



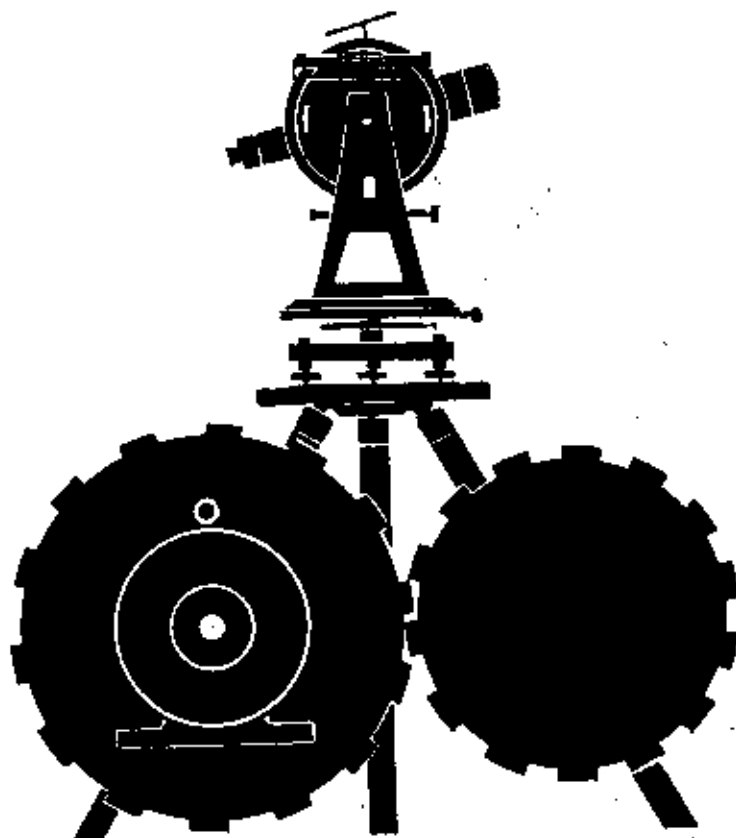
BHARATIYA VIDYA BHAVAN
Sardar Patel College Of Engineering
ANDHERI, BOMBAY-58



Vol.
VII

SARJANIKA

MAY
1972



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S. S. DIGHE

Signature of Publisher.

MAY 1972

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BHARATIYA VIDYA BHAVAN

Sardar Patel College Of Engineering

ANDHERI, BOMBAY-58



SARJANIKA



OL. VII

MAY 1972

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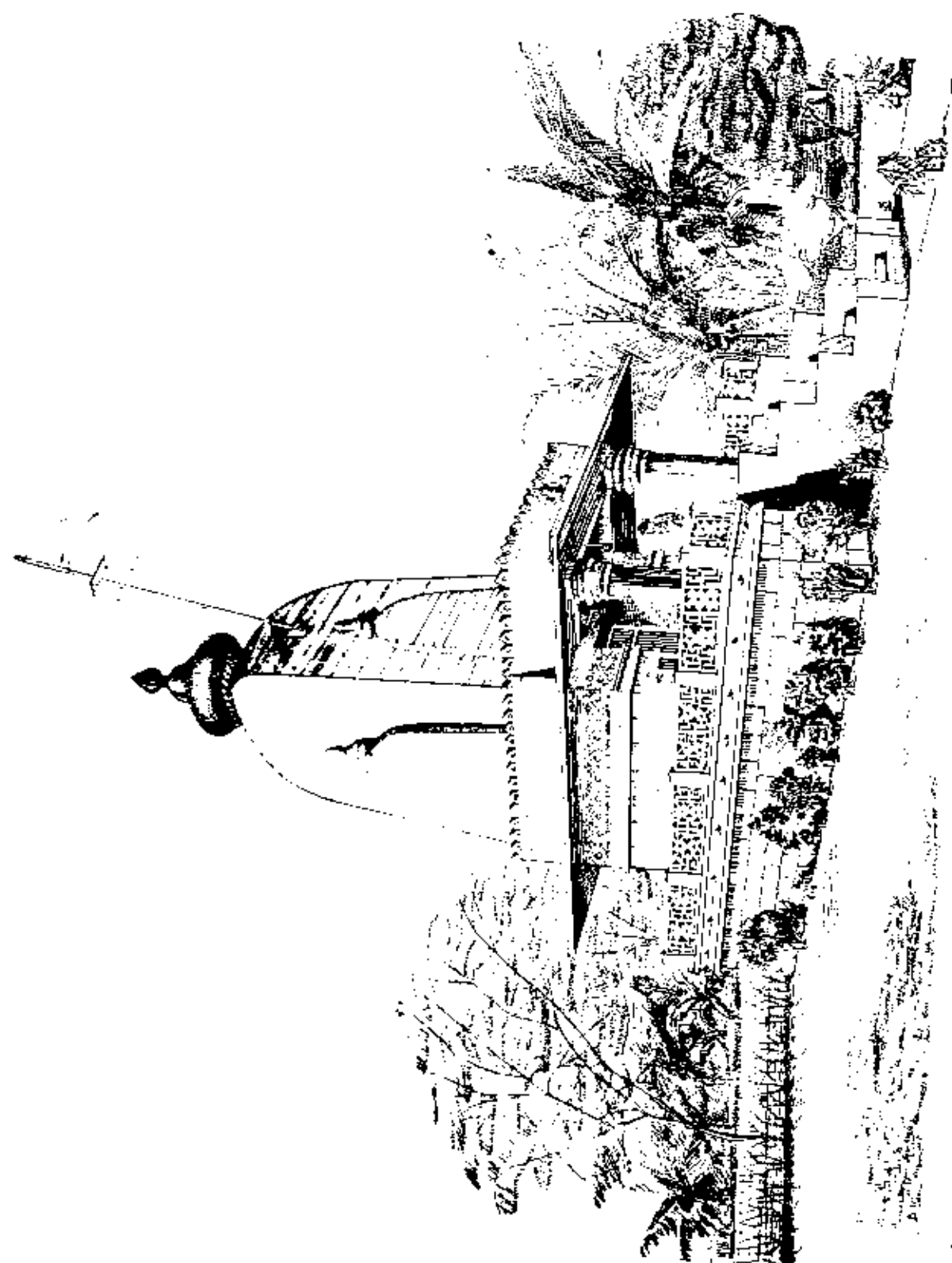
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Lord Chandrasekhur Temple
Bharati's College Campus,
Andheri.

Bhavan's Faith

Let me set forth the Bhavan's faith for the benefit of new students and members, for it is necessary that they should understand it clearly and imbibe its spirit.

The Bhavan strives for the reintegration of Indian culture.

In a world falling to pieces under the impact of an amoral technological revolution, it tries to hold fast to the fundamental values for which our culture stands. RITA, SATYAM, YAGN-4 and UTPAN.

FAITH is the basis of the Cosmic Order;

TRUTH is the accord between mind, word and deed;

DEDICATION which offers all movements of life as an offering to God.

SUPREMACY which purifies the body and soul and transmute passions and emotions into things of beauty.

The great classical norms and doctrines, is Dharma, the three-fold path of Karma, SATYAM, SHIVAM, SUNDARAM

For the sages, our forefathers lived and died. So did Sri Ramakrishna, Paramahansa, Swami Vivekananda, Sri Aurobindo, among the moderns.

Their faith is etched on our national outlook.

We must have the respect of the world because of them.

We must be engaged to the future with confidence only by our own moral quality which gives the power to vindicate the values of this tear-and-avara-ridden age of ours.

We are human family, whether it is the smaller one or the larger one, must make every effort in restoring an awareness of the values in personal and collective life.

K. M. M. K.

OUR KULAPATI



DR. K. M. MUNSHI
When he visited us in 1962.

V



Bharatiya Vidya Bhavan,
Chowpatty Road, Bombay-7.

December 21, 1971.

Message

I am glad that the Sardar Patel College of Engineering is going to publish the College Annual Magazine 'Sarjanika' on the eve of the first Decennial Year of the College. In a short span of time the College has distinguished itself by being considered one of the premier Engineering Colleges. If the College can turn out devoted engineers who will be considered competent and who will be ready to face future with confidence, it will be something for which the College can be very proud of. The students will bring credit to our College when they enter life in whatever position they hold. I wish every success to your efforts and congratulate the students and the staff for their devotion to duty.

Lilavati Munshi

(LILAVATI MUNSHI)
President.



SMT. LILAVATI MUNSHI
President, Bharatiya Vidya Bhavan.



SRI GURDHARULAL MEHTA
Our Vice-President.



SRI JAISUKHLAL HATHI
Off. Vice President.



SRI S. RAMAKRISHNAN
Executive Secretary.

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Editorial

The Seventh Volume of our college magazine "SARJANIKA" is presented to our esteemed readers with a sense of satisfaction and fulfilment of the long felt desire of bringing a good number of Technical articles. Besides there are a few articles on general topics, humorous sketches and cartoons to bring variety and encourage the youngsters to develop their keen sense of observation and literary talents. Our students and staff have shown a great deal of interest and zeal in making this magazine what it is.

