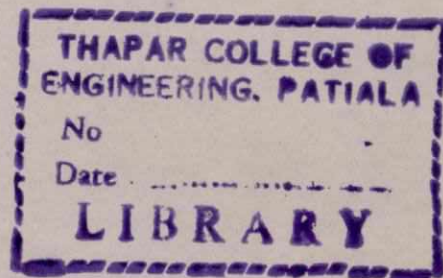


REPORT ON
WORK TERM-I
AT
PUNJAB CHEMICALS AND PHARMACEUTICALS LTD.
BHANKARPUR

Submitted in partial fulfilment of the requirements
for the IIIrd Year B. E. (Industrial Engg.)



Thapar Institute of Engineering & Technology
PATIALA
CENTRAL LIBRARY



Co-ordinator

MR. JAIN PARKASH (PCPL)
PROF. P.L. BALI

By

ASHISH JINDAL
129/87

DEPARTMENT OF MECHANICAL & INDUSTRIAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
(Deemed University)
PATIALA-147001.

1990

ACKNOWLEDGEMENT

I am immensely pleased to acknowledge my deep gratitude and thanks to Mr. Jain Parkash (Sr. Industrial Engineer) P.C.P.L. for his inspirations, valuable suggestions guidance and help every moment I sought. His critical and time to time evaluation of my work enabled me to complete my work-term-I successfully.

I would also like to thank all other PCPL employees for their help and cooperation during my six months tenure at PCPL.

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C O N T E N T S

1. INTRODUCTION

Product Range

Office addresses

Shifts

Shares

An introduction to new unit (Sugar Plant)

2. List of Projects

3. Small description of all the projects

Note:

Since it is chemical factory therefore they make our report strictly confidential. So we are able to give only outlines of each projects.

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AN INTRODUCTION TO PCPL

Punjab Chemicals and Pharmaceuticals Limited is Promoted by Excel Industries Ltd., Bombay alongwith Punjab State Industrial Development corporation. The foundation stone of the Factory was laid on 19th Nov. 1975, by the then Hon'ble Chief Minister, Giani Zail Singh.

Its first Project was to manufacture MALATHION, a pesticides, in year 1981, 1983 and in August 1989, the company has started manufacturing OXALIC ACID, DIETHYL OXALATE and SODIUM NITRITE Respectively. They have a licenced capacity of 10,000 MT, 4500 MT and 3000 MT of OXALIC ACID, DI-ETHYL OXALATE, and SODIUM NITRITE per annum.

The factory covers an Area of 20 acres situated at Bhankarpur, Milestone-18, Ambala- Kalka Road.

The company's registered office is situated at:
S.C.O. 371-372, Sector 35-B
Himalaya Marg, Chandigarh.

Works:

Bhankarpur, Distt. Patiala (Pb)

Bombay office

Excel Estate, S.V. Road,
Goregaon (West) Bombay-400062

Delhi Office

107, Ansal Bhavan,
KG Marg,
New Delhi-110001

Hydrabad Office:

8-2-293/A/89, Road No.9,
Jubilee Hills,
Hydrabad-500034 AD.

The factory has approximately 300 confirmed employees, and approximately same number of casuals.

Shifts:

Shifts	Starting time	Lunch/Dinner time	Tea Timing	End of Shifts
General Shift	9 A.M.	12.30 P.M.to1.00PM 1.00 PM to 1.30 PM	10.30AM to10.50	5PM
A-Shift	7 AM	12.00 PM to12.30PM	8.00AM to8.20	3 PM
B-Shift	3 PM	7.30 PM to 8.00PM	5.30PM to5.50	11PM
C- Shift	11 PM	-	1 AM to 1.30 AM 4 AM to 4.30 AM	7 AM

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SHARE

The present share value is Rs 175/- per share

Sugar Plant

Since sugar is raw Material for oxalic acid therefore PCPL set up a new sugar plant with an investment of approximately 4 crores in the factory. It will be in working order from October 90. It has a capacity of 25 Tonnes sugar per day.

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List Projects:-

In my 6 months training I have done following projects with the recommendation of Mr. Jain Parkash.

1. Man-Power Planning.
2. System study of Plant.
3. Material flow diagram of plant.
4. Godown layout.
5. Make formats of AOP.
6. Flow chart for movement of papers of marketing, Purchase, Accounts (Existing and proposed).
7. Documentation flow of every report of factory.
8. Making format and complete system of sugar cane deptt.

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MAN POWER PLANNING:

Under man power planning I have done the planning of following departments:-

1. Despatch Deptt.
2. Security Deptt.
3. Purchase Deptt.
4. Marketing Deptt.
5. Accounts Deptt.

Despatch Deptt:-

Purpose:

The despatch deptt. people has requested that they have shortage of people, therefore they wanted two new workers, for this Mr. Jain Parkash has given us (Mr. and Mr. Kumaldeep) a job to study that whether they needed them or not.

Methodology:

The despatch deptt. people have following jobs:-

1. Material handling of oxalic acid in oxalic acid plant.
2. Material handling of Sodium Nitrite in Sodium Nitrite plant.
3. Material handling of ash in Boiler house.
4. Despatch of oxalic acid, and DEO.

In oxalic acid plant, there are two types of oxalic acid bags i.e. 25 kg bags and 50 kg bags.

For 25 kg bags:-

For 25 kg bags they have to do following functions:-

- Hot sealing.
- Initial stitching.
- Taping.
- Final stitching.
- Loading of bags on trolley.
- Trolley to crate.

.....2.....

- Unloading of bags on crate.
- Trolley back to loading area.

For 50 kg bags:

- Sticking.
- Loading of bags on trolley.
- Trolley to crate.
- Unloading of bags on crate.
- Trolley back to loading area.

For all these we have noted the timings for each activity with the help of stop watch. Then we add various allowances to calculate the standard times. From standard times we calculate the work load on each person.

Result:-

They have no standard method of working. We standardized the method of working and fix standard times. From all this study we come to conclusion that they did not need more man power.

Let pay of one person (worker) = Rs. 900/-Per Month.

Then saving per month = Rs. 900x2 = Rs. 1800/- Per month.

.....2.....

While hot sealing, the man who transports the bag near hot sealing Machine can also transports the hot sealed bag to a vacant space (we have 8.71 for this job)

The lifting of bag for hot sealing can be done by the man who is doing hot sealing.

$$\begin{aligned} 60 \text{ bags can be prepared in } 1.57 \text{ hrs, no of bags in } 1 \text{ hr} &= \frac{60}{1.51} = 39.73 \\ &= 39 \text{ Bags.} \end{aligned}$$

For 50 kg bags for DEO

No. of bags/Shift	= $\frac{400}{3}$	=133
1 Setting of stiching	= 18.01 x 133	=2395.3
2. Loading	= $55.1 \times \frac{133}{4}$	=1832.08
3. Trolley to crate	= $\frac{42.01}{4} \times 133$	=1396.8
4. Unloading	= $41.71 \times \frac{133}{4}$	=1386.8
5. Trolley back	= $33.6 \times \frac{133}{4}$	=1117.2
Total Time	=	=8128.2
Man hrs reqd.	= $\frac{8128.2}{3600}$	=2.26 Hrs.

No. of bags prepared in 1 hr = 58, 50 kg sticking and stacking.

One man is setting, other is stiching.

Under Normal Conditions

Considering 35 ton production of oxalic acid
 20 ton for DEO plant
 15 ton for export and grade-I

Export grade I ratio is taken as 30:70 so according to above assumptions

No. of 25 kg export bags = 180/day

No. of 50kg (grade I)bags = 210/day

No. of 50 kg (for DEO)bags = 400/day

For 25 kg bags:

No of bags per shift = 60

1. Opening and setting of bags = $\frac{18.6 \times 60}{2} = 558$

(each person is opening $\frac{60}{2}$ bags)

2. Lifting the bag hot sealing and placing bag down = $23.5 \times 60 = 1410$

3. Setting, stitching, taping and stitching = $28.01 \times 60 = 1680.6$

4. Loading = $\frac{74 \times 60}{6} = 740$

There are $\frac{60}{6}$ loadings of 6 bags)

5. Trolley to crate = $28.8 \times \frac{60}{6} = 288$

6. Unloading = $\frac{55.65 \times 60}{6} = 556.5$

7. Trolley back to loading area = $\frac{20.82 \times 60}{6} = 208.2$

Total time for 60 bags = 5441.3

Man hours reqd. for these bags = $\frac{5441.3}{3600} = 1.51$

For 50 kg. bags (grade I)

No. of bags/shift	=	70	
1. Setting and initial stitching taping and final stitching	=	24.89 x 70	= 1742.3
2. Loading	=	55.1 x $\frac{70}{4}$	= 964.25
$\frac{70}{4}$ loadings will be there)			
3. Trolley to crate	=	42.01 x $\frac{70}{4}$	= 735.18
4. Unloading	=	41.71 x $\frac{70}{4}$	= 729.92
5. Trolley back	=	33.6 x $\frac{70}{4}$	= 588
Total	=		4759.65

Man Hrs. reqd. = 1.32 Hrs.

No of bags prepared in 1 hr= 53

During final stitching the other man should do taping.

SUMMARY

Total time reqd for 180 bags of 25 kg = 4.53 hr.

Total time reqd for 210 bags of 50 kg (gd.1) = 3.96 hr.

Total time reqd for 400 bags of 50 kg (DEO) = 6.78 hr.

(By 2 men)

Total = 15.27 hrs.
(By 2 men)

Total time reqd by 1 man = 30.54 Hr.

Man Hrs available = 7 Hrs.

Man power reqd for 35 ton prod. = $\frac{30.54}{7} = 4.36$

Taking 2 men/Shift

Work load for 2 men (35 ton prod.) = 15.27 Hrs/day

Work load for 2 men/shift = $\frac{15.27}{3} = 5.9$ Hrs.

= 5 Hours 54 Min.

For 35 ton 2 men should be able to complete work in 6 hrs (3 shifts)

OPERATION Hot sealing, stitching, taping, final stitching & stacking of 25kg bags on crates lying outside of Ox. Ac. Plant.

EQUIPMENT USED Hot sealing M/c, Sticking M/c, Trolley

TIME STARTED 10.33 AM
TIME FINISHED 12.00 PM

OPERATOR RAJ KUMAR (setting)

LOCATION Ox. Acid Plant (Ground fl.)

DEPARTMENT Despatch

SHIFT - GENERAL + A

METHOD

DEPARTMENT Despatch

SHIFT - GENERAL + A

WORKING CONDITIONS : Fair - Presence of small amount of Toxic dust. (Temp. - Normal)

- ANY OTHER DESCRIPTION
- 1) Personal Needs and Basic fatigue - 9%
 - 2) Stand on both feet - 2%
 - 3) Bending - 6%
 - 4) Carrying Heavy load in one hand - 3%
 - 5) Loading weights - equivalent to 25-50kg bag - 20%

STUDY BY Ashish Jindal and Kamaldeep Singh Jindal
APPROVED BY _____

S. NO.	ACTIVITY	No.	TIMINGS	AVG. TIME (s)	RATING	BASIC TIME	ALLOWANCE	STD. T.
1.	OPENING AND SETTING OF BAGS. for hot sealing	8	10.5, 17.8, 16, 15, 12, 16.2, 18.5, 16	15.25	100%	15.25	22%	18.60
2.	TRANSPORTATION TO M/C AREA. Hot sealing	9	1.6, 1.6, 1.6, 1.6, 1.5, 1.6, 1.6, 1.5, 1.6	1.57	100%	1.57	42%	2.23
3.	LIFTING THE BAG AND PLACING FOR HOT SEALING.	9	20, 15, 21, 17.5, 18, 15, 17.5, 20, 20.3	18.25	100%	18.25	17%	21.35
4.	SETTING AND HOT SEALING.	7	1.5, 1.45, 1.5, 1.6, 1.5, 1.5, 1.6	1.52	100%	1.52	42%	2.15

NO.	ACTIVITY	NO.	TIMINGS	AVG. TIME	RATING	BASIC TIME	ALLOWANCE	STD. T.
6.	SETTING, TRANSPORTATION AND INITIAL STICHING.	13	15.8, 16.2, 19, 22.5 15.5, 15.5, 18, 19 14, 15, 15.5, 13.5, 16	16.57	100%	16.57	27.5%	21.13
7	TRANSPORTATION AND TAPING.	7	5, 4, 4.5, 4, 5, 5.1, 5,	4.65	100%	4.65	23.5%	5.75
8.	TRANSPORTATION AND FINAL STICHING.	9	4, 5.5, 5.6, 6.1, 5.6, 4.9, 5.2, 5.8, 5.6	5.4	100%	5.4	27.5%	6.88
9.	LOADING BAGS ON TROLLEY. (6 bags)	8	49, 54, 57, 58, 48, 47, 50, 48	51.41	100%	51.41	44%	74
10.	TROLLEY TO CRATE	8	20, 23, 20, 21, 24.3 30.1, 25, 26.3	23.7	100%	23.7	21.5%	28.8
11.	UNLOADING	8	46, 44.1, 32.8, 44, 45.2, 34, 30, 33.1	38.65	100%	38.65	44%	55.65
12.	TROLLEY BACK TO M/C AREA	8	16, 19.3, 18.8, 12.5, 17, 16.5, 20, 18.7	17.35	100%	17.35	20%	20.82

OPERATION STITCHING AND STACKING OF 50 kg BAGS ON CRATES LYING OUTSIDE OA PLANT

EQUIPMENT USED STICHING M/C, TROLLEY

TIME STARTED 9.25 A.M.
TIME FINISHED 10.10 A.M.

