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Division: I

Batch: I2

EXPERIMENT NO. 7

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

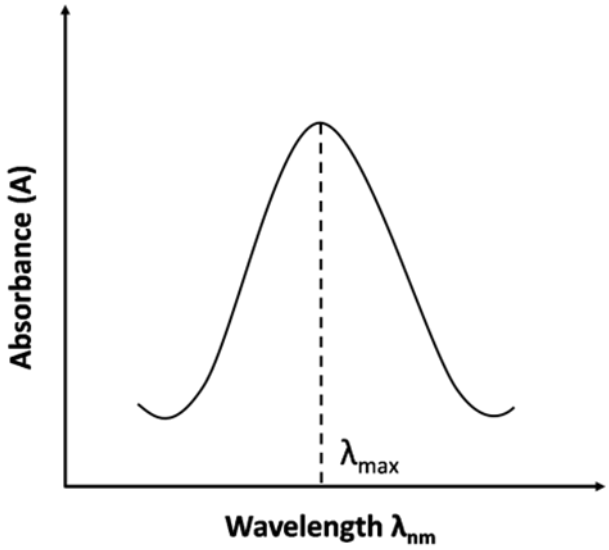
Observation Table:

1) Determination of λ_{max}

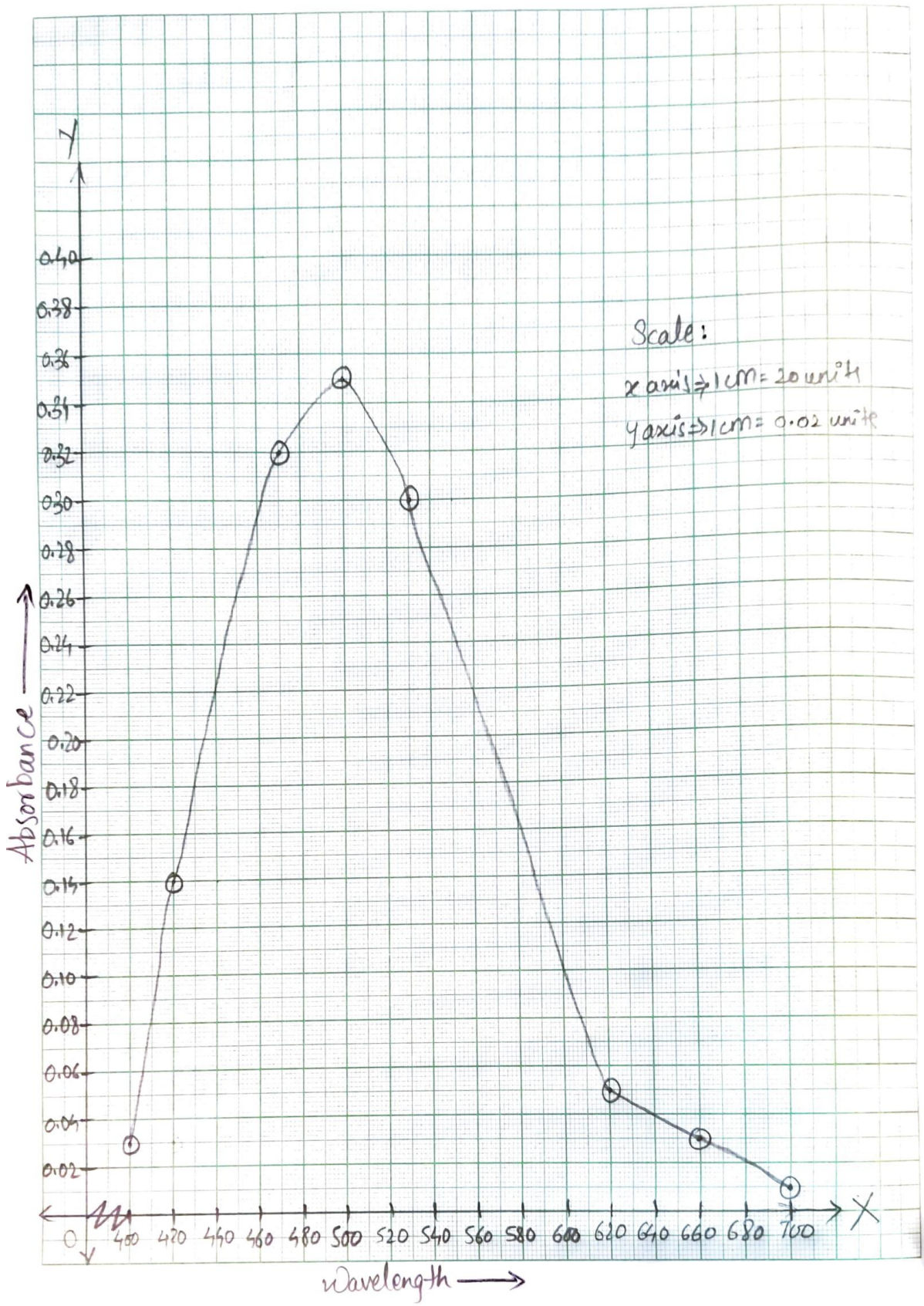
Concentration of solution = 0.005 mg/ml

Filter No.	Wavelength (nm)	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

Graph I: (1 Mark+2Marks))



From graph I , λ_{max} = 500 nm


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 ⇒ 1 cm = 20 units