THE FIRST DECADE OF OUR COLLEGE

This year has a greater significance in the history of our college. It is ten years back, that the Bharatiya Vidya Bhavan, under the inspiring guidance and advice of our revered Bapaji, Late Kadambari Dr. K. M. Munshi started this college in the most ideal and enviable surroundings of the Bhavan's campus. The college has had the good fortune of having Prof. S. B. Junnarkar, an eminent Structural Engineer, well-known Educationist and above all a Professor of great reputation as the first Principal of this college. The dedicated service of Prof. R. H. Chokhvatia, who succeeded Prin. S. B. Junnarkar, in building this institution in the traditions of the Bharatiya Vidya Bhavan can hardly be forgotten. The present Principal S. S. Dize who is associated with the college right from its inception as Professor and then as Vice-Principal, has made a rich and varied contribution to the growth of this college into a prime Engineering institution in the country.

How we wish, our Bapaji lived amidst us now to guide this institution to still higher and higher pinnacles of glory. But it is said, "Those who live in the hearts do not die." Bapaji still lives in our hearts and continues to inspire us. Let us all rededicate ourselves to strive to achieve and preserve the lofty ideal of this great institution of our Bapaji, "The Bharatiya Vidya Bhavan". This is how we can pay our homage to our Revered Kadambari Late Dr. K. M. Munshi in this 10th year of our institution.

ACADEMIC YEAR 1971-72

The academic year started on 20th June 1971. The Principal P. H. Chokhvatia, before proceeding on leave preparatory

to retirement addressed the students and the staff on 2-7-1971. Prin. S. S. Dighe assumed the office on 9-7-1971. Under the guidance and stewardship of Prin. S. S. Dighe varied activities were conducted during the year.

Elections were held to elect the representatives from among the students to the Gynkhana Committee for the year 1971-72 and Shri Paraminderjit Singh of B.E. (E) class was elected General Secretary, and Shri Kudakia and Shri Urban Lewis were elected Joint Secretaries. Shri Ulhas J. Badakar, General Secretary of the Gynkhana Committee for 1970-71 was selected to represent our college on the University Welfare Board.

ANNUAL FUNCTION

Originally we had thought of celebrating the Tenth College annual day on a grand scale. But the circumstances, calling for austerity on our parts, due to the Indo-Pak war thrust on our country demanded that we should cut down our expenses and contribute our mite to the cause of the Nation. Accordingly our students came forward unanimously with their decision to celebrate the annual day function in a simple manner.

Smt. Lilavati Munshi, our president was our chief guest. She expressed her fond desire to establish the most cordial relationship between the students and teachers of not only of a particular institution but also with those of the other sister institutions of the Bhavan.

The dinner which was prepared under the supervision of students only on the annual day function was very well attended. Smt. Lilavati Munshi and other invitees graced the dinner function and the whole function was reminiscent of the great tradition of the Guru Shishya relation "Sahanavavatu; Sahanau Bhunaktu . . ."

OUR ACHIEVEMENTS

It is needless to repeat here our achievements in the academic and extra curricular activities. The report of our Prin. S. S. Dighe brings out clearly how we have progressed from year to year in our academic records and it is fortunate, our progress has always been graphically an ascending curve. This admirable record is made possible because of the high quality of our students and the untiring efforts and dedicated work of our staff.

Our extra curricular activities make us feel that given the right guidance and opportunity our students can do still better. Although it is known that Engineers and Technicians talk less and work more, we have amidst us a few budding engineers who can do the job of talking equally well. We are proud that

colleague has a good team of debators, elocutionists and essayists.

OUR STAFF

Prof. and vice-principal S. S. Dighe was promoted as principal of the college this year and Prof. J. G. Shah is now vice-principal. Shri V. D. Khatri was promoted as professor and now he is the Head of the Structural Engineering Department. Shri M. C. Shah has been promoted as Asst. Professor of Mechanical Engineering and Shri P. V. Parameswaran as Asst. professor in Civil Engineering. Shri R. M. Joshi has been promoted as lecturer in Civil Engineering and Shri A. Vijaykumar as lecturer in Electrical Engineering. Shri B. M. Gaurahi has been promoted as Office Superintendent.

Many of our staff members have passed the Masters degree in Engineering. Prof. V. D. Khatri and Shri S. M. Sidwani got M. E. in Structures; Shri M. C. Shah and Shri D. K. Chawla got M.E. in Mechanical Engineering; Shri A. G. Mhaskar, Shri M. M. Shah, Shri J. M. Padaria, Shri G. K. Vaidya, Shri A. Vijaykumar and Shri P. K. Viswanathan got M. E. in Electrical Engineering.

Shri J. V. N. Rao, lecturer in Structural Engineering has been sponsored for the doctoral programme at I. I. T. Kanpur. Prof. Dr. J. G. Shah, read the following two papers at the C. D. C. in Electrical Engineering at I. I. T. Delhi.

(i) Inter action between Teaching, Research and Industrial Collaboration.

(ii) Observations on Technological courses and Students Assessment procedure in India.

Shri D. D. Desai Lecturer in Civil Engineering read a paper on "Environmental pollution due to Noise" at the Seminar on Environmental pollution and its control at Baroda.

Prof. M. M. Ranade professor of Mathematics read a paper on "Stability of A Finitely Conducting Liquid Jet in the presence of Magnetic field" at the conference in Theoretical and Applied Mechanics at Allahabad.

Dr. S. S. Mane, Asst. professor in Electrical Engineering has published a paper on "Two New R. C. Frequency Bridges" in the September 1971 issue of the journal of the Institution of Engineers, India, Electrical Engineering Division.

WE WELCOME ALL OUR NEW STAFF

Shri S. R. Chobhavatia has joined our college as Professor in Structural Engg. Shri K. Ramaswamy and Shri S. Bhavani have been appointed as Assistant professor in Metallurgy and Shri S. S. Dighe as Assistant professor in Mechanical Engineering respectively.

Shri V. Nagaraj, Shri N. K. Pannickar, Shri H. K. Suhas and Shri G. V. Yugandhar have joined as lecturers in Mechanical Engineering. Shri R. P. Joshi has joined our structural Engineering Department as lecturer. Shri U. M. Puranjape, Shri O. M. Lemos, Mrs. S. K. Dharia, have joined as associate lecturers in the Civil, Structural and Electrical Engineering departments respectively.

NEW HOPE

With the well equipped Laboratories, Workshop and Library and with well experienced and qualified staff, the regular postgraduate classes in various branches of Engineering can be organised. It is hoped that with the blessings of the Bharatiya Vidya Bhavan, the postgraduate courses come to stay as a well organised regular postgraduate activity of the college.

WE MISS THEM ALL

This year Prin. R. H. Chokhavatia retired after a dedicated service of nearly 10 years in this college. He was associated with this institution right from the beginning as Joint Principal, and later as Principal. As a Principal and Professor in advanced Structural Engineering subjects he endeared himself to many. Only a few can equal him in his devotion to duty and his incessant working nature. We all wish him a peaceful and healthy retired life.

Many of our young staff members, Shri P. V. Joshi, Shri K. D. Desai, Shri S. N. Sidwani, Shri S. P. Savla, Shri P. P. Dagli, Shri R. S. Icengar, Shri N. V. Patel, Shri N. M. Iyer and Shri S. J. Thakkar left our institution seeking better prospects. We all wish them a nice and prosperous career.

ACKNOWLEDGMENTS

We thank all our staff and students for their keen interest in our magazine. We extend our grateful thanks to all those who have contributed articles in the magazine. Our thanks are due to Shri Vijay Churi for the scheme of the cover design and for his excellent cartoons. We record our sincere thanks and appreciation to all our patrons. Our thanks are due to Shri E. K. Warriar, Shri B. M. Gandhi and other office staff for their ready and ever obliging help in the magazine work. We thank the General Manager Shri D. D. Karkaria and his staff in the Associated Advertisers and Printers for all their co-operation in bringing out this magazine.

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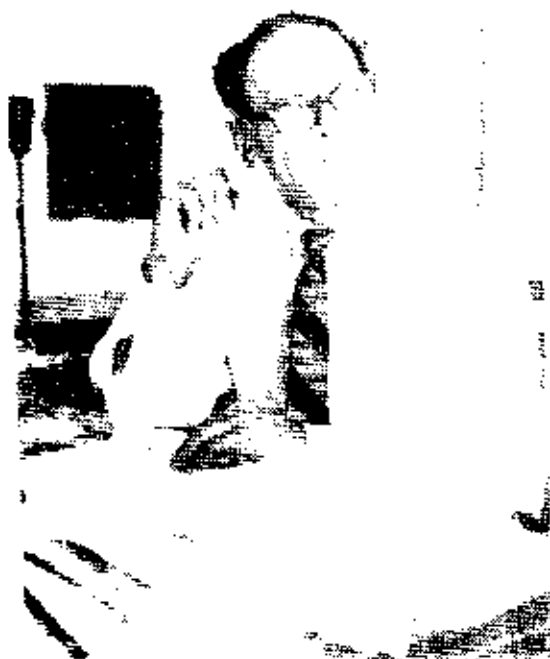
BAPAJI AT THE COLLEGE CAMPUS
[Prim. S. S. Dighe; Dr. K. M. Munshe; Sri S. Ramakrishnan]



Prof. S. B. Jinnarkar
(1922-1997)



Prof. R. H. Chokharyatia
(1904-1997)



Prof. S. S. Dhole
(1921-1997)



H. Chokharyan
1971



Mr. Parminderjit Singh
General Secretary

★



Mr. Pankaj K. Choudhary
1971



Mr. Urban Lewis
Joint Secretary



COLLEGE GYMKHANA COMMITTEE
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Principal's Report

Dr. V. V. Vaidya, Director and General

I am glad to welcome you to the 10th Annual College Report. In the light of celebration of the 10th Anniversary of the College on a grand scale, it is God's will that we should be amongst the first and second when India is celebrating its 50th birthday. I am glad that we set down this report to the Government in tiding of progress, expecting that it will be of use to them.