OPERATOR MEIWA SINGH (STICHING)

PROSHOTUM DASS, BALSINDER SINGH (STACKING)

METHOD LOCATION Ox. Acid Plant DEPARTMENT DESPATCH SHIFT GENERAL A

WORKING CONDITIONS : Fair - Presence of small amount of Toxic Dust. (Temp: - Normal)

ANY OTHER DESCRIPTION
 1) Personal Needs and Basic Fatigue - 9%
 2) Stand on both feet - 2%
 3) Bending - 6%
 4) Carrying (Heavy load in one hand - 3%
 5) Loading bags - Equivalent to 50 kg bags - 20%
 6) Atmospheric Conditions - 5%
 7) Continuous, repetitive and short cycle - 15%

STUDY BY Ashish Jindal

APPROVED BY _____

S. NO.	ACTIVITY	No.	TIMINGS (in secs)	AVG. TIME (secs)	RATING	BASIC TIME	ALLOWANCE	STD. T.
1.	TRANSPORTATION, SETTING AND STICHING.	12	13.6, 11.1, 14, 14, 15, 10, 10, 12.4, 17.9, 13.1, 13, 25.5	14.13	100%	14.13	27.5%	18.01 (New)
2.	8 LOADING BAGS ON TROLLEY (4 BAGS)	8	42.8, 40, 38, 32, 30, 44.6, 40, 39.4	38.27	100%	38.27	44%	55.10
3.	TROLLEY TO CRATE	8	35, 30, 32, 36, 37.5, 41.1, 31, 34	34.58	100%	34.58	21.5%	42.01

DATE

CONTD...SHEET

No. 1

SHEET NO. 004

NO.	ACTIVITY	NO.	TIMINGS	AVG. TIME	RATING	BASIC TIME	ALLOWANCE	STD. T. (secs)
4.	UNLOADING THE BAGS ON CRATE	8	31, 36, 29, 30, 22, 29.2, 29.4, 26	29.07	100%	29.07	43.52	41.71
5.	TROLLEY BACK TO LOADING AREA	9	23.1, 26, 30.2, 28.3, 27.2, 29, 27.3, 29.2, 31.7	28	100%	28	20%	33.6

FOR 25 KG BAGS (EXPORT)

S.No	ACTIVITY	MAN - I	MAN - II	Time (secs)	Time (secs)
1.	OPENING AND SETTING OF BAGS.			186	186
2.	(THIS IS CONTINUOUS ACTIVITY UNTILL ALL THE BAGS ARE OPENED.) LIFTING THE BAG, HOT SEALING AND PLACING IT DOWN.	A) LIFTING BAG FOR HOT SEALING B) TRANSPORTATION OF BAGS NEAR HOT SEALING M/C C) SHIFFING bag to distant empty place		233 125 877	235
3.	(THIS IS ALSO CONTINUOUS SETTING AND INITIAL STICHTING, TAPING.)	ACTIVITY UNTILL OPERATION IS COMPLETED.) SETTING AND INITIAL STICHTING.		573	576
4.	FINAL STICHTING	STICHTING.		688	1038
1.	(THIS IS ALSO CONTINUOUS LOADING BAGS ON TROLLEY (6 BAGS)	ACTIVITY UNTILL ABOVE OPERATIONS ARE COMPLETED)			20
2.	Trolley TO CRATE	WORKING	WORKING.	74	74
3.	UNLOADING THE BAGS ON Trolley CRATE	WORKING. WITHOUT LOAD		288	288
4.	Trolley BACK TO LOADING AREA.		WORKING WITHOUT LOAD.	5565	5565
				110	110
				120	120
				130	130
				140	140
				150	150
				160	160
				170	170
				180	180
				190	190
				200	200

S No	FOR 50 Kg BAGS (FOR UEO BAGS)	MAN - I	MAN - II	Time (secs)	Time (secs)
1	TRANSPORTATION, SETTING AND STICKING. (This is continuous activity)	WORKING	WORKING Setting	18.01	18.01
1	LOADING BAGS ON TROLLEY (4 BAGS)	WORKING untill all the bags are	WORKING.	55.1 Sec	55.1 Sec
2	TROLLEY TO CRATE	WORKING WITHOUT LOAD.		42.01	42.01
3	UNLOADING THE BAGS ON CRATE			97.11	97.11
4	TROLLEY BACK TO LOADING AREA.		WORKING WITHOUT LOAD.	33.6	33.6

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180

18.01 55.1 Sec 42.01 97.11 33.6 172.42

18.01 55.1 Sec 42.01 97.11 33.6 172.42

18.01 55.1 Sec 42.01 97.11 33.6 172.42

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18.01 55.1 Sec 42.01 97.11 33.6 172.42

18.01 55.1 Sec 42.01 97.11 33.6 172.42

FOR 50 kg (Grade - I)

S No	ACTIVITY	MAN - I	Time (secs)	MAN - II	Time (secs)
1	SETTING AND INITIAL STICHTING, TAPING	SETTING AND STICHTING.	21.3	TAPING	5.5
2	FINAL STICHTING.	WORKING.	6.8	IDLE	1.0
	(THIS ACTIVITY CONTINUOUS UNTILL ALL THE BAGS ARE STICHTED)				1.5
1.	LOADING BAGS ON TROLLEY (4 BAGS)	WORKING	55.1	WORKING	55.1
2	TROLLEY TO CRATE	WORKING WITHOUT LOAD	42.0		42.0
3	UNLOADING THE BAGS ON CRATE	WORKING	41.71	WORKING	41.71
4	TROLLEY BACK TO LOADING AREA.		33.6	WORKING WITHOUT LOAD	33.6

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PURCHASE DEPARTMENT

PRESENT MAN-POWER STRENGTH - 7

	<u>NAME</u>	<u>DESIGNATION</u>
1.	MR. R.K. SAIDHA	ASSTT. MANAGER PURCHASE
2.	MR. MUKESH KUMAR	ASSTT. PURCHASE OFFICER
3.	MR. S.K. PATHAK	PURCHASE ASSISTANT
4.	MR. SANDEEP GOYAL	PURCHASE ASSISTANT
5.	MRS. U. KAUL	OFFICE ASSISTANT
6.	MISS SEEMA KOHLI	STENO
7.	MR. S.K. JAGGI	CLERK CUM TYPIST

PRESENT SYSTEM OF WORKING :

1. Indent Received

First of all the indents are received by Miss Seema in the morning Dak. Then she take them to Mr. R.K. Saidha for marking to various people. Then Miss Seema distribute them to Sandeep, Mukesh and Pathak. Miss seema receive three copies of indent from factory.

WHITE	-	Recorded by Purchase Deptt.
YELLOW	-	Sent to store after Purchase action
GREEN	-	To Bombay (Daily)

2. Entry in Indent Register

There are two Indent registers. One is maintained by Mr. Sandeep and one is by Mr. Pathak.

Both enter the indent in the respective registers . If the Indent is common to both, then both enter their related items in Indent register.

Since for raw materials there are no indents therefore Mr. Mukesh has no Indent register. The format of indent register has following columns :

INDENT NO./	DESCRIPTION OF MATERIAL	QTY.	RECEIVED DATE	ENQ. DATE	ENQUIRY	P.O. NO.	PARTY'S NAME	FOLLOW UP	MRIR	REMARKS
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3. Enquiry Float

This step is not always be used. This is for the items whose rates are fluctuating or for Capital items. We have a format for floating enquiry to the parties.

4. Quotations Received

On the basis of above enquiry, the various parties have sent their quotation. Sometimes parties do not send quotations in time, then it is required to send messages to them.

5. Comparative Statement

On the basis of quotations received from the various parties, the comparative statement are made by the person, whose related the Indent was.

6. Release of Purchase Order :

In the case of daily routine items and monopolistic items the steps 3, 4 & 5 are not needed to follow.

The purchase orders are of two types :-

1. Local Purchase Orders
2. Capital Purchase Orders

1. LOCAL PURCHASE ORDERS

This purchase order is mostly handwritten. There are 4 copies of local purchase order.

WHITE	-	PARTY
RED	-	ACCOUNTS
BLUE	-	RECORD
YELLOW	-	STORE

This red copy is sent to Accounts with MRIR and Bill. These three things collectively known as OBM.

2. CAPITAL PURCHASE ORDER

This purchase order has to be typed. There are eight copies of the purchase order.

- 2 WHITE - To party, then party return one copy.
- RED - To Accounts
- BLUE - In Party file.
- 3 GREEN - PCPL - Bombay, Purchase Record, PCPL - Delhi (for Delhi Party)
- YELLOW - STORE

These purchase orders are entered in P.O. register. The format is as follows :

P.O. NO. DATE PARTY'S NAME MATERIAL DESCRIPTION

7. Follow Up

This step is needed if party does not send the material in time. We have typed performa for the follow up.

8. MATERIAL TO STORE

This step also have two procedures.

1. If payment is through bank. Then Purchase deptt. receive a GR copy from party and they send to Accounts. They released documents from bank after giving payments. Then purchase deptt. people got the material from transporters and send it to the factory site.
2. The second case we directly received the material.

9. MRIR Copy to H.O. From Stores

After receiving the material, the store people send a green copy of MRIR. In this they just write down the description of received material. Mrs. Kaul enter this in the MRIR register. The format of the MRIR register has following columns :

MRIR NO.	DATE OF MRIR	MATERIAL DESCRIPTION	QTY.	BILL NO./ DATE	BILL AMOUNT	DATE, THE BILL SENT TO ACCOUNT
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After 2-3 days, the store people send the white copy of MRIR and copy of Bill. From this Mrs. Kaul enter them in the MRIR register. These are three MRIR registers.

- MRIR 001 - General Items
- MRIR D.I. - For Lab. items, Magnet etc.
- MRIR SM - For Sugar plant, Pesticides.

10. OBM

By attaching a red copy of purchase order, the OBM is ready. Then after checking it is send to Accounts Deptt.

11. Release of Payments

From accounts deptt. they receive cheques and distribute them to the concerned parties, after entering in the Register.

MARKETING DEPARTMENT

Present Man power Strength - 3

<u>Name</u>	<u>Designation</u>
Mr. S.P.Parmar	Asstt.Marketing Manager.
Mr. J.K.Thakur	Asstt.Marketing Officer.
Mr. Dharam Paul	Typist.

Present System of Working:

1. **PROCUREMENT OF ORDER:-**

We first of all take the orders from the parties. These orders are received in the form of letter which includes quantity required, quality, rate, delivery schedule, payment terms etc., (like our Purchase Order).

2. **ARRANGE VEHICLES:-**

For the despatch of material, the marketing deptt. arrange vehicles. They inform the transporters about destination, delivery schedule etc.,

3. **INFORM FACTORY:-**

They inform the despatch deptt. at factory about despatch of material, party's name, destination, despatch date, transporter's name etc. This information is mostly send by TP or on telephone.

4. **CHALLAN, PROFORMA INVOICE,G.R.:-**

Challan:-

Three copies of challan has come from factory.

- Yellow** - Office File
- White** - To party
- Pink** - Accts.

Performa Invoice: Only one copy.

G.R. Twp copies.

Accts. party.

5. **DESPATCH ADVICE:-**

On the basis of above, the marketing deptt. make despatch advice. In despatch advice they additionally write freight, order ref. no., payment terms.

Two copies of despatch advice.

- To computer centre.
- One is left in booklet itself.

From computer centre despatch advice came back, they file it in office file alongwith bill.

6. **INVOICE (BILL):-**

From despatch advice, computer make bill:-

There are 8 copies of Invoice/(Photostat copies)

.....3.....

- Party
- Office file,
- Bank (If payment under L/C)
- Accounts
- Bombay
- Factory
- Party's File.
- Hyderabad (If party is from Hyderabad)

7. DESPATCH REGISTER:

This has been maintained product wise. From the despatch advice and bill they fill all the columns in the despatch register. This register is filled by Mr. Thakur.

8. PARTY LEDGER:-

As clear from the name, it is party wise rates ledger. From despatch register they entry in the column debit of the party folio is made. When they receive any cheque or draft or under L/C same payment from the party, then they enter the payment received in the column credit. This is maintain by Mr. Thakur.

9. ORDER MAINTAIN REGISTER:-

This register is also maintained party wise. In this total quantity required by the party is filled and the quantity despatch in instalments is also written

The format of order maintain register has following columns:-

PARTY'S NAME:

MONTH	ORDERED BY	DATE	BILL NO/DATE	EXECUTED	BALANCE
				QTY	

This register is also maintained by Mr. Thakur.

.....4.....

10. L/C REGISTER:-

This register is also partywise. Some parties have made limits in the banks. This register is maintained only for that parties which have limits in the banks. We send documents (Challan , GR, Bill) to bank, in turn bank give us payment from the party's accounts.

11. FOLLOW UP FOR PAYMENTS:-

Sometimes parties do not pay in time, in that cases we need follow up with parties.

12. DEBIT/CREDIT NOTE:-

This note is used when we receive less or more payment from the party against our bill, or we give some discount to the party. If we get more payment from the party then we issue credit note to party and if receive less payment we issue debit note to party. Three copies- one to party, In party file, one to accounts.

13. WEEKLY REPORT

Weekly report has seven copies. All the copies are typed. Firstly Mr. Thakur make it manually & hand over to Mr. Dharam Pal for typing. Seven copies are divided as follows:-

Chairman, Bombay, Accounts, Factory (JKS) , Hyderabad, Delhi, Office record

14. MONTHLY REPORT:-

This include partywise sales report. It includes total production of each product and the name of the parties which the material his sold. This is also firstly made manually by Mr. Thakur and then typed by Mr. Dharam Pal Copies send to - Chairman, Bombay, Accounts, Factory, Hyderabad, Delhi Office, Office Record.

15. MONTHLY DEBETORS STATEMENT:

This statement includes that from which party we have to get money and how much amount. A copy of it is send to Bombay Office (monthly).

16. APPLYING FOR CCS:-

The cash compensatory scheme) Under CCS, the Indian Govt. has paid 15% of total valve of material export (they paid us because we collected foreign currency for country).

We apply for CCS, monthly. For this we have to fill the form (typed).

17. APPLYING FOR REP. LICENCE:-

This is given by Indian Govt. against export. This is valid for 18months and after that it has expired.

.....5.....

Indian Govt. issue a licence to goods against the export. These we can import goods within 18 months of applying for licence.

18. ECGC(THE EXPORT CREDIT GURANTEE CORPORATION)

This is insurance of Export material. We mskr insurance for the full year. We make insurance for the full year. We pay premium against export every month. The columns in the form is typed by Mr. Dharam Pal.

19. CHEMICAL REPORT:

This include application to statistics officer- Bombay regarding "**Monthly Progress**" return of exports alongwith export details.

SUGGESTIONS

PURCHASE DEPTT.

1. Yellow copy of indent which is send to store after purchase action, should be sent to indenter through store.
2. There should be one indent register in place of two in indent registers. Enterier in this should be made by Miss Seema, serialulise and daily.
3. We can combine present indent register, MRIR register and PCPL Bby Requirement register in one register. A new format for such register is suggested, which can serve the purpose of all the above three registers.

INDENT No./DT	INDENT Received OT	DESCRIP Tion of MATL	DEPTT	QTY	ENQ	P.O	NO	PARTY'S Name	QTY	DEUVER	FOLLOW UP	MRIR No /DT
---------------	--------------------	----------------------	-------	-----	-----	-----	----	--------------	-----	--------	-----------	-------------

DISCREPENANCY	BILL No	REMARKS
Shortage Acceptance	DT	

- 4. We should not need the green copy of MRIR separately because its purpose has solved by daily incoming material report. The green copy of MRIR should come with white copy.
- 5. It should be a duty of MR. R.K. Sadha to check the indent register and all other registers after a week that whether all the entries are made regularly
- 6. Purchase assistant should go to market after lunch time to confirm rates for add items, rather now they go and come and repeat this step many times in a day. This causes lot of fatigue and time wastages.
- 7. After 15 days, Asstt. Purchase officer should check that which orders are pended and why? And ask for follow up for pending orders.
- 8. There should be a masterlist of suppliers with their rates Then we made master comparative statement. It should be checked after 6 months.
- 9. Rates of purchased material should be sent to the indent or so that he may also know the rate of material and this will help in the better handling of material
- 10. Same MRIR copy is stored at purchase, Accts, and computer section. We should record it at one place preferably to be recorded by Accts. Deptt.

11. There should be a inventory planning, so that frequency of indents which are most urgent should be less.

MARKETING DEPTT.

- 1) We need not to have a separate despatch advice
Its purpose can be solved by profomainvoice that we
receive from despatch deptt. (Factory)
- 2) We may send weekly reports to Bombay, chairman, &
Factory instead of sending them invoice weekly report
can be made on computer.