y axis ⇒ 1 cm = 0.02 units
O
400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700
X
Wavelength

2) Determination of Unknown Concentration (2 Marks)

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

Calculations:

Concentration of standard Fe solution = 0.01 mg/ml
Using $C_1 V_1 = C_2 V_2$, calculate concentration of all solutions.

1. 0.01 * 5 = C2 *50
   C2 = 0.001 mg/ml

2. 0.01 * 10 = C2 * 50
   C2 = 0.002 mg/ml

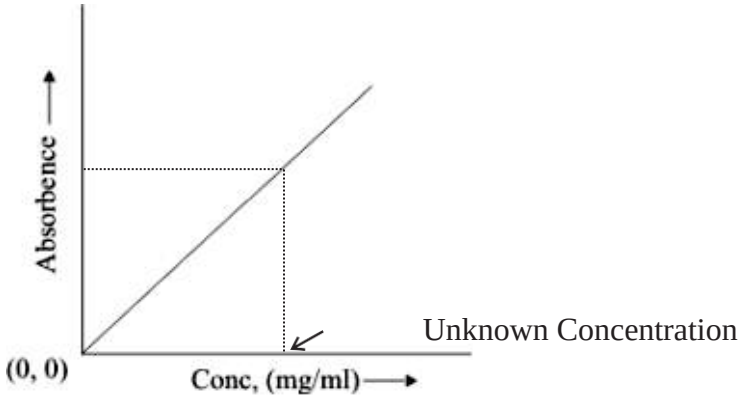
3. 0.01 * 15 = C2 * 50
   C2 = 0.003 mg/ml