It is my part to mention that the college is well known in many parts of this country as well as abroad. The Bharatiya Vidya Bhavan is extremely alive in its work for students and in its scheme to organize 200 students and teachers in the Bharatiya Vidya Bhavan.

The college has a record of 10 years of the college on the basis of the principle of report and a standard book of achievements and failures and in the future engage the se-

views of a statistician who would surely show every facet of your firm an achievement with the use of his special probability formula."

However, to-day we have our President to be our Chief Guest and she knows this Institution so intimately that it is not necessary to resort to any subterfuge. She knows how this institution has grown up from a small beginning. She also knows very well that during these ten years we have surpassed many of the contemporary institutions and we have come shoulder to shoulder with institutions that have been established more than 100 years ago. The credit for this surely goes to the dedicated zeal with which the Staff and Students are working in our Institutions and to the ideals that Bhavan has always placed before us.

The construction work of the main building is now complete and the work of the building of the South Wing of the Hostel is in full swing. The total expenditure up-to-date has been Rs. 87,48,377 - in which the Government of India has spent Rs. 32,14,140 - in addition to a loan for Hostels of Rs. 10,46,000 - the Government of Maharashtra Rs. 20,76,837 - and Bharatiya Vidya Bhavan Rs. 24,11,000 -.

It would be very instructive to see the number of Engineers that have graduated from this Institution year-wise from 1965 onwards:

TABLE 1

	1965	1966	1967	1968	1969	1970	1971	Total
1	46	50	47	30	44	252		
2	84	79	51	62	80	423		
3	70	70	41	50	84	349		
4	200	199	139	142	208	1024		

It will be seen from above that during the seven years i.e. from the year the first batch of B.E. graduated to 1971, 1024 Engineers have passed out, out of which 200 had obtained First Class Honours.

A big number of these engineers have

distinguished themselves abroad and when they write about this Institution with love and admiration, we feel the fulfilment of our mission in life

The results for this year are as follows:

TABLE 2
Combined results of April & October 1971 examinations

Class	No. of student appearing	1	Passed II	P	Total	Percentage
E. E.	206	19	108	48	165	80
S. E. (C)	57	-	17	32	49	86
S. E. (M)	75	10	44	17	71	95
S. E. (E)	80	2	25	48	75	94
T. E. (C)	45	1	33	8	42	92.5
T. E. (M)	78	31	37	8	76	97.4
T. E. (E)	85	10	53	14	77	90.5
B. E. (C)	44	17	26	1	44	100
B. E. (M)	80	43	37	-	80	100
B. E. (E)	90	37	46	1	84	93

The results are very good, one of the reasons being the introduction from this year of a modified Semester System in engineering courses.

We had also a record number of students passing the Master's Degree in Engineering this year:

- 2 got it in Structural Engineering
- 3 got it in Mechanical Engineering
- and 3 got it in Electrical Engineering

A number of awards and scholarships are available to our students. This year the Kulpati's Gold Medals are awarded to:

1. Shri S.K. Idnani, B.E.(M), as the Best all round student of the College for the year 1971-72.
2. Shri R.P. Jari, B.E.(C), for securing the First class and the highest

number of marks in April 1971 examination.

3. Shri N.P. Eklahare and Shri P.G. Deshpande, for securing the First class and the highest and equal number of marks in B.E.(M) in April 1971 examination.
4. Shri B.K. Rupani and Shri A.N. Modak, for securing the First class and the highest and equal number of marks in B.E.(E) examination in April 1971.

For standing second in the respective branches the following students have been awarded Kulpati's Silver Medals:

1. Shri D.S. Sanghavi, T.E.(M), being the Second Best all round student of the year 1971-72.
2. Shri S.S. Thate, B.E.(C), Shri R.M. Parsanpuria, B.E.(M), and Shri P.D. Pradhan, B.E.(E), all of

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tion with love
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are as follows:

Total	Percentage
85	80
49	86
71	95
75	94
42	92.5
76	97.4
77	90.5
44	100
50	100
54	93

April 1971 exa-

and Shri P.G.
ing the First
and equal num-
(M) in April

and Shri A.N.
the First class
equal number of
examination in

the respective
ents have been
als:

T.E.(M), he-
round student

E.(C), Shri R.
E.(M), and
E.(F), all of

having secured the First class in
B.E. Examination and stood Second

Prize in Mathematics: Kinariwala Prize:

Shri A.N. Kinariwala, S.S. (E) and
Shri S.P. Parekh, S.E. (E), for be-
ing the students with the highest
number of marks admitted to S.E.
E

2. Shri M.P. Shah, T.E. (F), for being
the student with the highest number
of marks admitted to T.E. (F)

3. Shri A.B. Kasabwala, B.E. (E), for
being the student with the highest
number of marks admitted to B.E.
E

4. Shri B.A. Rajani, B.E. (F) and
Shri S.A. Mahesh, B.E. (F), for
being the B.E. (E) Examination
with the highest number of marks.

Prize in Science: Kinariwala Prize:

1. Shri Bhargava A.Z. T.E. (C).

Prize in English: Kinariwala Prize:

1. Shri Bhargava A.Z. S.E. (E).

Prize in History: Kinariwala Prize:

1. Shri Bhargava S.S. T.E. (M).

2. Shri Bhargava S.K. S.E. (E).

Prize in Music:

1.

1. Shri Bhargava A.Z. P.

2. Shri Bhargava S.J.

S.E.(C) :

1. Shri Parekh J.A.
2. Shri Gala Laxmichand M.

S.E.(M) :

1. Shri Parekh Bharatkumar K.
2. Shri Dighe S.S.

S.E.(E) :

1. Shri Kinariwala V. and Parekh S.P.
2. Shri Desai Ajay M.

T.E.(C) :

1. Shri Kasabwala J.B.
2. Shri Kulkarni S.M.

T.E.(M) :

1. Shri Singhavi D.S.
2. Shri Kale S.L.

T.E.(E) :

1. Shri Shah M.P.
2. Shri Shikhare D.M.

B.E.(C) :

1. Shri Shah D.M.
2. Shri Churi V.N.

B.E.(M) :

1. Shri Idnani S.K.
2. Shri Mody R.J.

B.E.(E) :

1. Shri Kulkarni A.B.
2. Shri Daruwala H.P.

The Semester System does not leave much
time for extra curricular activities, even
then our students participated in number of
competitions dealing with sports, drama and
elocutions.

Our team consisting of Shri D.M. Chandvadkar and Shri G.G. Vaidya won the Podar College Debating Trophy for the third year in succession. Shri G.G. Vaidya obtained the third prize at the competition. Shri D.M. Chandvadkar got the second prize in the Elocution Competition held by Youth Club of Juhu Junior Chamber. Shri V.R. Nadkarni obtained first prize and brought for the college the Silver Trophy of Panditrao Memorial Elocution Competition held at Thana. He also won the first prize and the team brought the Shield and the

Silver Trophy at Shri Nana Patkar Elocution Competition held at Vile Parle.

Our teams have also won prizes at Barrister M.S. Sirdar Debating Competition held at Sholapur and Dr. Hivali Trophy Competition held at Ahmednagar.

At the Public Health and Housing Department of the Government of Maharashtra, Shri D.M. Chandvadkar won the First Prize of Rs. 200 in the Elocution Competition. He spoke on Population Education Programme.

* * *

THOUGHT FOR THE DAY

The need of the present-day is to have good leadership in every walk of life.

THE LEADERSHIP DEMANDS :

1. IMAGINATION :
A clear vision for realising the objective of the work.
2. KNOWLEDGE :
Technical know-how of the work.
3. ABILITY :
To organise skillfully all the activities according to day to day requirements.

4. DETERMINATION :

The will to accomplish the work at the proper place and time even in the face of odds.

5. PSYCHOLOGY :

Inspiring and tactful handling of men developing team spirit, rather than individual ego.

6. MAGNETISM :

Develop a sense of indispensability and a sense of usefulness to the organisation.

..... Parkin

* * *

circuits or instruments he has developed, be supervised by him directly until it is placed on assembly line in a perfected condition.

The above concise comments place doubtlessly into evidence, the interaction between teaching, research and industrial collaboration. I shall however, limit my observations to the electronics industry with which I am required to be in contact because of my specialization.

The teaching and revision of courses in electronics poses a challenge which is not felt by other disciplines, because of the very rapid developments in electronics. Research in electronics also faces interesting possibilities because of new products which are being developed almost everyday. The industry in electronics is still caught up in discussion as to whether electronics products and equipments must be handled by small scale or large scale industries.