Now we are making 8 copies of invoices. These
are send to party, Bank, Accounts Bombay, factory,
party's file, Hyderdabad and in office record. The copies
of invoices may be sent to pa rty, Bank, Account Only.
The marketing deptt. may not record copy of invoice
If sometimes they require it they can take it from
accou ts department.

- 3) The manual party ledger need not to be maintained
as it has been already been computerised. (If they
want any information regardingx any party they can
get information from computer section
- 4) The manual monthly reports purpose can be solved by sales
register (Being generated by computer) as it contains
all the information that is written in manual monthly
report.
- 5) Sales register is now being sent directly from computer
to Acts, it should be Channelised through marketing deptt.

SYSTEM STUDY OF PLANT

1. OXALIC ACID PLANT

FORMULA: $(COOH)_2 \cdot 2H_2O$

Reaction:

- 1. $C_{12}H_{22}O_{11} + 12HNO_3 + H_2O \rightarrow 6 \begin{matrix} COOH \\ | \\ COOH \end{matrix} 2H_2O + 12HO$
- 2. $NO + (O) \rightarrow NO_2$
- 3. $2NO_2 + H_2O \rightarrow HNO_3 + HNO_2$

Properties:

Molecular Wt 126.1
 Melting Pt. 101.5 C
 Sp. Gravity at 18/4°C 1.863

Process:

Sugar is fed to the hopper and is sent to a mixing tank in which mix acid is added concentration of nitric acid in mix acid is noted and if required some more nitric acid is added to it. If solid sugar is to be added it is fed to the hopper on the top floor. In the case of dirty sugar 60% solution with water is made and then it is pumped up. The reaction consists of 3 coils each through which cold water is circulated. This being an exothermic reaction water acts as coolant. One inlet is given to the outer jacket of the reactor. The Vapours evolved are nox gases which are reacted with O₂ in the

headers on the top floor. There are reacted twice in 2 stages in headers. The reacted liquid overflows from R₁ goes to R₂ then to R₄ and then to R₆ From R₆ it is sent to the digester on the ground floor. These are fitted with stirrers. So as to increase the rate of reaction and to provide sufficient time for reaction. There are a total of 8 stirrer fitted in it From digesters the liquid is pumped up to crystallizers. Where the temperature is brought down to 16 - 20° C by circulating chilled water in the outer jackets. The temperature of the liquid from the digester is about 60°C . The solution along with crystals are sent to the centrifuges. The mother liquor is expelled out where as crystals get settled along the cloth lining. This is taken out manually, filled in the bags and then sent to the driers. There are two types of driers. One is rotary drier and the other one is Flash Drier. The Mother liquor obtained is sent to Mother Liquor tank. M.L. Consists of 0.2% Nitric Acid 47% H₂ SO₄, 5-6% Oxalic Acid this is sent to concentrators where steam is passed through the tubes. The liquor obtained from the last concentrator is most concentrated NO₂ gases obtained after reacting with O₂ are sent to the bottom of the absorption tower. The Mother liquor is sprayed from the top. HNO₃ is formed and this is sent to storage tank on the ground floor. From laboratory analysis We check the concentration of nitric acid, H₂SO₄ etc. and if H₂SO₄ is found to be less it is added on the ground floor itself levels of nitric acid and concentrated liquid are maintained with the help of rotometers. The excess of Nox gases

are sent to the absorption towers (4) of sodium nitrite plant. The dried material from the driers is sent to packaging in the moisture proof bags. H₂SO₄ is added to prevent the formation of tartaric acid and for controlling the reaction.

Details of Equipment:

- i) S.S. Reacters 6 No's
 Capacity 12000 Lt. ~~12~~ 3 No's
 6000 Lt. 1 No
 10000 Lt. 2 Nos
 - ii) Crystallizers: 10 No's
 Capacity 5000 Lt 6 No's
 2500 Lt. 4 No's
 - iii) Rotary Dryer 1 No. Capacity 12T/batch
 - iv) Flash Dryer 1 No. Capacity 1.5 T/hr
- CAPACITY OF THE EXISTING PLANT 25MT/Day

INPUTS

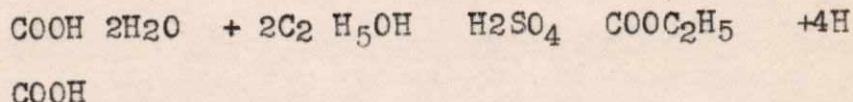
RM Input per day	Sugar	12 MT
	Nitric Acid	5MT
	Sulphuric acid	1 MT

OUTPUT OXALIC ACID 20 MT.

DIETHYL OXALATE

The process of manufacturing Diethyl Oxalate is esterification reaction.

Reaction



FORMULA:- (COOC₂H₅)

B.P. 185.7°C

Relative Density (Water) 1.079

Vapour Density 5.04

PLANT CAPACITY 18 T/Day

Details of Equipment

- 1) Reactors Stainless Steel 4 Nos 5000 Lt Each
- Glass Lined Reactors 4 Nos 5000Lt Each
- 2) Distillation Column 2 No's 3000 Lt each
- 3) Washing Vessel 3000 Lts.
- 4) Lower Layer Vessel 3500 Lt.

PROCESS: Oxalic acid and Ethyl alcohol are added in a premixer at ~~55~~ 55°C and 1.5-2.0Kg/Cm². The solution is sent to the premixer tank on the topfloor. From the p remixer tank it is fed to the S.S. reactors. Benzene is added to S.S. reactors. Benzene is added to remove water Sulphuric acid is added in the glass lined reactors as moderators. For a charge of 1200 Kg. of oxalic acid:

2100 Lt of Ethyl Alcohol 1700 Lt of benzene is added.

In S.S. reactors steam is passed from the outer jacket steam pressure of about 0.5 Kg/cm^2 and a temperature of about 72° is maintained 50% of the reaction is done in this total time of the both is around 14 hrs. in S.S. reactor it is kept for about 6 hrs. The vapours are sent to the condensers and through chillers it is sent back to the measurement tanks. The upper layer is fed back to the reactor and the lower layer is sent to the tank. The reacting mass is then fed to the glass lined reactor. The temperature maintained is about 90° and pr. is about 2.5 Kg/cm^2 . The vapour obtained are condensed and upper layer and lower layer is formed. After some time the lower layer ~~is~~ formation stops. The upper layer consists of about 86% Benzene, 13% Alcohol and 1-2% water. The lower layer consists of 8-10% Benzene 48% Alcohol, 42% Water. After sometime the lower formation is stopped. The upper layer is kept recirculating to the reactor when the lower layer formation is stopped the steam pr. is raised 3.5 Kg/cm^2 This is called cooking period. The acid maintained is 2.5. It is cooled and then sent for water wash Alcohol gets desolved in water and subsequently for soda wash to reduce the acidity to Nil. Again it is washed with water. The liquor obtained is sent for distillation (2Nos) In the first distillation column benzene is removed Alcohol if present is removed in the second distillation column under vacuum. The DEO obtained is sent to the storage tank (4Nos). The lower layer ~~is~~ after being stored in the tank are fed to the distillation column. The vapour obtained

are condensed and then sent to chillers. From a mixture of benzene and alcohol, benzene is obtained first and then alcohol due to difference in sp. gravity. After separation of benzene, steam is passed and 90% ethyl alcohol is obtained which is sent to storage tank.

Sp. gravity of DEO 1.079 at 20°C 98% purity

Sodium Oxalate:

Sodium oxalate is obtained when washed with soda ash This is washed with water and dried in a rotary dryer by passing steam through the jacket.

In the DEO process a bit of sulphuric acid is added to break the molecules of water and remove the impurities.

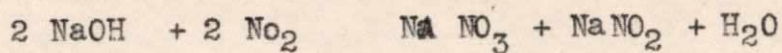
SODIUM NITRITE PLANT

Formula Na NO₂

REACTIONS :

- i) $NO + \frac{1}{2}O_2 \rightarrow NO_2$
- ii) $Na_2CO_3 + NO_2 + NO \rightarrow 2NaNO_2 + CO_2$
- iii) $Na_2CO_3 + 2 NO_2 \rightarrow NaNO_2 + NaNO_3 + CO_2$

When caustic lye is used



CAPACITY OF PLANT Depends upon availability of NO₂ gas

t present producing 1.5T/day

EQUIPMENTS:

CONCENTRATOR/CRYSTALLIZER IN 7500 Lt
 M.L. Tank 1 No 2500 Lt
 CENTRIFUGE 110 Kg/Batch
 ABSORPTION TOWER TANKS(4) 4000 lt
 DISSOLVING REACTOR(1) 2000 lt.
 TRAY DRYER 500 Kg

PROCESS:

Sodium Carbonate is fed to the conveyor through hopper and finelly to dissoving reactor. For 500 Kg of Na_2CO_3 1500 lt of water is taken. This is being continusly agitated by an agitator. Since no cemp is noted and accordingly temperature ranges from 60-80°C. After the required parameter are ditained it is fed to the absorpction tower NO 4. No2 gases obtained from the last absorpction tower of oxalic plant are fed to tower No 1 of sod. nitrite plant from the bottom of the tower. The exhaust gases from top of tower No. q is fed to the bottom of the tower No. 2 and thus the cycle proceeds. There are 2 types of liquid lines. In the first case the liquid is continouly fed by circulating pump from bottom to top and back. We can transfer the liquid to other tower

by operating the valves and pumps. A PH of 6.9 and Min free soda as Na_2CO_3 should be 0.2%. The conc of NaNO_2 should be around 23 to 25% and TDS as 30% (approx) when these promoters are obtained the solution is pumped to the concentration. The temp. in absorption tower is around 60°C . A charge of 4000 lt is transferred to concentration unit low vacuum is applied and temp. is about 60°C at a pr. of $0.2\text{Kg}/\text{cm}^2$. At 42°C the evaporation starts. Around 2500 lt of water is evaporated which is passed through a condenser and then to a tank and discharged. The remaining 1500Kg concentrate is fed to the centrifuge with a capacity of 110 Kg/batch. The Mother liquor obtained from this is fed to the mother liquor storage tank. The wet powder obtained is the first crop with 97% purity. The mother liquor (550lt) thus collected again fed to the concentrator and steam is applied. After concentration it is again fed to the centrifugation and the wet crystals obtained is the IInd crop. It is about 80-85% pure. The mother liquor (150lt approximate) obtained from this is collected in drums and taken to the flaking machine which acts like a concentrator. It is again centrifuged and the material obtained from this is 60-65% pure.

For calculating the percentage of sodicam nitrate

$$\% \text{ of } \text{NaNO}_2 = \frac{\text{TDS} + \text{Free Soda}}{\text{Total}} \times 100$$

The wet sod-nitrate is filled in the legs and is fed to the tray dryer (500 Kg Capacity) in trays. Steam is passed and a temp of about 125°C is maintained. After drying it is fed to the grinding machine and packed in 50Kg bags.

BOILER

CAPACITY: 7t/hr

Process:

The existing boiler is a husk fired, water tube, single pass natural circulation, self contained boiler working on a fluidised bed conclusion principle.

The boiler consists of mainly two sectors. One is the bottom structure, consisting of the fluidised bed arrangement with inlied steam generation section. The other is the top structure with the m in tube banks generating the 50% of the total boiler output, along with a steam drum of adequate capacity. The steam generating sections of both inbed and main headers are along the flue gas passage and the headers and drum stay. Outside the chamber are not subjected to direct heat from comlusion chambers. The header at the lower devotion is called the frant header and at the higher devotion is called rear header.

The boiler is lined with refractory and insulation bricks. The inbed headers and main headers are suitably connected to the steam drum. The steam is separated out by a steam separator and the hot water is recirculated. The cycle repeats.

Fluidised bed combustion chamber:-

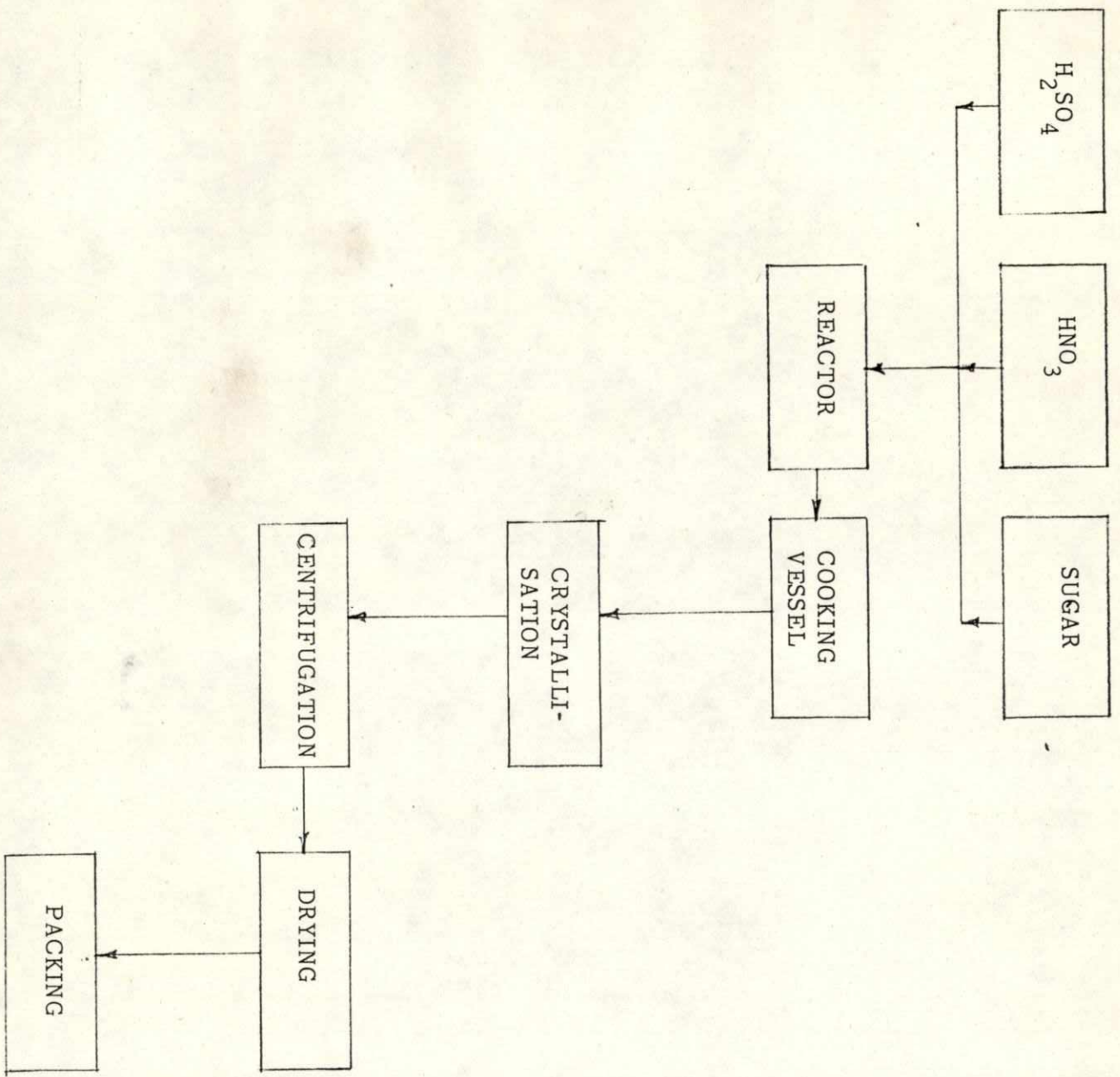
The fluidised bed assembly consists of a plenum chamber fitted with nozzles. Paking doors and viewing door are provided on the bottom structure. The flue gases outlet is from the top of the boiler. Air inlet is to the plenum chamber. The outlet is connected to the ID fan through heat recovery and dust collecting systems. The FD fan supplies the air to the plenum chamber. Ash removing arrangement is provided at the bottom of the plenum chamber for ash removal. The boiler feed water pump is a multistage high pr. centrifugal pump suitable for handling hot water. Compressed air is blown at the bottom of the bed through nozzles which keeps the husk in the fluidised state. The soot is blown out and is packed in logs and sold. Adequate volume is there in the combustion chamber to allow complete combustion of the fuel before the hot gases pass over the nest of tubes. The FD fan supplies a part of the combustion air (primary air) through the plenum chamber to burn husk the secondary air is taken from the plenum chamber which helps in burning gases and volatiles given off by the coal bed to obtain proper combustion chamber and The ID fan deals. The flue gases from the combustion chamber and delivers them to the chimney through the heat recovery and dust collections systems

P.F.

