S.Y.B.Sc. Semester IV Paper III

Q.P. Code: **70511** Date: **03/05/19**

Total Marks: 100

Scheme of Marking

Q 1.

A. Select the correct option and complete the sentence (any **Twelve**): - 12 marks

I. a) Separation
II. a) Precipitation
III. a) Nernst Distribution
IV. c) two
V. c) retardation
VI. b) TLC
VII. b) indicator
VIII. b) increases
IX. a) siemens
X. c) conductance
XI. c) alkaline
XII. c) "S"
XIII. a) s^2
XIV. c) 19.10
XV. b) frequency of occurrence
XVI. a) $\pm C_nR$
XVII. c) Q-test
XVIII. a) $t_{cal} < t_{tab}$

B. State whether following statements are true or false (any **Three**): - 03 marks

I. False
II. False
III. False
IV. True
V. True
VI. False

C. Match the columns (any **Five**): - 05 marks

Column A	Column B
1. Distillation	b) Volatilisation
2. Adsorbent	f) Al_2O_3
3. Saturated KCl	d) Salt Bridge

4. Glass electrode	e) pH-metry
5. Gaussian Curve	h) Bell-shaped
6. 4.0d rule	a) Rejection of result

Q 2. Answer any FOUR of the following: - 20 marks

a) Different methods (only names) - 01 mark
Explanation of any two - 02 + 02 marks

b) Explanation with example - 05 marks

c) i. Separation factor (β) - 02 marks

ii. Correct Formula:

$w_1 = a\ (\ V_w / (\ DV_o + V_w\ )\ )$ - 01 mark

Correct substitution - 01 mark

Correct answer = $D_{o/w} = 2.66$ - 01 mark

d) Preparation of Plates - 03 marks
Any four other steps - 02 marks

e) i) Correct Formula

$E = 100\ [\ 1 - (\ V_w / (DV_o + V_w)\ )^n\ ]$

Correct Substitution

Correct answer = E = 99.99%

- 2.5 marks

ii) Correct Formula

$W_n = a\ (V_w/(DV_o + V_w))^n$

Correct Substitution

Correct answer n= 5.84 ≈ 6.0 extractions

- 2.5 marks

f) Different methods (only names) - 02 marks
Explanation of any one with figure - 02 + 01 marks

Q 3. Answer any Four of the following: - 20 marks

a) Explanation - 3 methods - 03 marks
Graph of - 2 methods - 02 marks

b) Advantages and Limitations - 02 + 03 marks **OR** 03 + 02 marks (1 mark each)

c) Construction (Description with figure) - 03 + 01 marks

Working - 01 mark

d) Principle - 02 marks
Conductivity cell (Description) - 02 marks
Figure - 01 mark

e) i) Indicator electrode - 2.5 marks
ii) Reference electrode - 2.5 marks

f) Principle - 01 mark
Titration of S.A vs S.B - 03 + 01 marks
(Explanation with graph)

Q 4. Answer any Four of the following: - 20 marks

a) Variance ratio test - 01 mark
Given: $F_{tab} = 19.16$
$s_1 = \pm 0.07517$ - 01 mark
$s_2 = \pm 0.07071$ - 01 mark