The students trained in electronics subjects are usually capable of thinking on higher level, but may not be aware of the wide range of products available and being placed in the market in continually improved varieties and ratings. On the other hand, those who are aware of the availability of components, (fantastically cheap components are available from disposal stores) are experienced enough to run the assembly line of products like radios, and other electronic devices of day to day requirements, so that there arises a mutual distrust between the small entrepreneur and trained electronic personnel. The trained person in electronics thus tries hard to set up a personalized industry, in which he himself is everything, but hardly able to compete with that slightly experienced entrepreneur probably either because of his knowledge of availability of cheap components, or because of his being in possession of import licence quotas.

Research facilities available in electronics industry also seem to be limited to large scale industries, and also limited to copying out circuits published long back or given by the foreign collaborators. I would like to cite here one of my own experience. Our college undertook a project sponsored by the Defence Ministry, Government of India, to develop "a potentiostat" that would handle currents upto 2.5 amps. as a laboratory model to study the chemical reactions especially corrosion study. Two models, one of 100 ma range and another of 2.5 amps range have been delivered recently under this project to DRI. (M) Kanpur of the Defence Ministry, fully transistorized and using almost all indigenous components except a couple of Zener diodes. I learn that two other very similar potentiostats imported by Government departments are lying idle, because they could not be set up by the concerned departments, the equipments having been received with some components in damaged condition. I also learn that the personnel at National Chemical Laboratories at Poona are still busy assembling the 100 ma tube model which was reported long back in literature. We started with this reported model, and designed, developed and assembled and delivered fully transistorized potentiostats and even extended its range. I would even like to suggest that such research projects may be farmed out to three or more institutions and laboratories, so that a broader range of thinking is set to work, and more economic and perfected equipment results. Research facilities available to small scale industries is almost nil, and although cooperative research association in electronics has been attempted, and small scale industries development corporation tries to extend whatever help possible to such research association, it has not yet been placed on sound footing. As a matter of fact, I left my job at Vallabh Vidyunagar, which has a standing of sixteen years, because I felt

in electronics limited to large limited to copying back or given I would like experience. Our sponsored by Government of India, that would groups, as a laboratory chemical reactions Two models, another of 2.5 delivered recently (M) Kanpur of fully transistorized components diodes. I learn potentiostats departments are should not be set up ents, the equip- with some com- on. I also learn National Chemical still busy assem- el which was re- ure. We started and designed, de- delivered fully and even extend- like to suggest may be farmed- tions and labor- range of think- ere economic- ults. Research- scale industries- h cooperative re- tronics has been- industries deve- to extend what- h research asso- en placed on- er of fact, I le- agar, which ha- because I fe-

to take up the challenge to electronics research asso- at our campus at Andheri, serving the industries in electronics. The conference which met in Bombay has tried to difficulties in electro- sufficient progress is not The courses in electronics are a very limited number of in- the equipment required for these courses is usually costly, Government directly or indirectly technological institutions. It India Council for Education has issued a directive Engineering be offered at only

selected institutions. This is, of course, desirable to restrict unemployment possibilities among those trained in electronics.

Let us all realize that in modern times, any research that is worth its name is the result of cooperation among teams of workers, not only of engineers of one discipline, but engineers of all other disciplines as well as physicists, chemists, and mathematicians, and also technicians. Likewise also education is a process that not only benefits those who are taught but also the teachers and industry especially in the form of feed back to the institutions and a large feed back is expected to be generated by the teachers working in collaboration with the designers and testers in industries.

★ ★ ★

Truth is my Worship.
Form is my Manifestation.
Grace is my Guide. Peace is my
Experience is my School. Obstacle
Difficulty is my Stimulant.
Pain is my Warning.

Work is my Blessing. Light is my Realiza-
tion. Nature is my Companion. Adversary
is my Instructor. Neighbour is my Brother.
Struggle is my Opportunity. Future time is
my Promise. Order is my Attitude. Beauty
and Perfection is my Life.

* * *

the habit of not
from a book once in
what has just
I can't understand it.
I can't understand

it, throw the book down, and try to find
the answer in another book. It is what I
call 'active reading'.

—Lin Yu Tung

* * *

SYSTEME INTERNATIONAL D'UNITS

By

PRO. L. L. BHIRUD, Head, Department of Civil Engineering

SI stands for *Système International d'Unités* (French words) meaning International system of Units. It is an improved version of the present metric systems of units. It came into being at the Eleventh General Conference of Weights and Measures held in October 1960. The General Conference of Weights and Measures (an English equivalent of the original French name *Conférence Générale des Poids et Mesures* abbreviated as CGPM) is an international authority for prescribing definitions for fundamental units of weights and measures. In 1962, the recommendations of the CGPM were endorsed by the International Organisation for Standardization (ISO) of which our Indian Standards Institution (ISI) is a member.

In the world today, about 90 per cent of the people use the metric system of units. As SI is an improved version of the present metric systems it is bound to be very popular in the world very soon. Many countries, including ours, have already accepted it and some have passed necessary legislation too. Even a country like the United Kingdom that was following the British Foot-Pound Second system for centuries has taken steps to switch over to SI fully by 1975.

The SI units fall under the following three categories:

1. *Base or basic units:*

These are the arbitrarily chosen units for measuring certain physical quantities. They are given in Table 1. For definitions please see Appendix.

2. *Supplementary units:*

These are two dimensionless units prescribed for measuring angles, plane and solid. As angle can be expressed as a pure number, these units are redundant. They are however recommended for clarity. They are given in Table 2.

3. *Derived units:*

These follow from the combination of the basic units. They are shown in Table 3.

Recommended Prefixes:

Quantities in nature vary in magnitude from very very small to very very large, both beyond imagination. To facilitate the measurement of magnitudes spread over such a vast field, certain prefixes have been recommended for use with the above units. These are given in Table 4.

Advantages of SI over other systems:

SI is a comprehensive system of units covering all branches of study such as commerce, science, engineering, technology etc. Hence it is useful for measuring physical quantities in all the fields of activity in the whole universe.

It is coherent. In a coherent system, the product or quotient of any two unit quantities gives the unit for the resultant third quantity thus avoiding confusion and at the same time simplifying calculations. For example, if metre is a unit of length, square metre (1 metre $\times$ 1 metre) becomes the unit of area in a coherent system. The units square yard, square centimetre, square kilometre do not satisfy this requirement and hence are not coherent and so not prescribed in SI.

UNITS

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the magnitude of forces working in nature. The unit kilogram force was comparatively more convenient. This is not, however, a serious matter for newton can always be prefixed by k, M, G and T to measure big forces.

Engineers accustomed to think in terms of force units kilograms, kip etc., will have to formulate new concepts in terms of the new unit. They will also have to discard the concepts of pressure head, energy head etc.

The second moment of area of structural units in engineering works out to be very small in m^2 and very small in $(mm)^4$. Engineers will find it difficult not to express it in cm^4 .

Some points in connection with the SI units.

1. The symbols specified for the various units are mandatory. No modifications are permitted. For example, for second, write s not sec.
2. Note the use of small and capital letters for the symbols, and write accordingly. Write m for metre, not M.
3. Note that full names of units named after the scientists begin with small letters, e.g. joule, kelvin, newton etc. But the symbols for such units have a capital initial letter, e.g. J, K, N etc.
4. Do not add 's' to the symbols to indicate plurality. Write 10 metres as 10 m and not 10 ms. The symbol s is reserved for the unit second.
5. Use of full stops or other punctuation marks is not permitted in writing symbols or the name SI, e.g. write 10 m not 10 m., 10 N m not N m, SI not S.I.

6. Leave single space between a numeral and symbol or between two different symbols as

$$10 \text{ N m} \quad 10 \text{ cd sr} \quad 10 \text{ J s}^2 \quad 10 \text{ w/m}^2$$

7. Use the solidus (/) as few times as possible. It is not necessary to leave single space when a solidus separates two symbols.

$$\text{Write } 10 \text{ W sr} \text{ instead of } 10 \text{ W sr} \\ 10 \text{ V} \quad \quad \quad 10 \text{ W A}$$

8. Use of exponential term is preferred to solidus. Get used to write ampere per metre as A m^{-1} instead of A/m though the latter form will be preferred by industry.

9. Use a bracket to write two different symbols appearing in the denominator separated from the numerator by a solidus.

Write joule per kilogram kelvin as J (kg K) instead of J kg K , or better write it as $\text{J kg}^{-1} \text{K}^{-1}$.

10. As mentioned later the measurement of angles in degrees, minutes and seconds, i.e. non-SI units is permitted. In writing such measurement single space need not be left between the numeral and symbol. Thus writing like $20' 30''$ is permitted.

11. Note that the symbols for the units are written in upright letters. Hence, write algebraic symbols denoting physical quantities in italics. Thus write W for weight, v for velocity etc.

12. Do not use comma in writing long arithmetic numbers. Instead, break up the number in groups of 3 digits starting from the unit digit. For numbers having a decimal point, start from the decimal point and move away from it, either to the left or to the right to break into groups. Sepa-

rate the consecutive groups either in the integral part or the fractional one by a single space. Examples:

12 345

123 456.78

1 234 567.123 456

If a number does not contain more than 4 digits either in the integral or fractional part of a number, it may not be broken into groups. Example:

1234 1234.1234 0.1234

Similar exception is made for writing standard specification numbers, e.g. IS 1234-1971.

13. The decimal point in the metric dimensions on engineering drawings may be replaced by a comma. This convention is yet to get international recognition.

14. As far as possible avoid the use of prefixes deci, centi, deca and hecto; use only $10^{\pm 3n}$ as the multiplier of the fundamental unit where n is an integer. This means, the popular unit centimetre will have to be discarded.