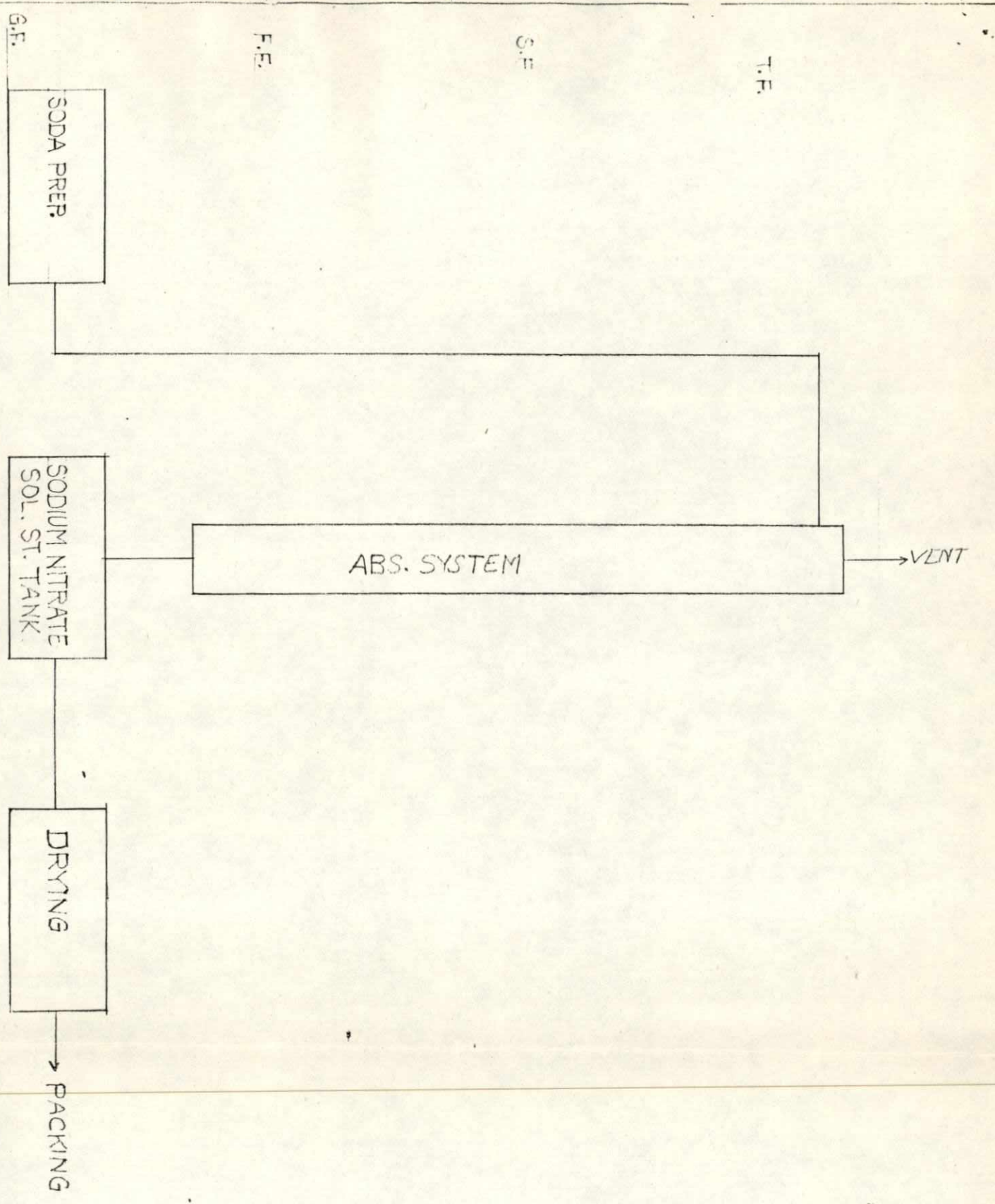
T.F.

S.F.

F.F.



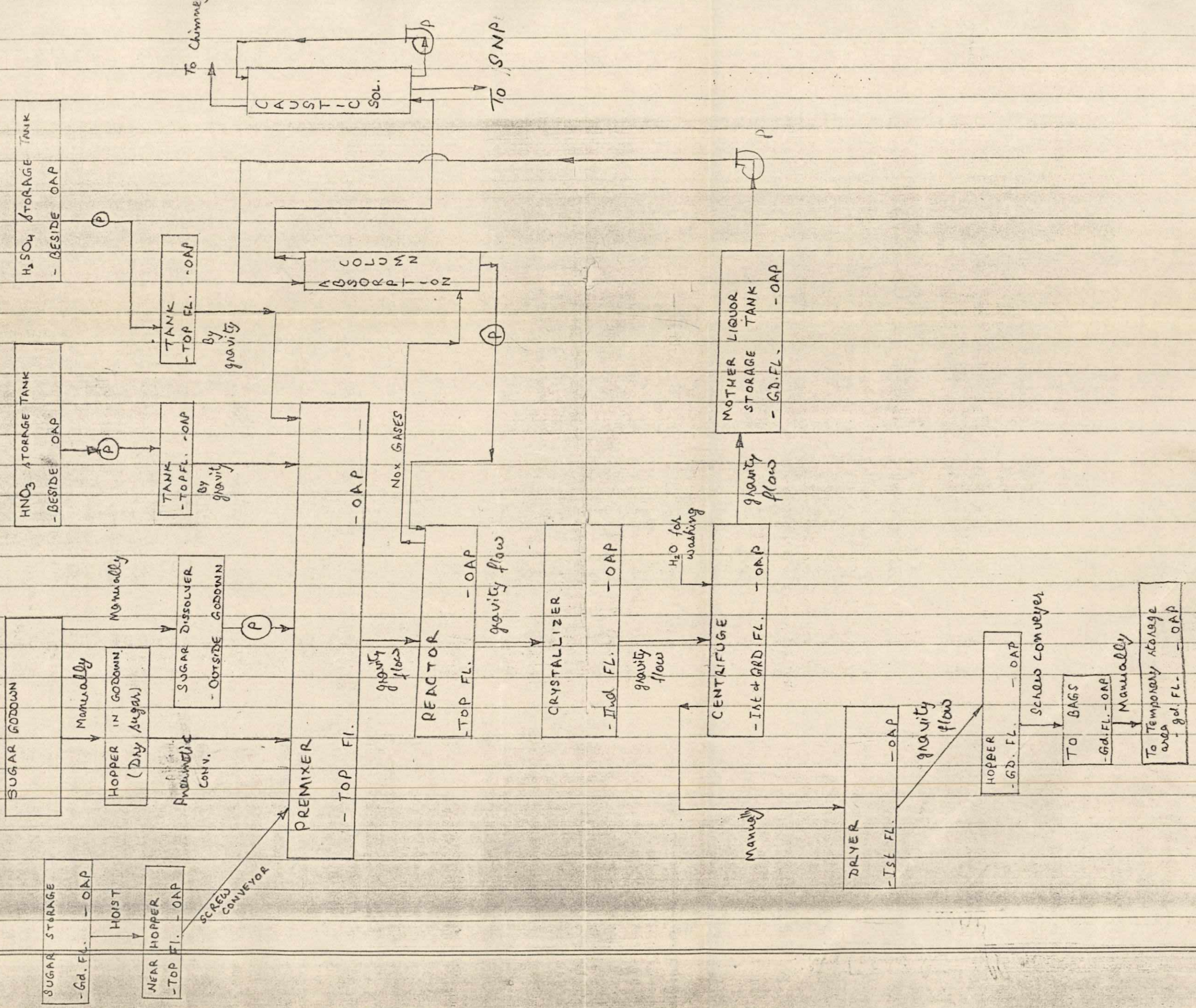
SK. No. 302-5-50 Single



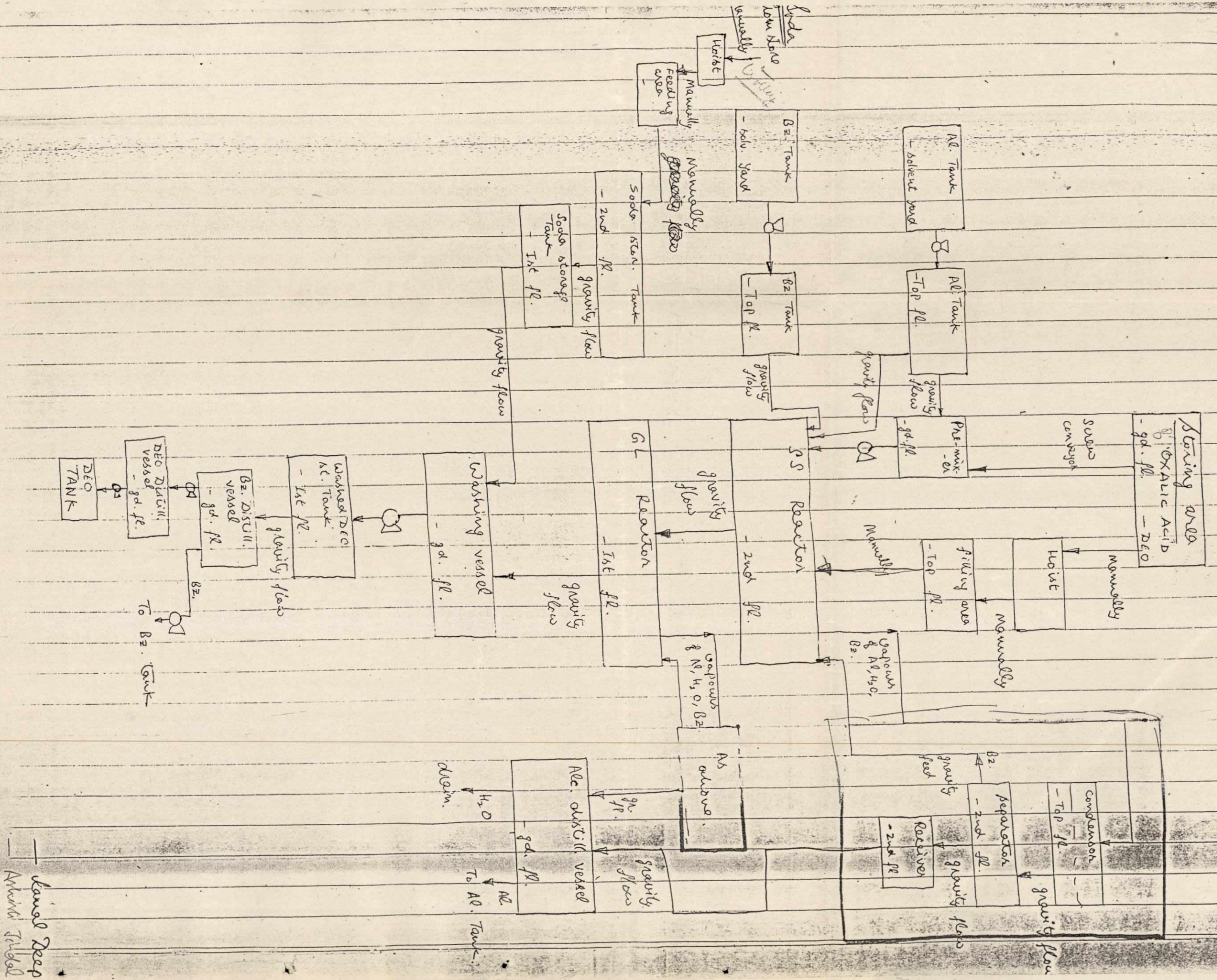
BLOCK DIAGRAM OF SODIUM NITRITE / NITRATE.

U.N. No. 305-5-30 19/19

Material flow ^{of OAP}



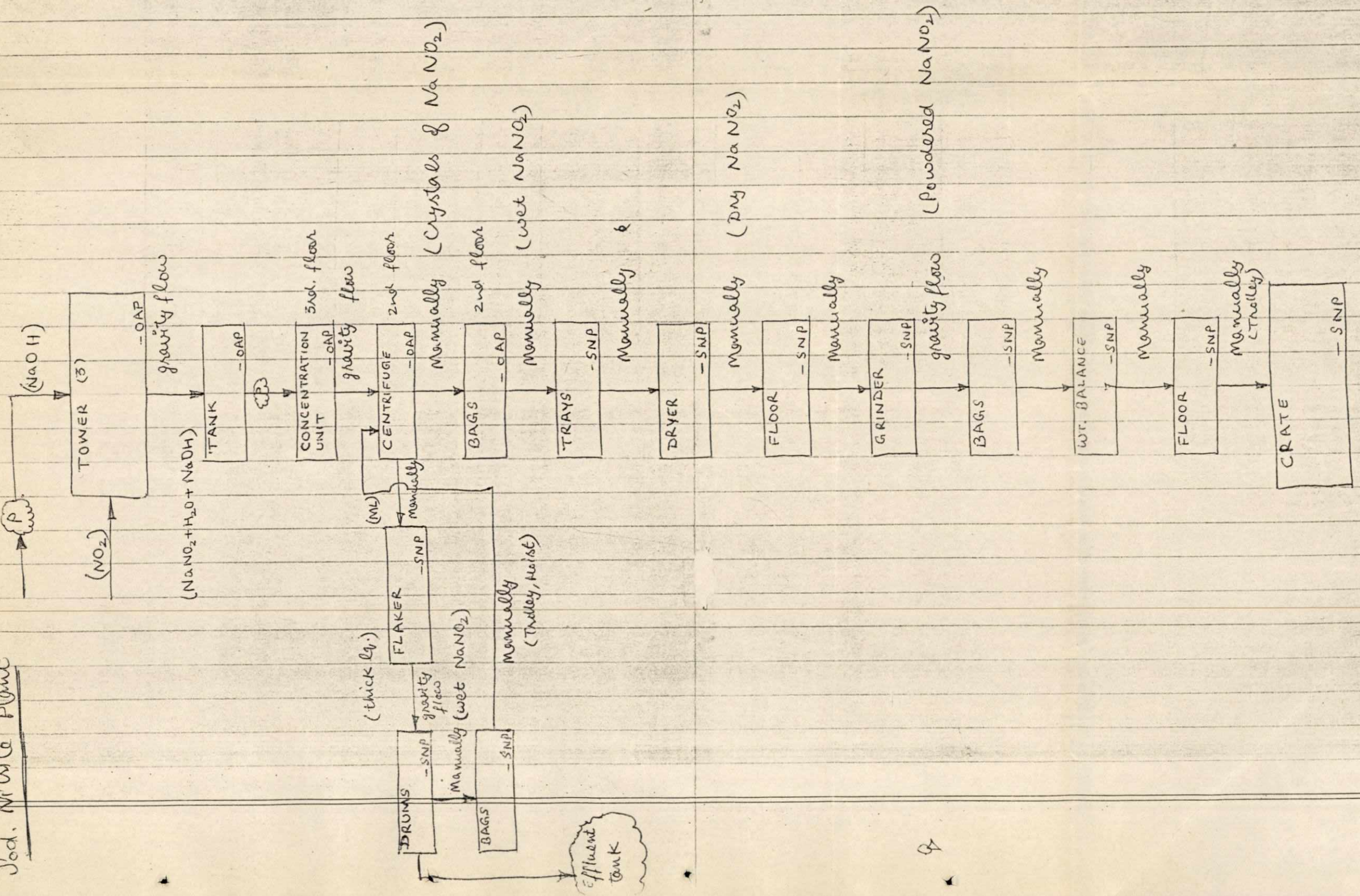
DED
Natural Flow



— Kanal Deep
Ahmednagar, India

13th Mar

Sod. Nitrite Plant



Ashtok Jindal an.
 - Kunaldeep S.