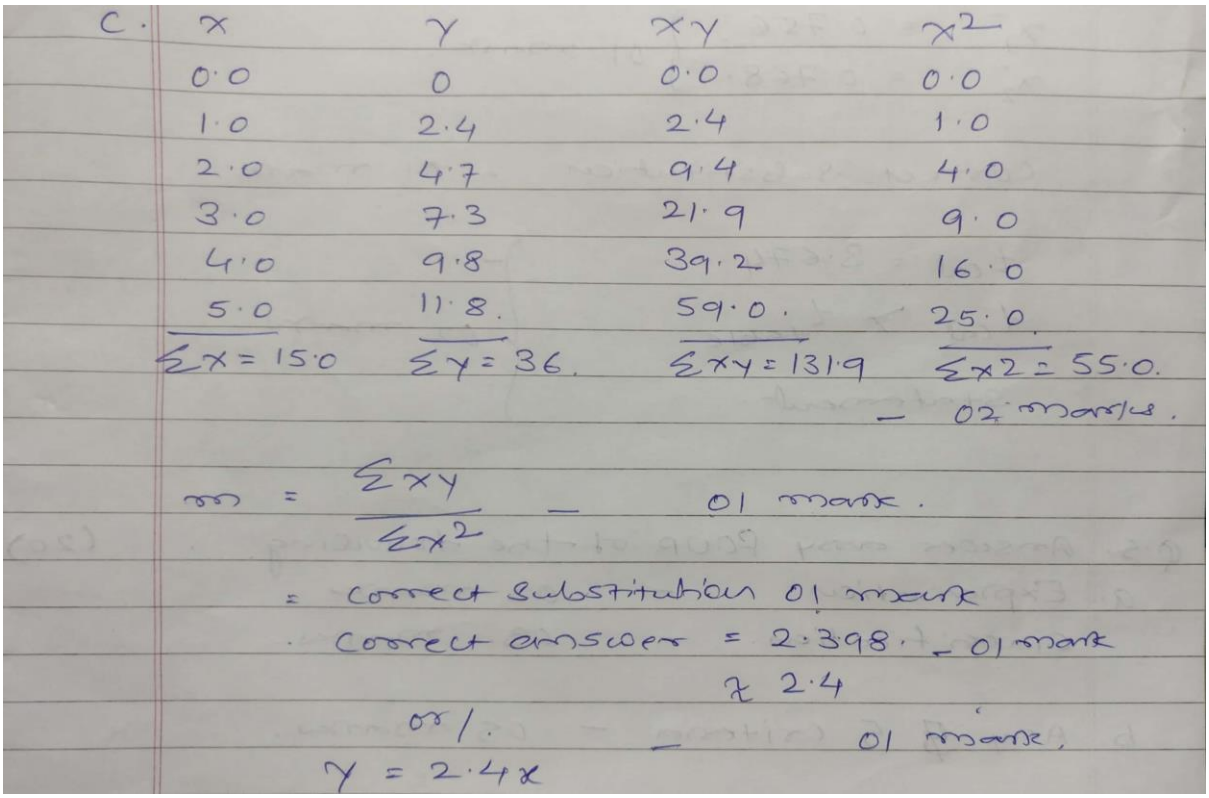
$F_{cal} = (s_1)^2 / (s_2)^2$ - 01 mark

$F_{cal} = 1.13$

$F_{cal} < F_{table}$ or statement - 01 mark

b) Any Four features with curve - 04 + 01 marks

c) Refer Image



c.	x	y	xy	x^2
	0.0	0	0.0	0.0
	1.0	2.4	2.4	1.0
	2.0	4.7	9.4	4.0
	3.0	7.3	21.9	9.0
	4.0	9.8	39.2	16.0
	5.0	11.8.	59.0.	25.0.
	$\Sigma x = 15.0$	$\Sigma y = 36.$	$\Sigma xy = 131.9$	$\Sigma x2 = 55.0.$

– 02 marks.

$m = \frac{\Sigma xy}{\Sigma x^2}$ – 01 mark.

= correct substitution 01 mark

correct answer = 2.398. – 01 mark

≈ 2.4

or /. – 01 mark.

$y = 2.4x$

d) Q- test - 01 mark

4 steps - 04 marks

e) 2.5d rule application 0.3 > 0.168 - 2.5 marks

4.0d rule application 0.3 > 0.268 - 2.5 marks

f) Given: $t_{tab} = 2.78$

Correct Formula of t_{cal} - 01 mark

$$t_{cal} = \frac{|\bar{x}1 - \bar{x}2|}{S}\sqrt{\frac{N1*N2}{N1 + N2}}$$

$\bar{x}_1 = 0.756$ and $\bar{x}_2 = 0.768$ - 01 mark

Correct Substitution - 01 mark

$t_{cal} = 3.674$

$t_{cal} > t_{table}$ or statement } - 02 marks

Q 5. Answer any four of the following: - 20 marks

a) Explanation - 02 marks
Classification - 03 marks

b) Any 5 criteria - 05 marks

c) Two applications of conductometry - 2.5 + 2.5 marks

d) Three types of pH-meters - 03 marks

Biological Analysis - 02 marks

e) Given: t = 2.78, z = 1.96 at 95% confidence limit

$\mu = \bar{x} \pm ts / \sqrt{N}$

Correct Substitution - 2.5 marks

= 15.62 ± 0.075

$\mu = \bar{x} \pm z\sigma / \sqrt{N}$

Correct Substitution - 2.5 marks

= 15.62 ± 0.0175

f) Mean Formula - 0.5 mark

$\bar{x}$ = 396 - 0.5 mark

Median Formula - 0.5 mark

$\bar{m}$ = 397 - 0.5 mark

Range Formula - 0.5 mark

Range = 9 - 0.5 mark

Average Deviation formula - 0.5 mark

$\bar{d}$ = 2.66 ≈ 2.67 - 0.5 mark

Standard deviation formula	- 0.5 mark
$s = \pm 3.41$	- 0.5 mark