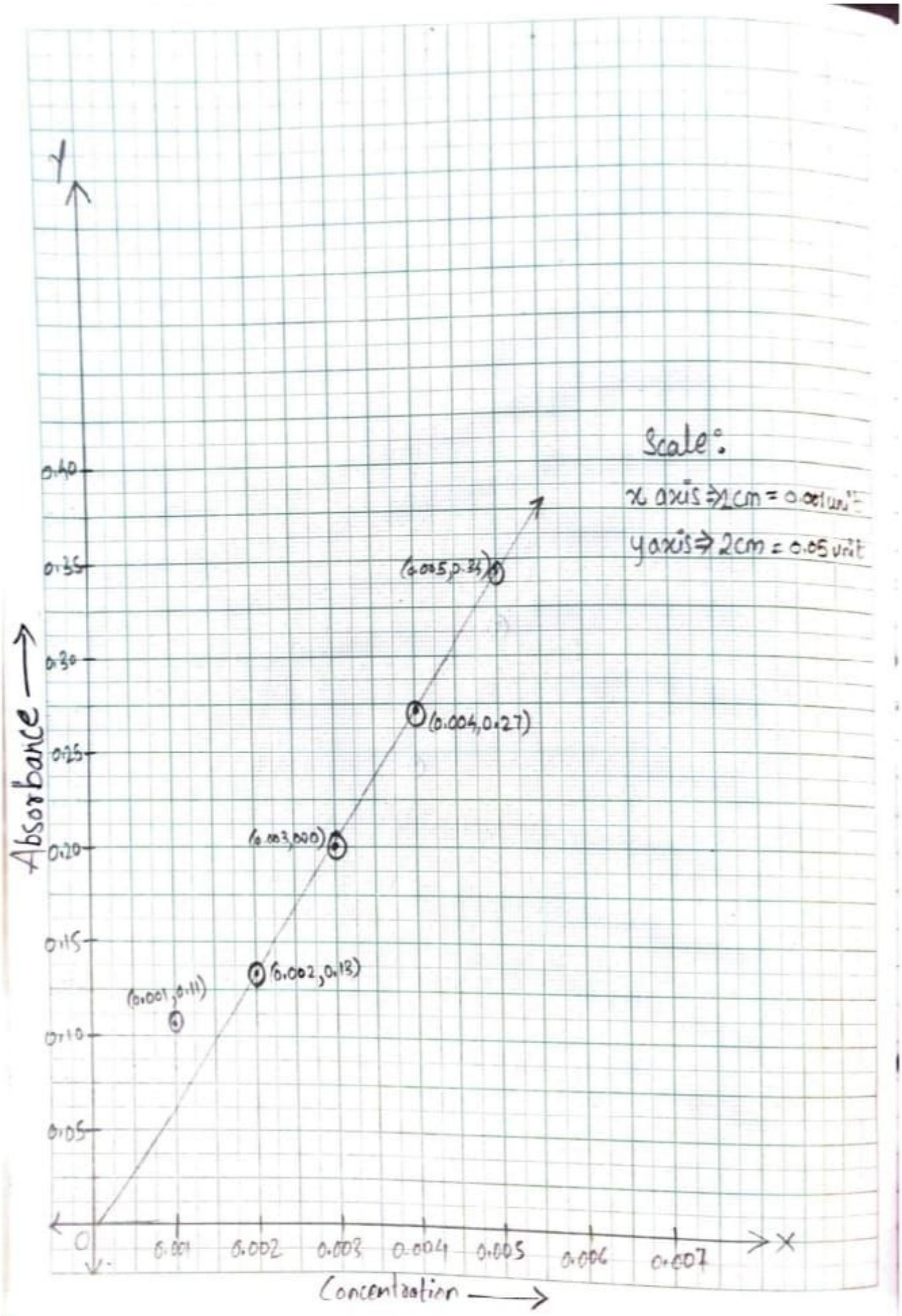
Sr. no.	Volume of standard Fe solution	Concentration in mg/ml	% Transmission (% T)	A = − log T
1	5 ml	0.001	77	0.11
2	10 ml	0.002	74	0.13
3	15 ml	0.003	63	0.20
4	20 ml	0.004	54	0.27
5.	25 ml	0.005	46	0.34
6.	Blank	-	(100)	0
7.	Unknown	?	73.	0.14
8.				

Calculations:

Concentration of standard Fe solution = 0.01 mg/ml
Using $C_1V_1 = C_2V_2$, calculate concentration of all solutions.

1. $0.01 \times 5 = C_2 \times 50$
   $C_2 = 0.001$ mg/ml

2. $0.01 \times 10 = C_2 \times 50$
   $C_2 = 0.002$ mg/ml


Y
Scale:
x axis ⇒ 2cm = 0.001 unit
y axis ⇒ 2cm = 0.05 unit
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
Absorbance
(0.005, 0.35)
(0.004, 0.27)
(0.003, 0.20)
(0.002, 0.13)
(0.001, 0.11)
O
0.001
0.002
0.003
0.004
0.005
0.006
0.007
X
Concentration

3) $0.01 \times 15 = C2 \times 50$

$C_2 = 0.003$ mg/ml

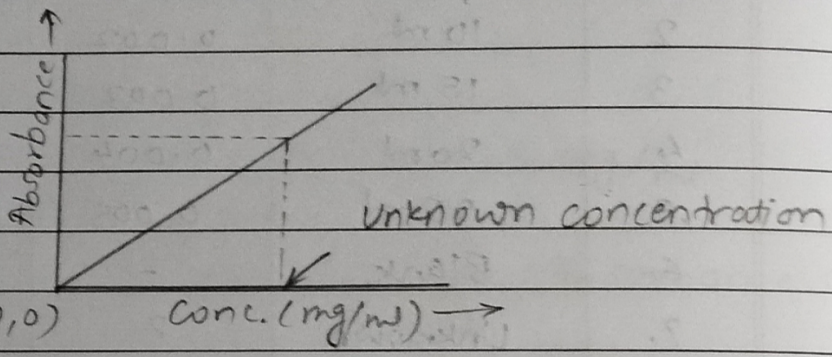
4) $0.01 \times 20 = C_2 \times 50$

$C_2 = 0.004$ mg/ml

5) $0.01 \times 25 = C_2 \times 50$

$C_2 = 0.005$ mg/ml

Plot a graph of absorbance v/s concentration.



From the standard curve obtained, determine the concentration of given unknown sample

* Result :

1) $\lambda_{max} = 500$ nm.

2) Concentration of iron present in a given sample = 0.0021 mg/ml

Questions:

1) State Lambart's law and Bear's law.

→ Lambart's law: When a beam of monochromatic light, is allowed to pass through a transparant medium, the rate of decrease of radiant power with the thickness of the madium or the path length.

Beer's law: When a beam of monochromatic light is allowed to pass through a transperant madium, the rate of decrease of radient power with the concentration of the madium is directly proportional to the radient power i.e. absorbance of the solution is directly proportional to the concentration of solution.