4) GODOWN LAYOUT

Purpose:

The factory has two godowns to store oxalic acid and some amount of sodium nitrite. They put bags on one another thus making a heap of bags. When oxalic acid has to be despatched they have faced following problems.

- 1) The lower layers of bags are not despatched thus only newly made material is despatched and old material remains unattended.
- 2) Some bags are worn out due to pressure from upper bags.
- 3) Lot of time is wasted as they have to first unload the crate in the godown and then they have to load the bags on the truck for depatch.

To solve these problems the management has decided to design racks for store. This work was given to us.

METHODOLOGY:

We first took the dimensions of both the stores. We we suggested to break the common wall. So that it can be

converted into one store. Then we took the dimensions of fork lift. We also noted the distance covered by a fork lift for ~~km~~ turning with or without crate. Critically examining all these points. We design racks and crates for the storage of oxalic acid.

5. FORMATS OF ANNUAL OPERATING PLAN (AOP)

Purpose:

The company management wants to know about the total annual planning i.e. expenses and their division, sale etc. for whole year at the beginning of year. For this purpose they gave us responsibility to make some formats which can be filled by related departments about their future planning.

Methodology:

For designing such formats, we went to each and every department and find out information available from them. After their observing their requirements and taking into consideration their suggestion we make AOP formate

PURCHASE DEPT. [EXISTING SYSTEM]

FOR ALL ITEMS EXCEPT RM,

INDENT

DAK

INDENT RECEIVED
- SEEMA

One copy to
H.O. Bby (Seema)

Marking to concerned
People (R.K. Sarda)

Is
Indent
Related
to PePL
Bby

Entry in PePL Bby
Register
(MRS. KAVI)

To H.O. Bombay

FOR MECH. AND
HARDWARE ITEMS
- SANDEEP

FOR ELEC., ADMIN.
AND COMPUTER ITEMS
- PATHAK

Entry in indent
Register - SANDEEP

Entry in indent
Register - PATHAK

Is
Indent
for capital
or odd
items

ENQUIRY
FLOAT

QUOTATIONS
RECEIVED

COMPARATIVE
STATEMENT

Purchase order
- Capital
- Local

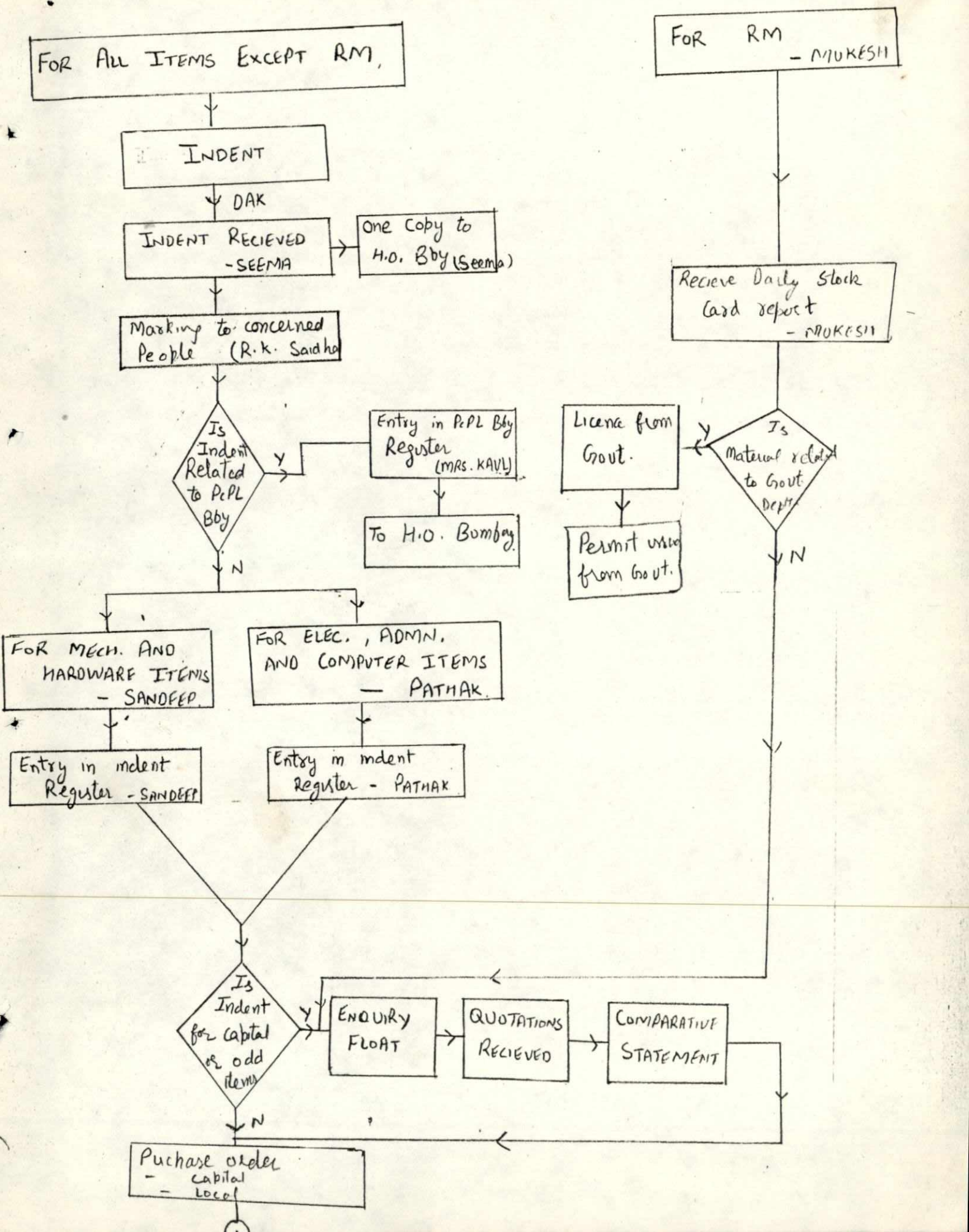
FOR RM
- MUKESH

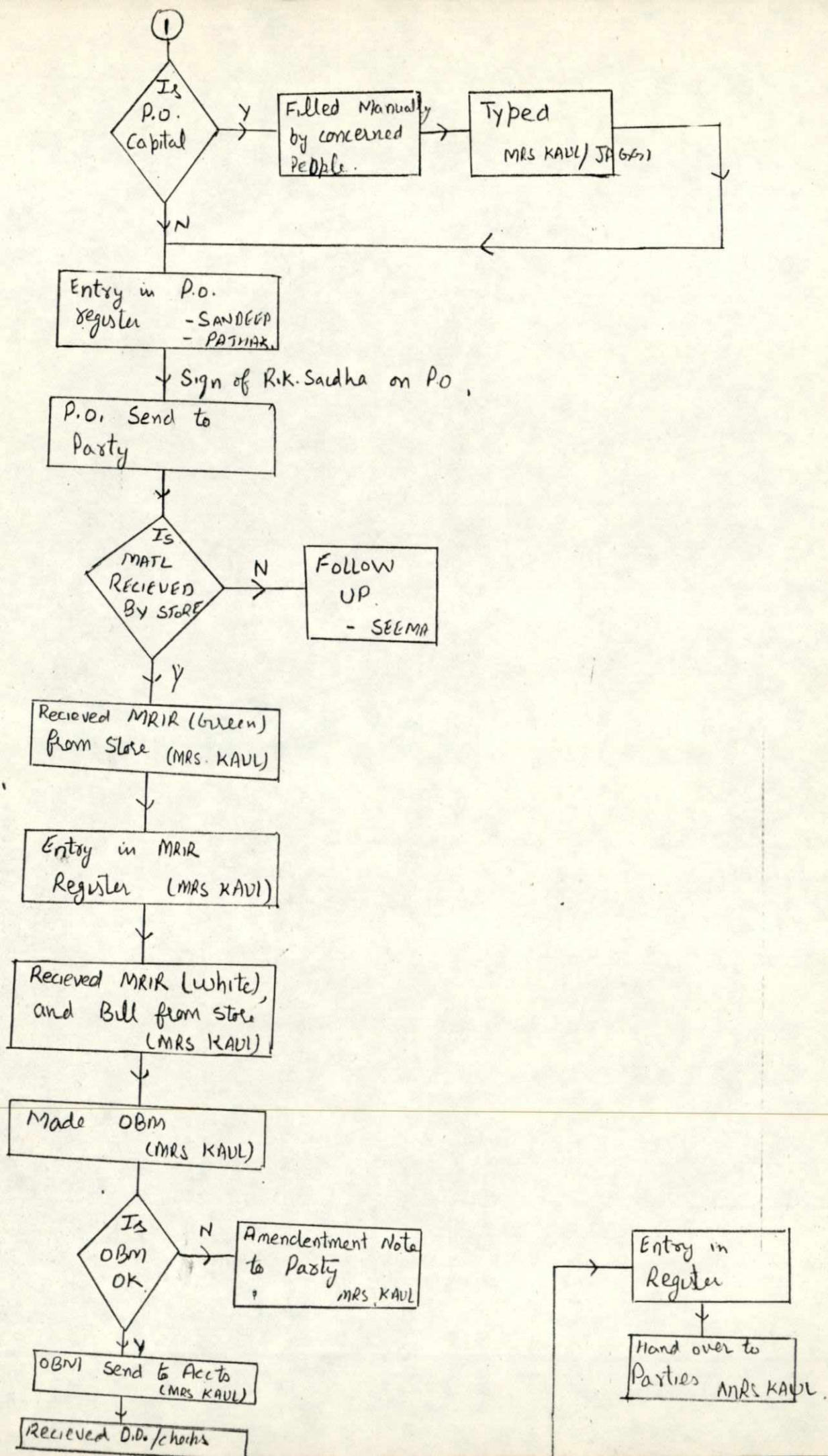
Recieve Daily Stock
Card report
- MUKESH

Is
Material related
to Govt.
Dept.

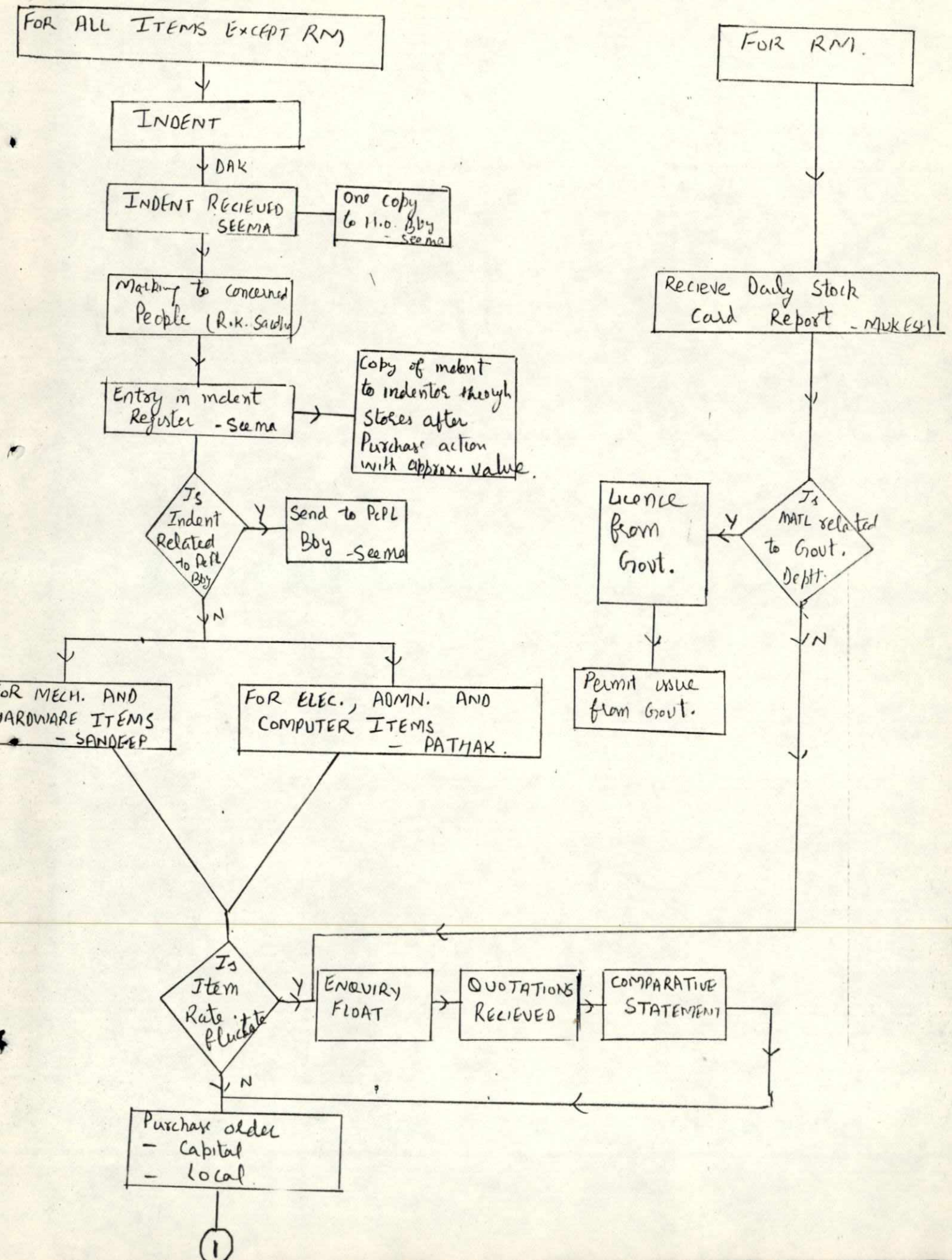
Licence from
Govt.