15. The prefixes mentioned in Table 4 are recommended for use only for SI units and not for non-SI units.

16. Avoid the use of double prefixes. Write gigametre (Gm) instead of kilomegametre (KMm); write nanosecond (ns) instead of millimicrosecond (mMs).

17. Do not leave single space between a prefix and the symbol of the fundamental unit. Write millimetre as mm and not as m m.

18. Note that the symbol kg for kilogram, the basic unit of mass, already contains the prefix k; hence do not prefix kg with other prefixes. As

groups either in the fractional one (examples:

do not contain more than the integral number, it may be groups. Example: 1234

made for writing numbers, e.g.

in the metric engineering drawings a comma. This get international-

avoid the use of deca and hecto; the multiplier of where n is an is, the popular have to be dis-

used in Table 4 for use only for SI non-SI units.

double prefixes. (Gm) instead of (mm); write nano-

space between a of the funda- millimetre as mm

kg for kilo- of mass, already k; hence do not prefixes. As a

use those prefixes with g. For example, write mg for one millionth of a kilogram and Mg for one thousand kilograms.

It is preferable to attach the prefix to the numerator than to the denominator. Thus pressure should be expressed in MN m⁻² instead of in mm⁻².

It is permissible to use, at least for some time to come, the popular internationally recognized units and notation. Examples:

year, month, day, hour, minute and second for measurement of time

degree, minute and second for measurement of angle

Use degree Celsius (°C) for measurement of temperature. Note particularly that the temperature intervals in the Celsius and Kelvin scales are identical, the correspondence between the two being

$$t/^\circ\text{C} = T/\text{K} - 273.15$$

Note also that, even though the Celsius scale is the same as the old Centigrade scale, use of degree Centigrade is not permitted. In France centigrade is still a standard for measuring angles, the relation being

$$1 \text{ grad} = 0.9 \text{ degrees} \\ 1 \text{ grad} = 100 \text{ centigrades.}$$

Note the difference in the symbols °C and K; it is wrong to write °K in SI.

Use of kilometre per hour is permitted.

Use of litre to measure volume. There is no change in

the definition of litre. Now litre is equivalent to cubic decimetre. It has been recommended that volume should not be expressed in litres in high precision work.

21. Frequency is now measured in hertz. Thus 10 hertz means 10 cycles per second. Cycles are counted in pure numbers. Hence hertz is s⁻¹. Symbol Hz replaces the words cycles per second used previously.

22. The unit of torque is the same as that of moment, i.e., newton-metre (N m).

23. Pressure is measured in N m⁻². This unit is called a Pascal abbreviated as Pa. Thus

$$1 \text{ Pa} = 1 \text{ N m}^{-2}$$

In fluid mechanics pressure need no more be indicated in an equivalent head of water or other liquid, like say metres in water etc.

24. In SI, the word specific used before a physical quantity means 'per unit mass'. Specific gravity refers to 'unit weight' and not 'unit mass'. Hence specific gravity need no longer be used in SI. If necessary use relative density. Best is to use actual densities in the problem.

25. The term 'specific heat' is replaced by a more meaningful term 'specific heat capacity'. It means, as before, heat capacity per unit mass.

26. As latent heat refers to 'unit mass' it is now called 'specific latent heat'.

26. In heat, the term 'power' is replaced by a more meaningful term 'rate of supply of heat'. It is measured in watts.

27. Specific volume means mass per unit volume. It is therefore the reciprocal of density.

28. Specific charge (electric) means charge per unit mass. It is measured in coulombs per kilogram.

29. In fluid mechanic the total energy of a body of fluid of mass m in kg, having a density ρ in kg m^{-3} at an elevation of h metres above an arbitrary datum, moving with a velocity of v metres per second under a pressure of p newtons per square metre is given by

Elevation energy $\quad mgh \quad \text{joules}$
 Pressure energy $\quad \frac{mp}{\rho} \quad \text{..}$
 Kinetic energy $\quad \frac{1}{2}mv^2 \quad \text{..}$

The expressions for energy per unit mass become

Elevation energy
 per unit mass $\quad gh \quad \text{joule/kilogram}$
 Pressure $\quad \frac{p}{\rho} \quad \text{..}$
 Kinetic $\quad \frac{v^2}{2} \quad \text{..}$

These expressions may be used in the Bernoulli's equation.

30. In engineering the loads on structures may be calculated in kN. Loading intensity may be expressed in kN m^{-2} . Express wind pressure in N m^{-2} , bearing capacity of foundation materials in kN m^{-2} , modulus of elasticity in MN m^{-2} , strength of concrete cubes in MN m^{-2} etc.

31. Express wave length of light in nanometres.

32. Express sound intensity, the power emitted through unit area, in microwatts per square metre, acoustic impedance in ohms (SI unit).

33. In electrolysis, express the electrochemical equivalent in kilograms per coulomb (kg C^{-1}).

34. In electricity and magnetism, express
 Permittivity of free space in picofarads per metre.
 Permeability of free space in microhenries per metre.

TABLE 1
BASE UNITS

Unit	Name	Symbol
Quantity	Unit Name	Unit Symbol
Length	Metre	m
Mass	Kilogram	kg
Time	second	s
Intensity of electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol (to be approved)

Note 1:

- Use of degree kelvin or $^{\circ}\text{K}$ instead of simple K above for denoting thermodynamic temperature is not allowed.
- Unit mole does not form part of the 6 base units recommended by the General Conference of Weights and Measures in October 1960.

TABLE 2
SUPPLEMENTARY UNITS

Quantity	Unit Name	Unit Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Note: that both these units are dimensionless.

TABLE 3
DERIVED UNITS

Quantity	Unit Name	Unit Symbol or Symbols
Area	square metre	m^2
Volume	cubic metre	m^3
Frequency	hertz	Hz
wave number	1 per metre	m^{-1}
Velocity	metre per second	m s^{-1}
Acceleration	metre per second squared	m s^{-2}
Angular velocity	radian per second	rad s^{-1}

TABLE 3
DERIVED UNITS (Contd.)

Unit Name	Unit Symbol or Symbols
radian per second square	rad·s ⁻²
kilogram per cubic metre	kg m ⁻³
newton	N kg m s ⁻²
newton per square metre or Pascal	N m ⁻² Pa
newton second per square metre	N s m ⁻²
square metre per second	m ² s
joule	J N m
watt	W J s
joule per kelvin	J K
joule per kilogram kelvin	J (kg K)
watt per metre kelvin	W (m K)
coulomb	C A s
volt	V W/A
volt per metre	V m
ohm	Ω V/A
farad	F A s V
weber	Wb V s
henry	H V s/A
tesla	T Wb m ⁻²
ampere per metre	A m
ampere	A
lumen	lm cd sr
candela per square metre	cd m ⁻²
lux	lx lm m ⁻²
watt per steradian	W sr
1 per second	s ⁻¹

TABLE 4
RECOMMENDED PREFIXES AND SYMBOLS

Power of 10	Prefix	Symbol
10 ¹²	tera	T
10 ⁹	giga	G
10 ⁶	mega	M
10 ³	kilo	k
10 ²	hecto	h
10 ¹	deca	da
10 ⁻¹	deci	d
10 ⁻²	centi	c
10 ⁻³	milli	m
10 ⁻⁶	micro	μ
10 ⁻⁹	nano	n
10 ⁻¹²	pico	p
10 ⁻¹⁵	femto	f
10 ⁻¹⁸	atto	a

APPENDIX

Definitions of Base Units (as recognised by the CGPM)

Metre

The metre is the length equal to 1 650 763.73 wavelengths in vacuum of the radiation corresponding to the transition between the levels $2p_{1/2}$ and $5d_{3/2}$ of the krypton-86 atom.

Kilogram

The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram.

Second

The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom.

Ampere

The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed one metre apart in vacuum, would produce be-

tween these conductors a force equal to 2×10^{-7} newton per metre of length.

Kelvin

The kelvin, unit of thermodynamic temperature, is the fraction $1/273.16$ of the thermodynamic temperature of the triple point of water.

Candela

The candela is the luminous intensity, in the perpendicular direction, of a surface of $1/600\,000$ square metre of a black body at the temperature of freezing platinum under a pressure of $101\,325$ newtons per square metre.

MOLE (Definition proposed)

The mole is the amount of substance of a system which contains as many elementary units as there are carbon atoms in 12 (or 0.012 as may be decided) kilograms of carbon-12. The elementary unit must be specified and may be an electron, a photon, an atom, a molecule, an ion, etc., or a specified group of such entities.

★ ★ ★

It is nice to be important and it is equally important to be nice.

- George Washington

Culture is the cream of conduct.

It is the sure result of the study.

Habit linked to self reliance and blessed bon concentration.

Albert Hubbard

✱

Culture is that complex whole which includes Knowledge, Belief, Art, Morals, Law, Custom, and any other capabilities acquired by man as a member of the society.

- E. B. Taylor

Observations on Technological Courses and Student Assessment Procedure in India

by D. J. G. SHAH Presented at CDC in Elec. Eng. at I. I. T., Delhi.
Prof. and Head Elec. Engg. Deptt.