4. 0.01 * 20 = C2 * 50
   C2 = 0.004 mg/ml

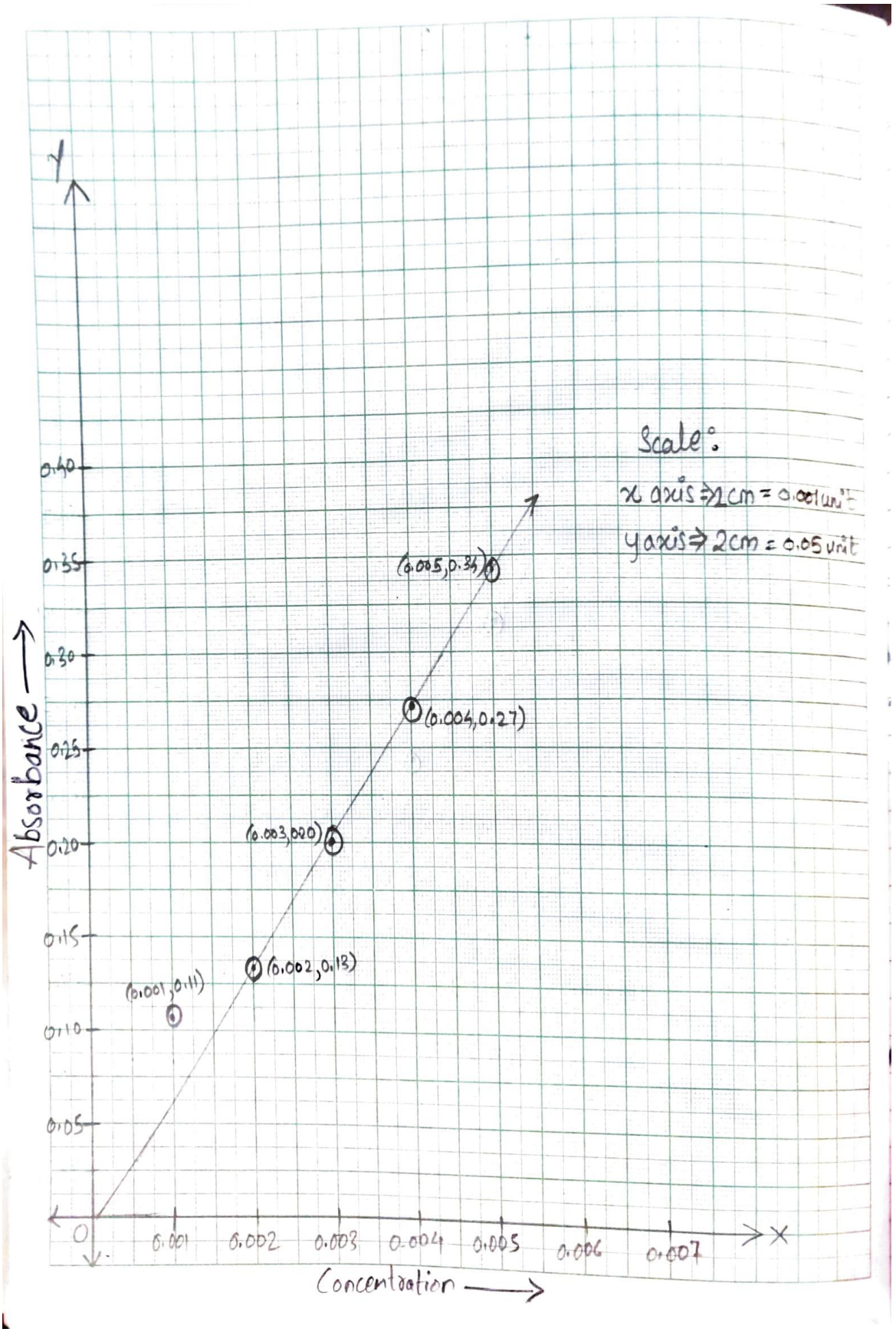
5. 0.01 * 25 = C2 * 50
   C2 = 0.005 mg/ml

Plot a graph of absorbance vs. concentration

Graph 2: (2Marks)



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


Y
X
O
Absorbance
Concentration
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.001
0.002
0.003
0.004
0.005
0.006
0.007
(0.001, 0.11)
(0.002, 0.18)
(0.003, 0.20)
(0.004, 0.27)
(0.005, 0.34)
Scale:
x axis ⇒ 1cm = 0.001 unit
y axis ⇒ 2cm = 0.05 unit

Results: (2 Marks)

1) λ_{max} =_____500____nm.

2) Concentration of iron present in a given sample=_____0.0021_____mg/ml.

Questions (1mark)

Q.1) State Lambert's law and Beer's law.

Ans) Lambert's Law: When a beam of monochromatic light is allowed to pass through a transparent medium, the rate of decrease of radiant power with the thickness of the medium is directly proportional to the thickness of medium or the path length.

Beer's Law: When a beam of monochromatic light is allowed to pass through a transparent medium, the rate of decrease of radiant power with the concentration of the medium is directly proportional to the radiant power i.e., absorbance of the solution is directly proportional to the concentration of the solution.