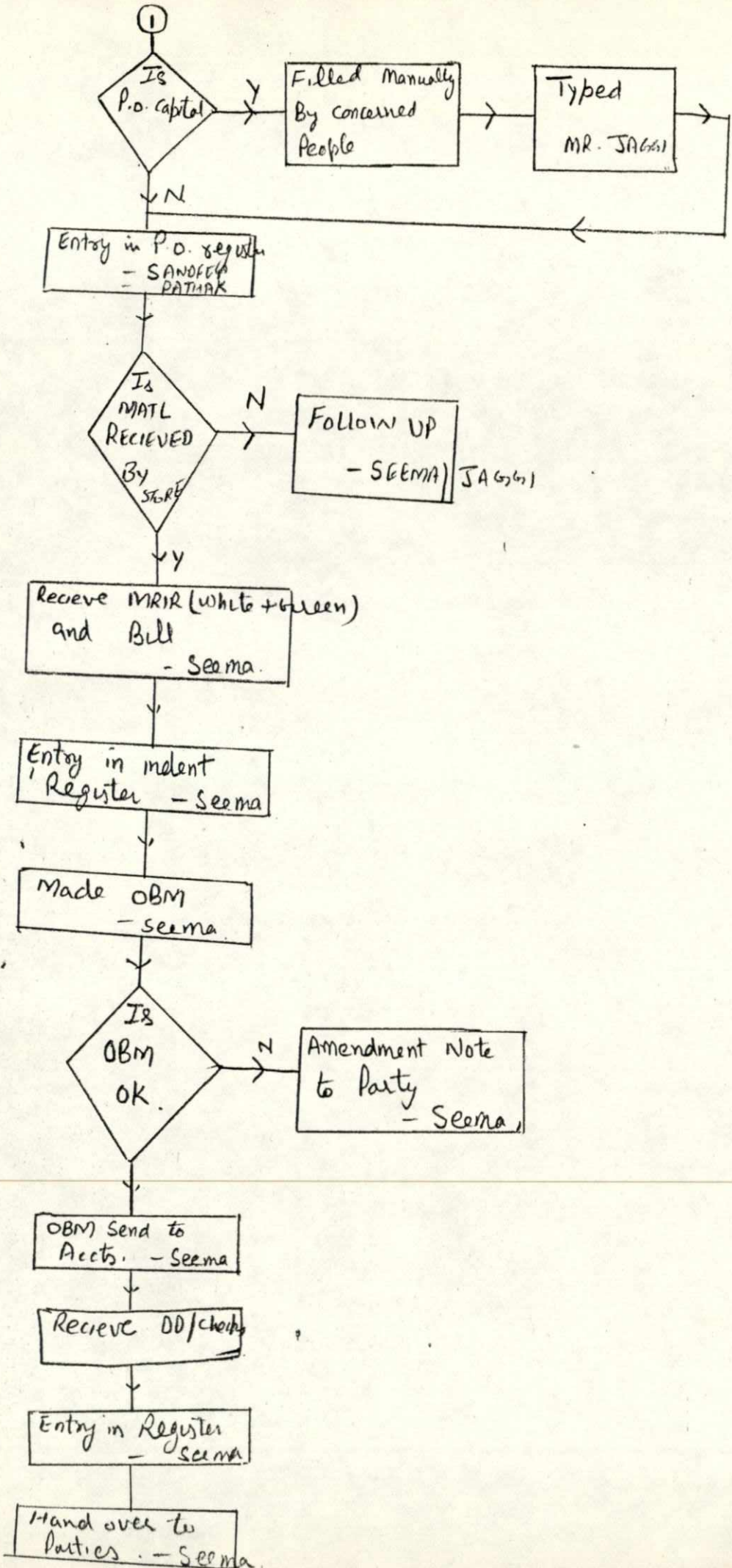
Permit used
from Govt.

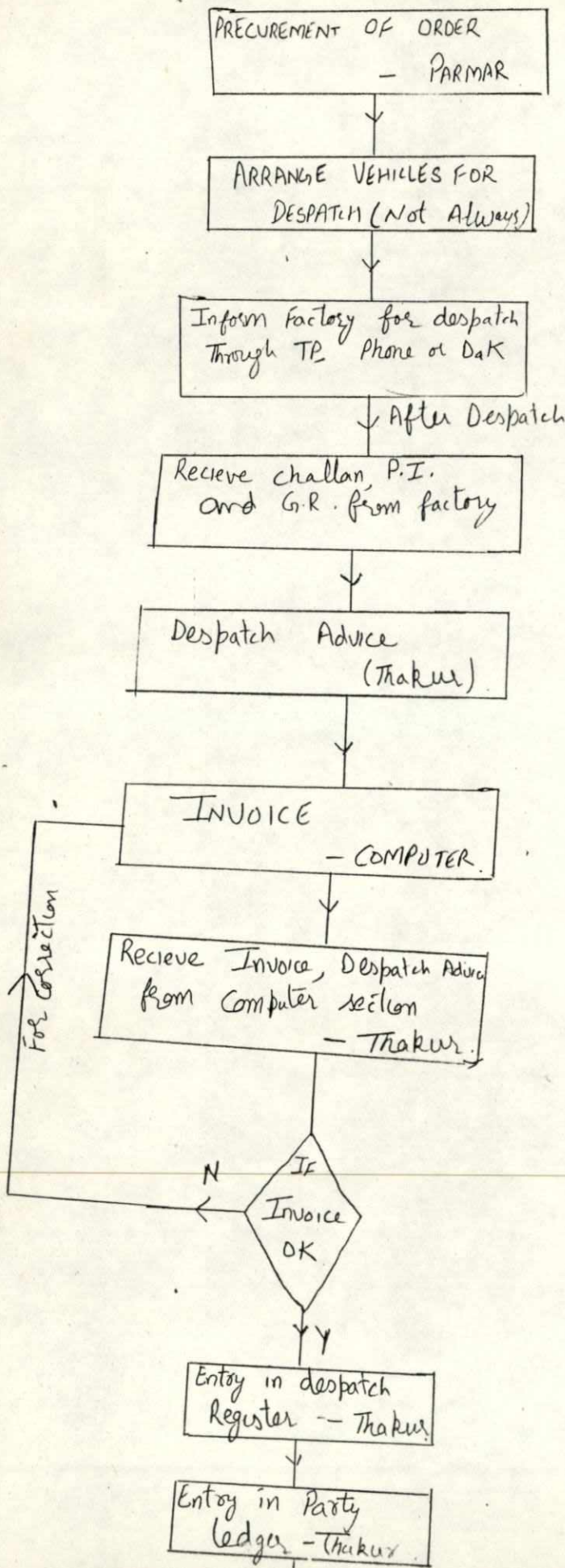


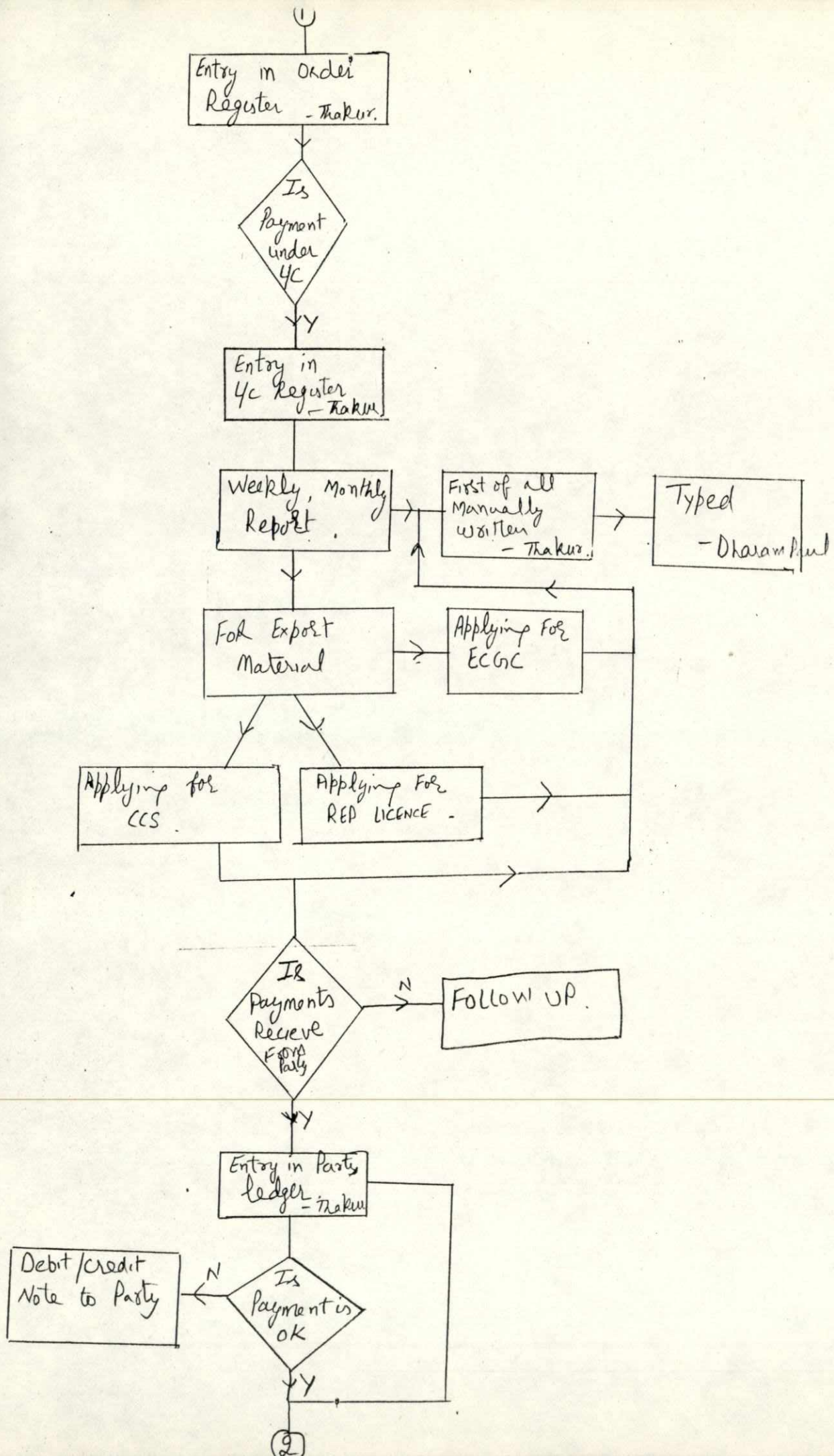


PURCHASE DEPTT. [PROPOSED SYSTEM]