Technological courses in almost all institutions in India, are primarily based on the recommendations made by the Council of Technical Education. The subjects in each year of study are prescribed in each subject. The course is prescribed from the point of view of uniformity and enabling at least a large percentage of student population to move from one institution to another. The course is prescribed from the point of view of teaching and local conditions. The course is prescribed from the point of view of the needs and variations in the subject matter and the topic contents at each stage. The present trend which is also obtaining in the teaching deeper roots, is towards specialization. This trend towards specialization is leading to the offering of increasing number of courses pertaining to one subject and as bifurcation of students in different disciplines. This is desirable when they join a technical institution which is found more suitable for their specialization purposes. However, the present trend is to postpone the bifurcation of students into specialities, since the feeling is that our country is not yet ready for specialization. This may also be desirable from the point of view of the candidates earning a degree. I would like to observe one feature in the structure of our society. It is that a degree from a candidate is not sufficient for a job to him, without considering whether the job offered necessitates a degree. However, it is found that most of the jobs in which degree holders are employed do not necessitate a degree, and they have to spend extra time and

money on training again a candidate for a given job. The institutions of higher learning must envisage the technological developments in next five years to come, and revise their courses about every five years to bring within its purview the technological advances which are now taking place very rapidly. In the developing country of ours, institutions cannot afford to train their students for the requirement of a particular industry, using probably out dated technologies. This fact also stresses the need for interaction between teaching, research and industrial collaboration.

I should like to initiate these observations by defining engineering as a profession that aims at application of fundamental laws of physics and mathematics to the best use of the materials available. Thus physics and mathematics and material science must form the foundation on which the study of engineering must be based, and the topics which are most fundamental in these subjects must be chosen by engineers who will teach the engineering students to prepare them for application of these laws, for betterment of life and development of ever new types of materials wherever they are available. Engineering students must also be well prepared to increase their manoeuvring ability to tackle a problem both physically and mathematically and think out the solution of a problem both from local as well as national and international points of view.

The first one or two years in most of the technological institutions are thus devoted to the teaching of physics, chemistry and

mathematics, including rather basic one or two topics of engineering importance in these years. It should also be possible to select some fundamental topics in each discipline or technology, and the depth to which each student of engineering must learn these topics, so that he has the awareness and facility of inter-disciplinary applications. These topics may as well form the curriculum in the year after a student has had adequate grounding in the above sciences. For example some chosen topics and the depth to which each student must learn them, in each of the subjects of electrical engineering, namely, electromagnetic fields, electrical circuits, electrical machines, electronics, electrical and electronic measurements, power supply systems and computers, must be laid down in the curriculum for the first two years of engineering studies. These courses must also be offered for those not majoring in electrical engineering. One year may be devoted to these and more advanced topics and reaching into further depths for those students majoring in electrical engineering. There has been a thinking in direction of instituting a simple degree after three years, after which the students must be required to go into industry of their own choice and work there at least for two years. Those students who aspire to become designers, or work in research organisations, may join back the college for an honours degree. These students must be required to be sponsored by an industry, and will be undergoing advanced and specialized courses, leading to design procedures, and research methods. Another line of thought is in the direction that each engineering student should be required to undergo a period of training during his vacation period and before graduation, so that his total period of training should not be less than two years. It must, however, be emphatically recommended that such a training must be duly supervised by at least two persons, one staff from the college, and one

staff from the industry who will mutually work out a training programme for the students. In some institutions, such a "Sandwich" training programme is being implemented on a voluntary basis, since all the students cannot be accommodated in such a sandwich training programme. On the other hand, college may institute their own training programme for some selected students within the college itself. This training does not seem to have found unqualified favour among the students and among the industries, nor does it seem to have produced the desired training because such a training does cost appreciable amounts of money. And unless the government, industries and institutions arrive at tripartite agreement in meeting this huge cost of training, it is feared that making such a training compulsory will lead to wastage of colossal amounts of money and energy and materials. Therefore it should be emphatically recommended that proper supervision must be provided in this training programme, so that we would obtain the utmost results after having spent such large amounts of money, energy, and materials.

The curriculum material may be prescribed from two or three easily available textbooks. It may also be written out by senior staff members in the form of cyclo-styled notes especially for laboratory work. The students may then be introduced to tackle problems in a practical way in the form of tutorial classes. However, a large team of tutors and students, guided by very experienced teachers, is necessary to make the tutorial system a success. A central organisation may be set up that will invite eminent teachers and engineers to prepare lecture notes for prescribed topics and these lecture notes may be presented to large classes by tape recorder or closed circuit televisions.

The present implementation of the

who will mutually programme for the institutions, such a programme is being on a very basic, since all are accommodated in the programme. On May institute their for some selected college itself. This have found on the students and it does it seem desired training they most appreci-

And unless the institutions are in meeting this is feared that making a story will lead to loss of money and Therefore it should be added that proper added in this training would obtain the thing spent such energy, and mate-

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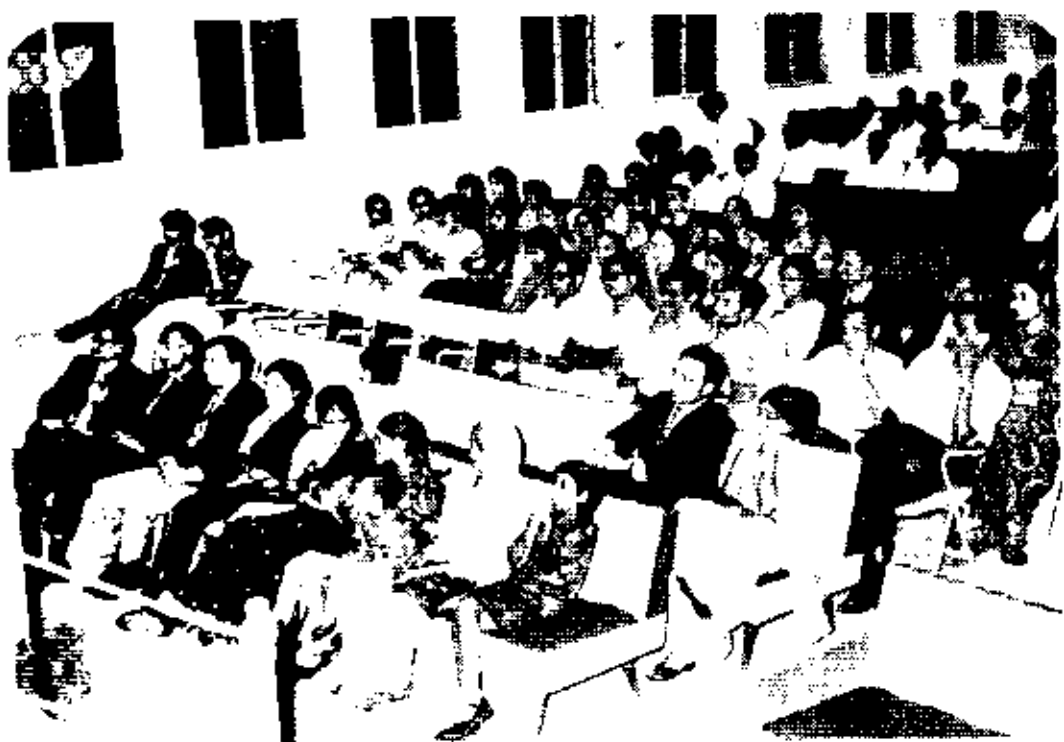
College Annual Function



President and guests being led to the function



A SECTION OF THE GATHERING



Another View of the Gathering



Principal welcoming the Guests



President Smt. Likhavi Munchi addressing the gathering



Vote of Thanks



Respect to National Anthem



Guests bidding good-bye to the audience



...that system is technological in-
...from a basic drawback.
...a student undergoes a course in any
...and fails to come up to a minimum
...paper necessary for him in that
...at the desired level, he
...to rely on his own at-
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ly relied upon for evaluating the students only on sessional assessment. But one thing must be stressed here that for evaluating the students for practicals and term work, no more satisfactory method of assessment can be found than that in which the students' work in the laboratories is assessed during the full period of the course in laboratory work, by the staff handling the laboratories. I have already stated elsewhere that laboratory work material should be written out in the form of cyclostyled notes by senior staff members, who can supervise this assessment procedure, for which the actual staff members handling the laboratories may be made responsible.

More serious research seems to be desirable on the following lines. I suspect that when the university announces a minimum number of marks required for passing a given course, it has two effects. Firstly, the students merely aim only a slightly higher than this minimum for passing. Secondly, the examiners tend to average out the performance of the students, and assess the answer books so that the average falls slightly above the minimum required for passing. The problem for research would be to study whether the students would aim at a higher performance or not, than at present if the university did not declare a minimum percentage for passing. My personal impression is that the higher I Q students, who are normally admitted to engineering courses, would in general aim at a higher performance than at present, since they will not be limited by the idea of a minimum percentage required for passing, although my suspicion is there that the lower I Q students may drop down in their performance under this new procedure. If this method of assessment is adopted, the examiners will be required to present to the university after assessment of the answer books, a distribution curve of the marks obtained by the candidates. This would be very scientific at least if the number of can-

didates is large. A committee would then go into the details of this distribution curves, submitted by various examiners; consider whether the distribution is a normal distribution, and then formulate the result in any one subject after arriving at the class average. This method is expected to result into a higher overall performance of the candidates, since all of them have to work harder to come up above the class average, which itself gets pushed up because of their hard work. Secondly, if any particular paper has been difficult, or any particular examiner has been very strict in his assessment, the result would not be discouraging, since the class average would be low enough to permit a sizable percentage of candidates to pass out.

I do believe that the assessment procedure should be so organized as to remove the fear of examinations in the candidates, so that they should study their subjects on a broader base than is required for the limited syllabus in a course. The elements of luck and uncertainty in an examination should also be reduced to a minimum and completely wiped out if possible.

In view of the above aims, I would like to stress that the sessionals do help quite a bit in removing the fear complex of the exams from the students. Procedure may also be investigated by which students' performance may not be made to depend on only one or two examinations. From this point of view, I strongly recommend that some form of weightage may be worked out for performance in all the courses studied by a candidate in a technical institution.

Many institutions have already introduced some form of weightage for the four or five years' performance of a student in a technical institution. Many others have introduced supplementary examination system or various forms of A.T.K.T. system so that a student's whole year is not wasted. Still many others have a system by which the class is awarded on the performance of the student in the final year's courses.

I have observed that the system in which the class is awarded on the performance of the student in final year's courses, the student tries frantically to do his utmost in the final year's courses, and tends to become sluggish in his second or third year courses. This results into a shaky foundation on which a student tries to build up his performance in the final year, which does not necessarily improve all of sudden with one year's hard work (which in practice is usually only one last month's hard work). If a student's rating was made to depend on all the years of his work in the technical institution, he will have an incentive to remain attentive on all the subjects which would build up a stronger foundation for him, and which will mean that his hard work is spread out over all the four or five years of technical education. His rating is not made to depend upon only one year's work, which becomes disastrous if some misfortune befalls him in that particular year. As against this, we have to consider the question whether it is desirable to grade a student on the subjects for which probably he had no liking. I suggest that some factual data must be collected in regard to these controversial questions, before a new assessment procedure can be introduced.



already introduced for the four or five years of a student in a many others have examination systems A.T.K.T. systems year is not wasted. a system by which the performance of year's courses.

the system in which the performance of year's courses, the do his utmost in and tends to be second or third year's a shaky foundation to build up his year, which does all of sudden with which in practice is each's hard work). made to depend on in the technical an incentive to re- the subjects which ger foundation for that his hard work four or five years His rating is also only one year's disastrous if some that particular have to consider desirable to grade for which pro- I suggest that some ected in regard to rs. before a useful be introduced

MODIFIED STEEL MELTING TECHNIQUES OF SPECIAL STEELS

By
K. RAMASWAMY
Assistant Professor of
Metallurgy
Dept. of Mech. Engg.

TECHNOLOGY has made rapid studies in the last two decades. Man has been able to make missiles of all sorts which are required by the developed countries to protect and improve the striking power of their armed forces and research in the production of consumable electrodes for transport planes. The development of high speed missiles, aircrafts and rockets demands the availability of high quality steels. At the present time the availability of high quality steels is not sufficient for the production of missiles and jet engines. The need for the development of the skin of aircrafts is also a major problem of maintaining the strength of the skin at elevated temperatures.

The strength required in steels for aircrafts are in the viscous range (10 to 15 kg/mm²) though the strength required for steels upto 100 kg/mm² (15 to 25 kg/mm²) tensile strength is required for some specialized steels such as aircraft landing gear. The need for the development of the skin of aircrafts is also a major problem of maintaining the strength of the skin at elevated temperatures.

The development of the skin of aircrafts is also a major problem of maintaining the strength of the skin at elevated temperatures. The need for the development of the skin of aircrafts is also a major problem of maintaining the strength of the skin at elevated temperatures. The need for the development of the skin of aircrafts is also a major problem of maintaining the strength of the skin at elevated temperatures.

We shall consider below some of the modified steel making techniques for production of special steels.

I Consumable Electrode Vacuum Arc Remelting

This process consists of remelting cast steel electrodes produced to a very high quality level in the arc furnace. The electrode moulds are special cylindrical moulds with large length to diameter ratio. After the electrode has been conditioned it is placed in a furnace which is evacuated to less than 10 microns. The electrode is negative, a copper lined water cooled mould is the positive and an arc is struck between them usually. Direct current is used for this purpose. The electrode is consumed during the melting process and forms a pool of molten metal which progressively solidifies in the water cooled mould. During melting the gases are withdrawn, many impurities are volatilized and due to water cooling there is appreciable alteration in the mode of solidification leading to reduction in certain types of segregation.

In addition to the above advantages the steels have better transverse ductility, improved fatigue properties, better impact strength and better soundness in large sections.

II Carbon De-oxidation

To produce cleaner steel without the increased cost of consumable melting the inherent property of carbon as a deoxidiser has been utilized. Carbon is a weak deoxidiser at atmospheric pressure but becomes

very effective in vacuum. The product being a gas and not a solid as in other methods of deoxidation it ensures better and cleaner steel.

III Induction Stirred Ladle Vacuum Degassing

The process consists of a ladle of steel in a vacuum chamber containing induction coils which surround the ladle. The induction stirring exposes all the steel to the

vacuum ensuring optimum deoxidation. Also any alloy additions can be thoroughly stirred in after degassing is complete. The ladles, however, have to be made of non-organic stainless steel and lined with high quality Alumina bricks.

The advantages of deoxidation is the production of steels with lower gas contents and improved cleanliness and transverse properties.

★ ★ ★ POPCORNS

Fried by VIJAY R. NADKARNI B. E. CIVIL.

1. A discussion was in progress in the seminar of zoologists. The subject was "Nature always compensates." A Sardarji zoologist was asked to give an illustration. He stood up, looked here and there, took a sip of water, touched the knot of his tie and said, "Gentlemen, it's very simple. Nature always compensates because if a man has one leg shorter, the other is longer."

2. Hitler was much disturbed when a clairvoyant let it be known that she could predict the exact day of his death. Her predictions were based on astrology and he believed in stars so he sent for her. After much divination the woman finally said that the omens indicated no specific death hour, other than it would definitely take place on a Jewish holiday.

"Which holiday?" Hitler demanded.

"I can't be certain."

"You have got to be sure," Hitler went into a shriek.

"What difference does it make?" shrugged the woman.

"Any day you die will be a Jewish holiday."

3. Two waiters were standing at a table over which a drunkard had fallen asleep.

"I woke him twice, now it will be third time," said one of the waiters.

"Why don't you throw him out?"

"Nay; not at all! Every time I wake him, he pays the bill."

4. An eminent judge and an equally celebrated Bishop were engaged in a friendly argument as to which of them had more power over their fellow men. Explained the bishop:

"After all, old man, you can only say to a man, 'you be hanged!'. I can go much further and say 'you be damned!'"

The judge nodded, smilingly.

"Yes" he said. "But the difference is that when I say a man 'you be hanged!' - he is hanged."

5. "How do you define 'works committee'?" asked the professor of management science to a student.

"It's easy Sir! It's a group of intellectuals who singly can do nothing but together can decide that nothing can be done."

★ ★ ★

can be thoroughly
is complete. The
be made of non-
lined with high

Oxidation is the
lower gas contents
and transverse

Environmental Pollution due to Noise

Shri D. D. Desai
M. E. Civil (Bom.)
A.M.I.E. (India)
M.I.A.W. & P.C. (India)
(Lecturer in Civil Engg.)

DEARN B. F. CIVIL

standing at a table
had fallen asleep.

Now it will be third
writers.

time I wake him.

and an equally
engaged in a friendly
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"You can only say a
"I can go much fur-
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English.

the difference is that
he's happy!" he is

the works committee
of management

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Water and Food are the three most essential commodities for sustaining life. We are polluting these nature's gifts by our insatiable consumptive activities. We have contaminated our agricultural produce standing in the field or stored in the warehouses, by the use of spraying by the abnormal use of insecticides, Rodenticides, Pesticides and Fungicides. Most of them are very poisonous. Many Indian rivers are polluted by rapid industrialisation and consequent discharges of industrial and other effluents. Our atmosphere is also polluted due to atomic explosions, factory smoke and the exhaust fumes from automobiles. Several many other gaseous invasions. Because of our increasing population and rampant consumption, our environment is being polluted due to Noise menace, the result of the unmitigated activities of the modern world. Noise is an inter-related component of environmental health, and can be regarded with many, a slow agent of death. The cities are increasingly congested and are extremely noisy. Noise abatement and its control by it are virtually

neglected issues in American Life today. The cities like Delhi, Bombay, Calcutta are considered to be disturbingly noisy ones in our own country. In India, if city noise continues to rise, as it is presently rising, it can't take much time for all to become stonedead. In U.S.A. between 6 and 16 million Americans are going deaf because of occupational noise. It would be a wise step if our medical and public health professions take keen interest in the study of noise menace and suggest suitable control measures. Air pollution kills us slowly but silently, noise makes each day a torment. Noise can be considered a molester and a detriment to well-being.

Noise may be defined as the undesired, disturbing sounds by the recipient (B.S. 661: 1955) which interfere with his work, comfort and rest. It is becoming an increasing annoyance and problem in industry and community living. The degree of annoyance or discomfort depends upon the frequency of occurrence, the absolute intensity, or loudness, the relative loudness and the necessity for the noise. The use of larger and more powerful equipment in

industry has caused increased interest in the subject of the effect of noise on the health and comfort of workers.