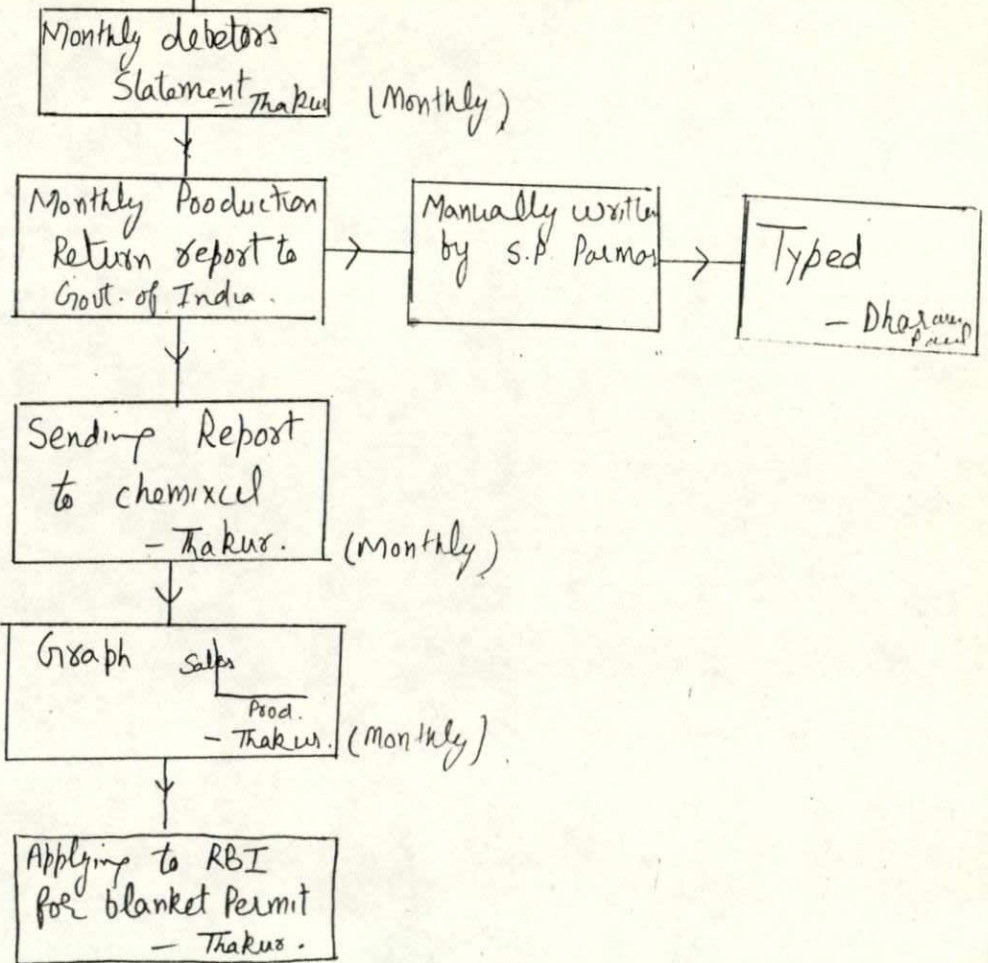






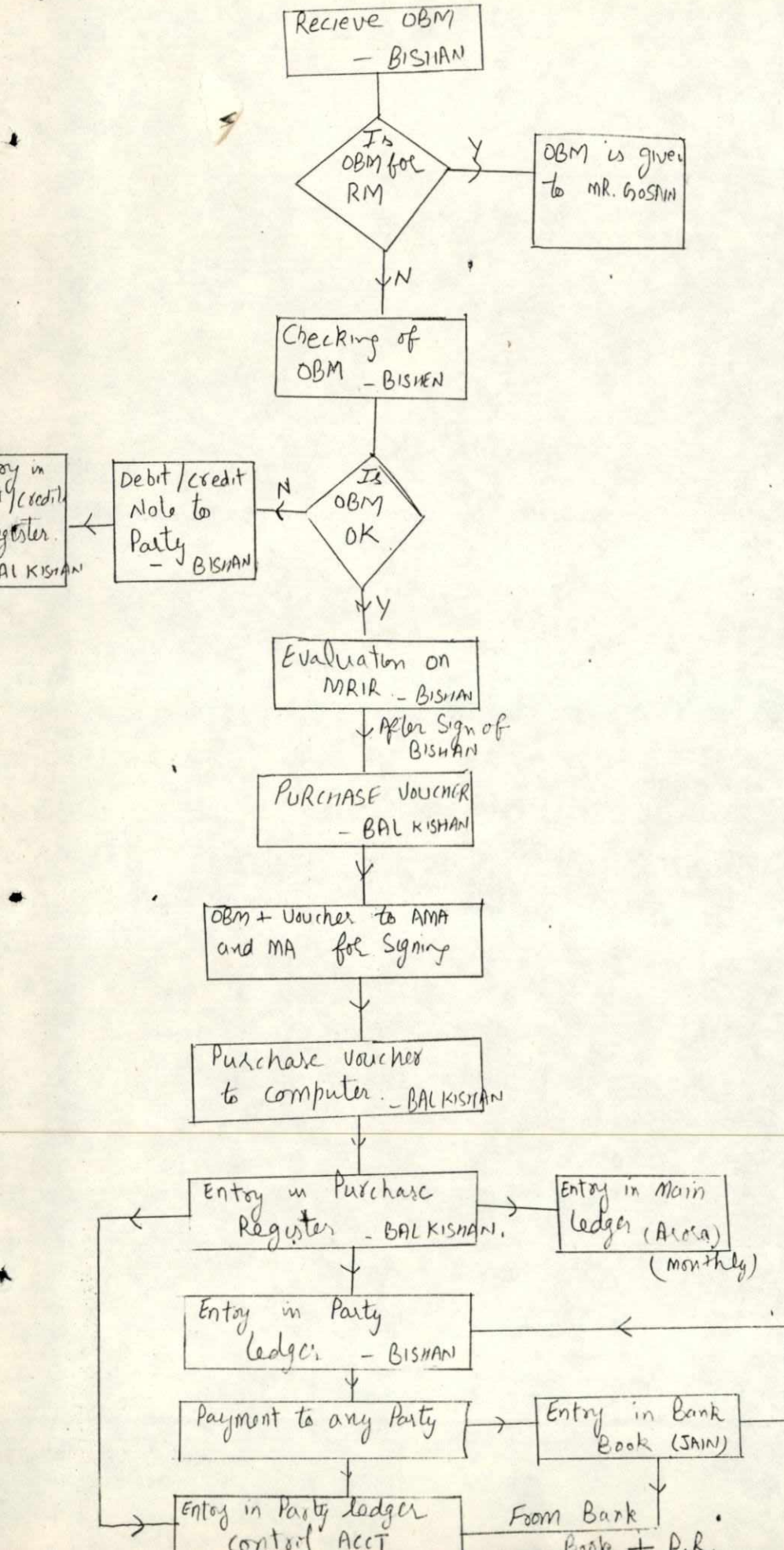


2



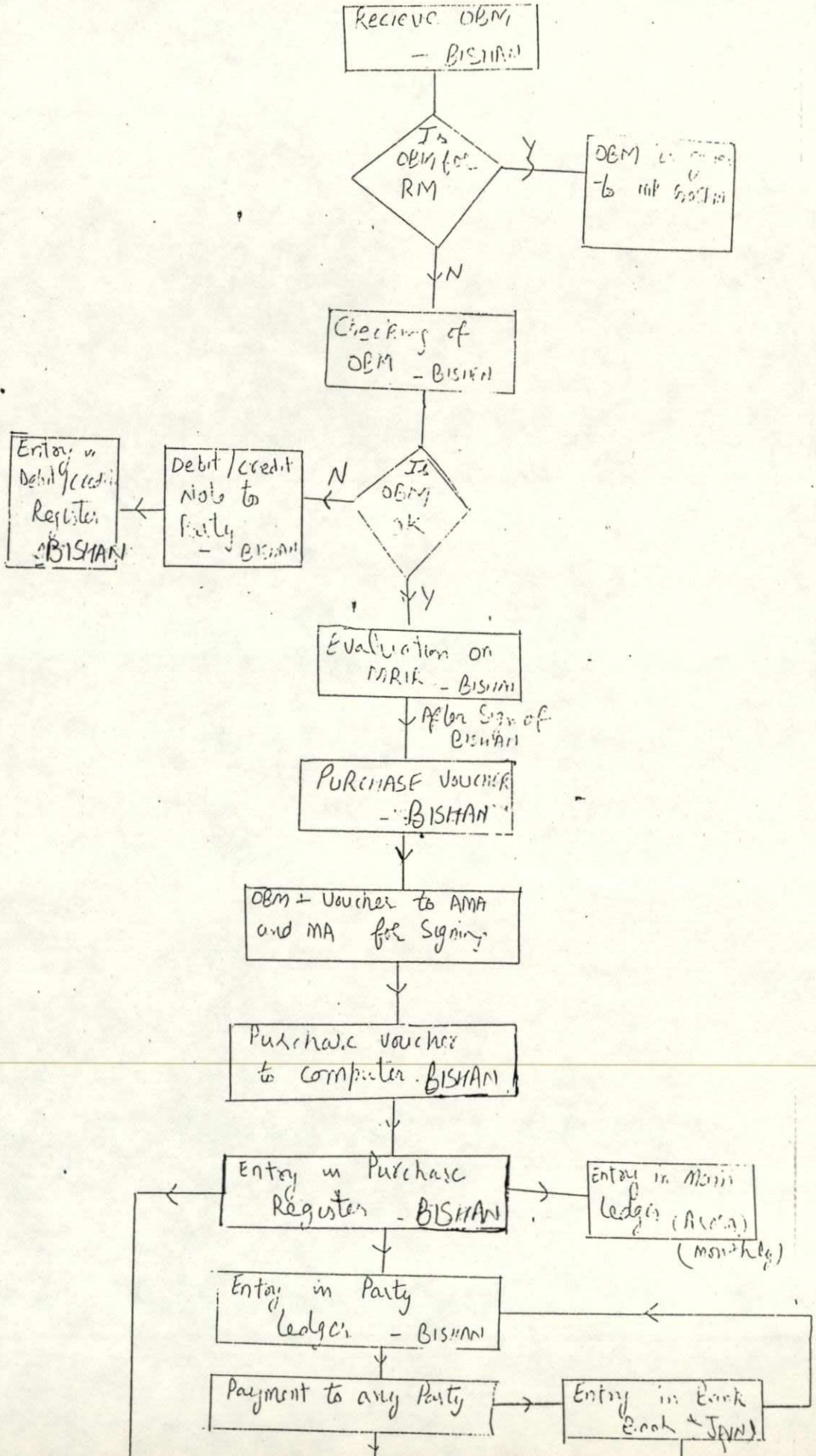
ACCOUNTS DEPTT.

PURCHASE SYSTEM (Existing)

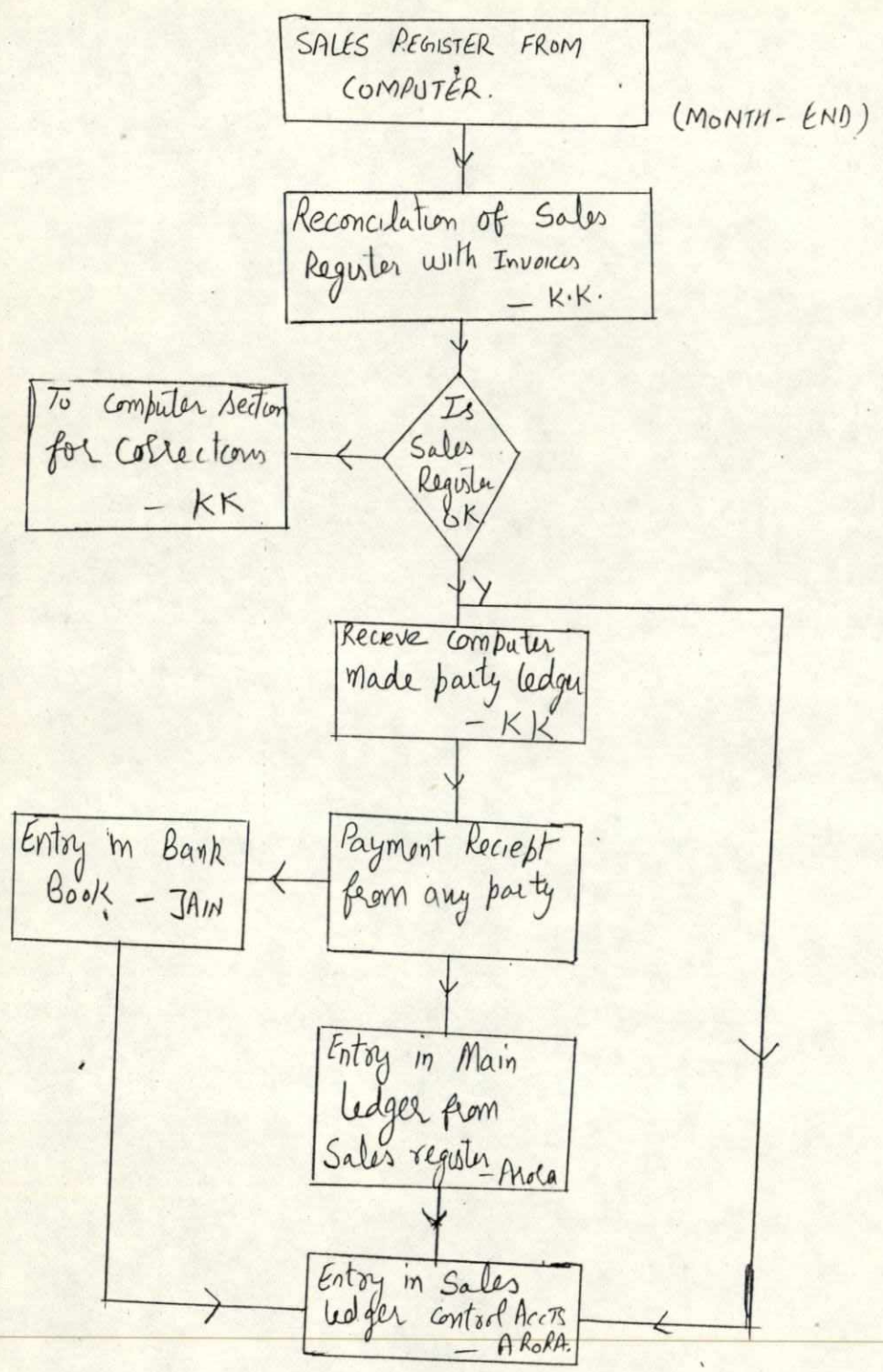


ACCOUNTS DEPTT.

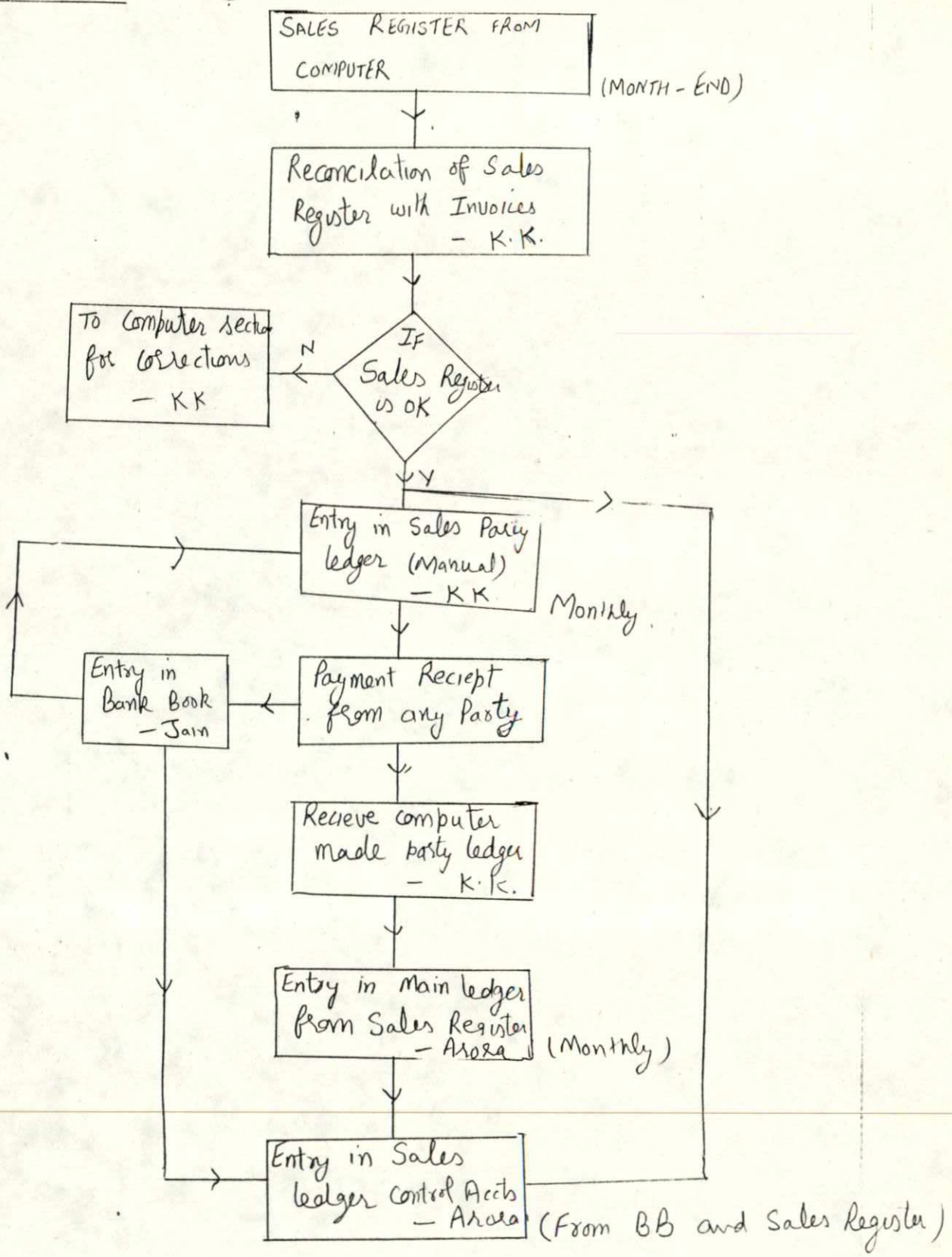
PURCHASE SYSTEM (Proposed)



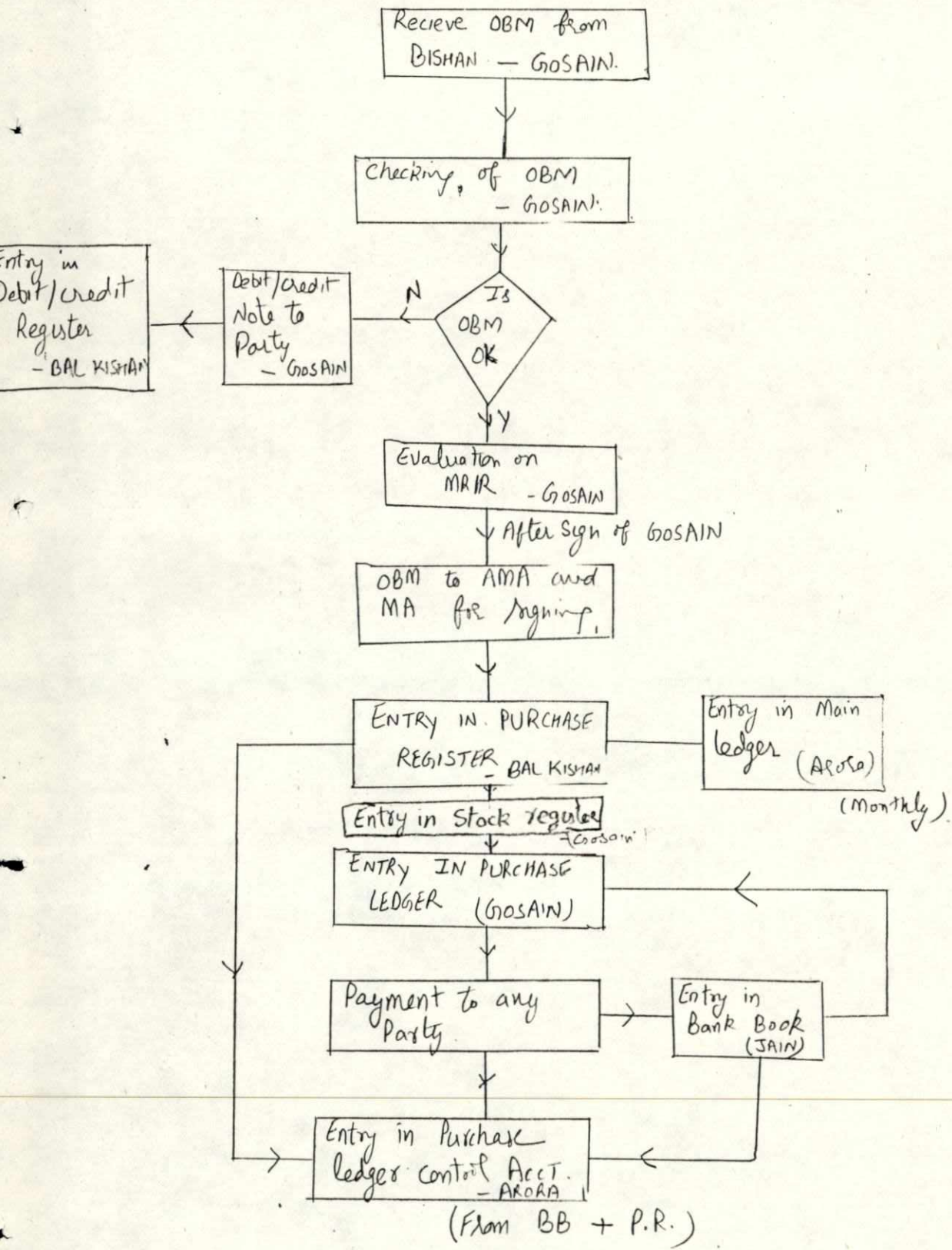
S SYSTEM (PROPOSED)



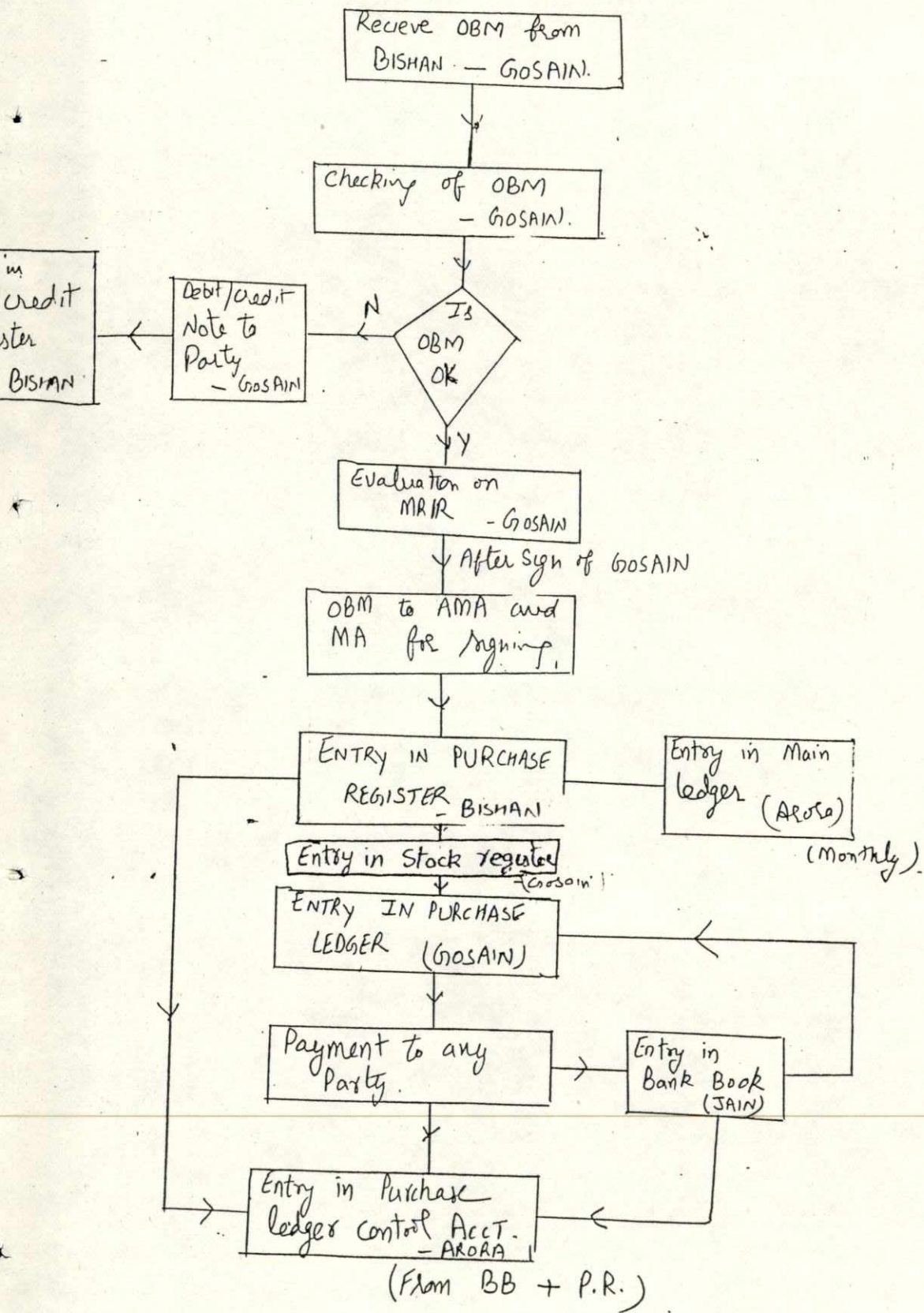
SALES SYSTEM. [EXISTING]



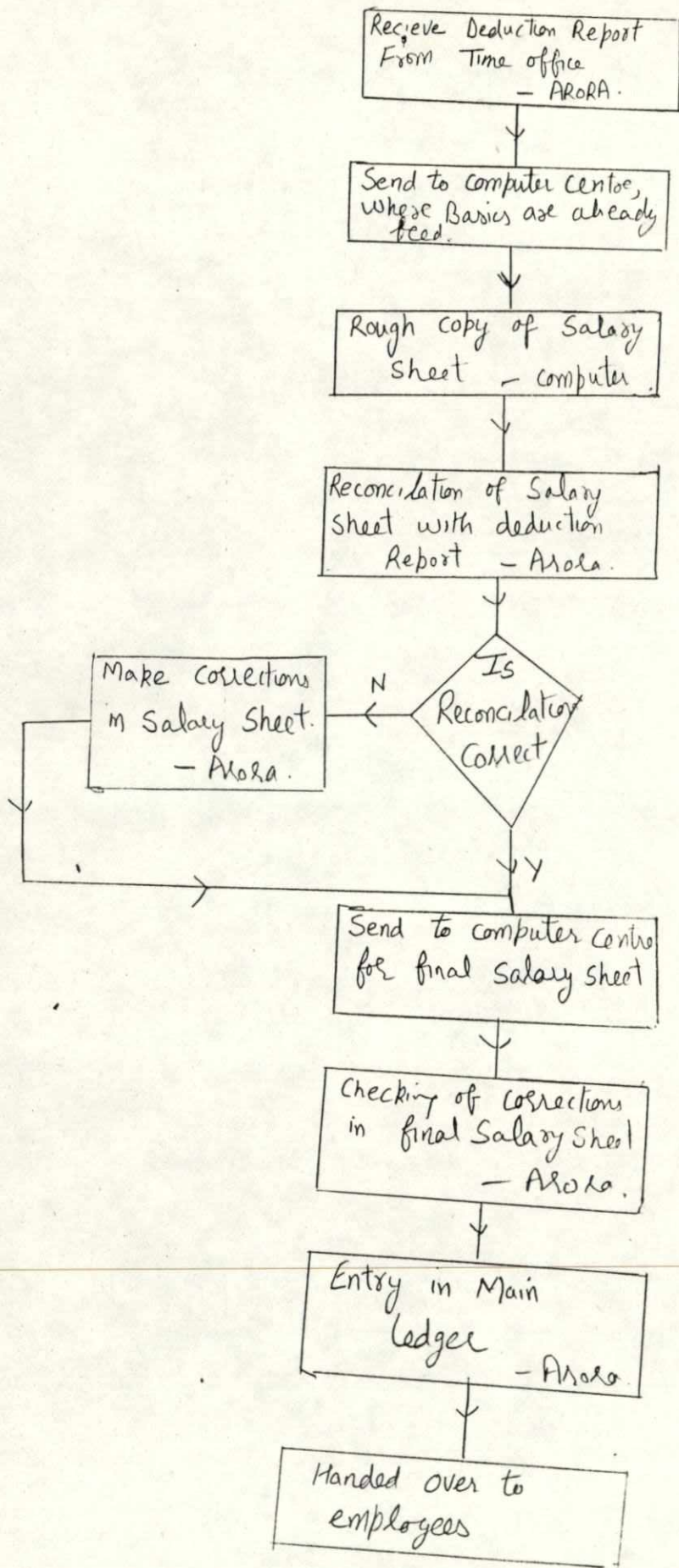
FOR RAW MATERIALS (EXISTING)



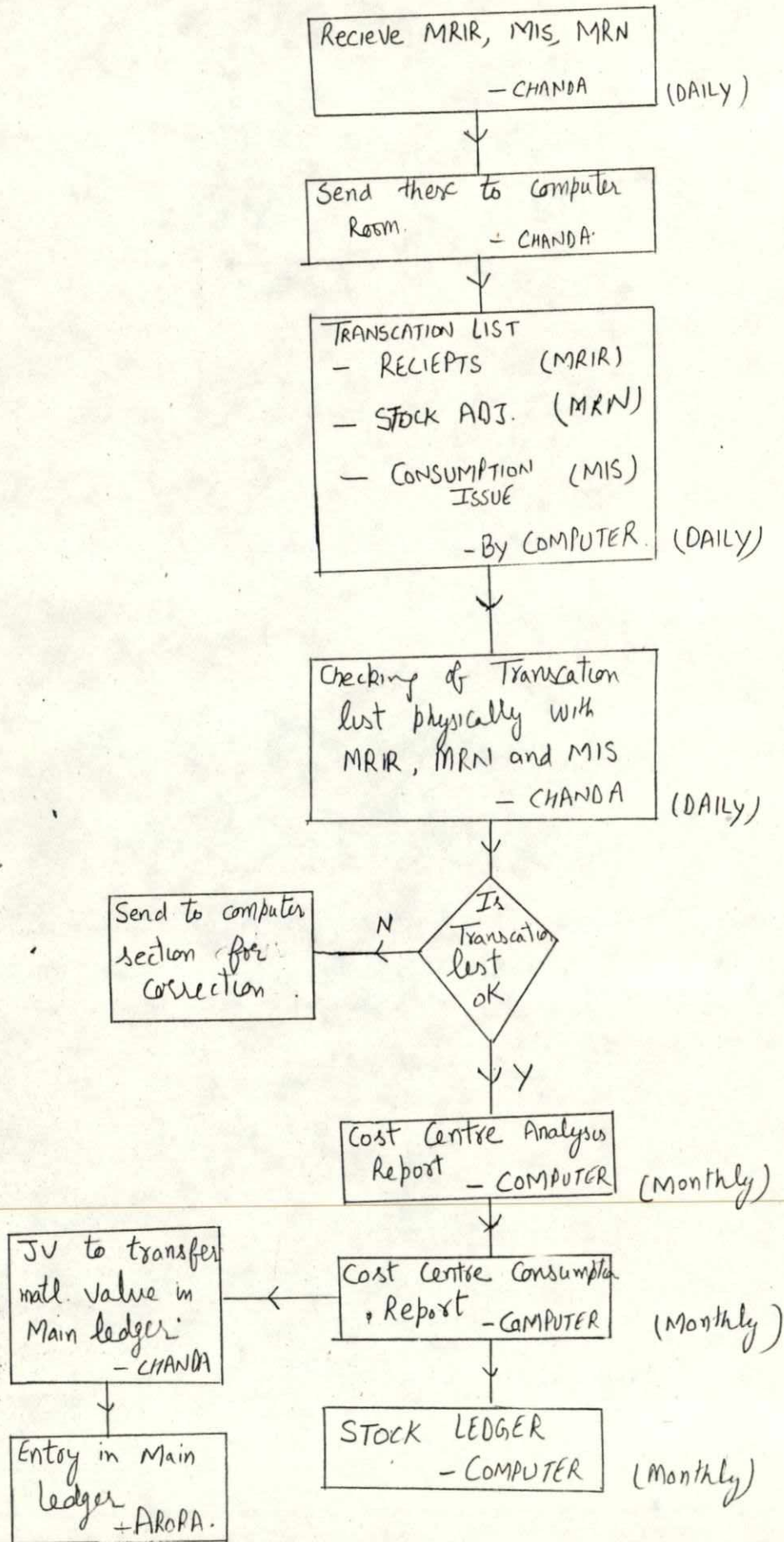
RAW MATERIALS (PROPOSED ~~EXISTING~~)



SALARY



FOR GENERAL ITEMS



7. Documentation Flow of every report of factory

Purpose:

The factory has no standardize method of documentation flow of any report. Mr Jain Parkash has given me a job to know which are the reports generated in the factory who receive them, what are the actions taken on them what has happened to them after taking action.

METHODOLOGY:

I went to each and every department and noted the reports generated by them. I also noted that where theis reports are gone, and where they should actually to be gone.

Benefits:

The management has utilized this report to take decision, whether generated reports have beneficial to them and they also came to know whether copy of report has given to appropriate perron of not. They are recording 2-3 copies of each report, I suggest them to store one copy of each report, rest should be disposed off.

Thapar Inst. of Engg. & Tech.

CENTRAL LIBRARY

No. Dt.