Although unpleasant noises of urban living may have nuisance value only, loud noises encountered in some industrial occupations may have adverse effects on health. The noise of congested traffic in Delhi, Bombay and Calcutta is loud enough to make one momentarily deaf. Noise can cause permanent deafness and even increase susceptibility to viral infection. Individuals vary in their reactions to noise, hence it is advisable to study the problems statistically.

Noise and Urbanman

Demolition and construction for urban renewal and city expansion can often make urban man a victim of an excessive noise that starts with the sunrise. Noise is created by refuse collecting trucks, helicopters, large jet air-liners, exhaust fans over range hoods, dish and cloth washing machines, vacuum cleaners and garbage disposal units. Large (4 engines) jet liners, single-engined jet fighters and large (4 engines) piston-engined air-liners create maximum noise values when passing overhead at take-off power, annoying the people residing in the vicinity of the air port. Many of us might have experienced the annoying sound levels of street hawkers, including newspaper boys, at times disturbing our pleasant sleep during morning hours!

Enroute to work, the urban man endures disturbingly high sound levels, no matter whether he travels by subway, by bus, by electric train, or by automobile with the window open. Before he reaches his work premises, he may have been sufficiently annoyed by the noise levels at curb-side, main roads.

At work he may be assaulted by high level, ear damaging noise from automated clerical and computing devices. Our city man in his office is sometimes unable to

make himself heard because of interference from helicopters and jets, from traffic and work at construction sites. Lunch hour, in most restaurants of congested cities like Bombay, is a nerve-racking cacophony of dish clatter and loud voices.

After work, he is subjected to another dose of transit noise. At home he is bombarded by noise from within his building and from without. It is difficult to discuss here the plight of a slum dweller, only a day's stay in a slum area can give more practical understanding about the noise levels in such areas! Our urban man has to listen to his family's radio set, his neighbour's radio set, blaring loudspeakers and details of his neighbours' personal lives, crying and shouting of the playing children and at times shouting from his own quarrelling wife. Any time during the night his sleep may be disturbed by many noise sources: buses, commercial goods traffic, motorcycles, the sirens of fire engines, police cars and ambulances, auto horns, barking dogs, planes and at times his neighbour's air conditioners, T.V. Set etc. in case of posh dwellers.

There is no escape from the annoying sound levels, even during leisure time in the city or in the country. Street noises prevent sleeping late on Saturdays or Sundays. Taxis may follow the urban dweller to the beaches, and the power lawnmower and the modern farm machinery may follow him to his countryside cottage. Where can he go for quiet, undisturbed relaxation? Not even to a hospital! Even there patients are exposed to noise which interferes with their rest and sleep, so necessary for health and convalescence.

Any one can "Solve" his sleep problem by consuming one or two sleeping tablets, but that is not the permanent solution. Nowadays, several western countries and countries of the far East are active in Noise Abatement Campaigns. To-day's dawn-

of interference from traffic and the lunch hour, in congested cities like the cacophony of

ected to another. At home he is bombarded within his building. It is difficult to discuss the urban dweller, only a few can give more about the noise. Our urban man has a radio set, his neighbours loudspeakers, his neighbours' parties and shouting of children at times shouting his wife. Any time he may be disturbed by buses, commercial vehicles, the sirens of fire engines and ambulances, automobiles and at times constructioners, T.V. Sets, etc.

from the annoying noise during leisure time in the street noises prevent him from sleeping on Sundays. The urban dweller to the power lawnmower machinery may follow the cottage. Where one is disturbed relaxation is impossible. Even there patients which interferes with necessary for healing.

his sleep problem. Two sleeping tablets are a permanent solution in some countries and they are active in North. To-day's dawn-

are not yesterday's, either in the spectrum of distribution of frequency, or any other characteristic. The public to-day is being exposed to levels that did not exist 5 years ago.

Aspects of Noise

The amount of reasonably quiet conditions for industrial workers is growing high day by day. There are three aspects of the noise problem namely,

1. For most reasonable conditions, for the industrial worker who is making the noise either naturally, or by his machine.
2. Protection of other workers either in the immediate vicinity of the noise source or at some distance and possibly in other areas.
3. The protection of surrounding property from noise created in the factory can be achieved by sound-absorbing and zoning measures.

The other two aspects are not limited to the noise level in the factory. The All India Institute of Medical Sciences has a Survey of Noise in India and Industrial Noise. It states that though workers are exposed to dangerous noise, and many have impaired hearing, the majority of the danger. On enquiry workers with damaged hearing told they felt "socially silent" when their hearing ceased working. At times, they have to move from one machine to another to hear their machines. They are often faced with operation of their machines. The noise level in their machines, the amount of time they become deafening over the years. Ignorant of the source of their disability, they are to go. But this situation is changing because of increasing awareness by the trade unions.

The Stimulus for Hearing (Audition)

Greek philosopher Aristotle over two thousand years ago referred to five senses, namely, vision, hearing, touch, taste and smell. It would be interesting to discuss at this stage, the human behaviour in connection with the sense of hearing or audition.

Mechanical disturbance can cause the molecules in solids, liquids, and gases to vibrate. These vibrations can be felt or seen in the shaking of our automobiles or steam pipes or in the circular waves set up when a pebble is thrown into the water of a quiescent lake. These mechanical vibrations can range in frequency from less than 1 per second to millions per second. When the frequency is between about 20 and 20,000 per second, one can hear the vibrations as sounds if they reach his ears. There are individual variations in hearing. Some people rated as "normal" in hearing cannot hear acoustic vibrations any higher than 12,000 or so. Occasionally such individuals spend money to obtain high fidelity sound equipment that is beyond their range of hearing! It is interesting to note that smaller mammals tend to be able to hear higher frequencies than human beings can hear-hence the use of "silent" whistles for dogs.

The vibrations we hear are usually in the form of wave motion in the air. Most sounds have very complex wave motions. However, it has been discovered that these complex waves can be analysed or broken down into a number of simple sine waves. A simple sine wave is a pure tone, such as the tone of a tuning fork. Each hill and valley, of a sine curve taken together, forms what is called a cycle. The frequency of a sine wave is the number of these cycles of vibrations that occur in one second.

The height of the hills and the depth of the valleys i.e. amplitude, are related to the amount of force or pressure in the wave. In fact, the physical energy or intensity of

PLATE NO 1

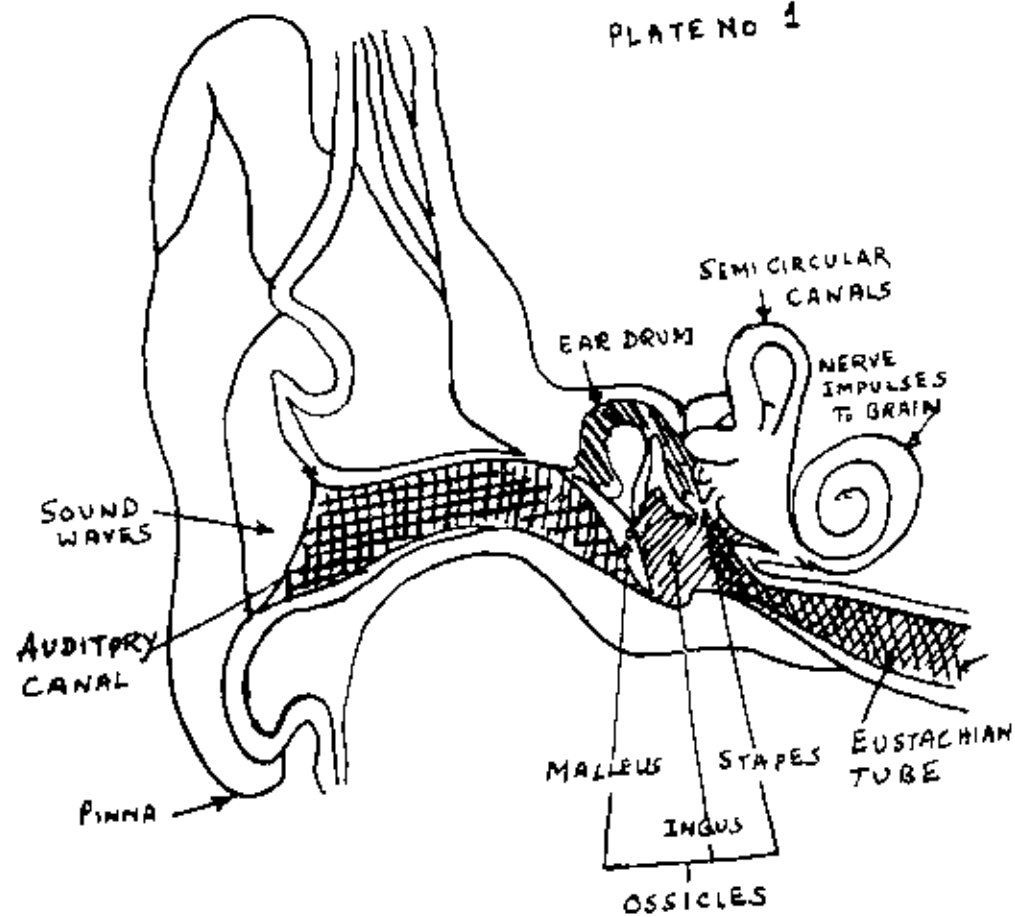
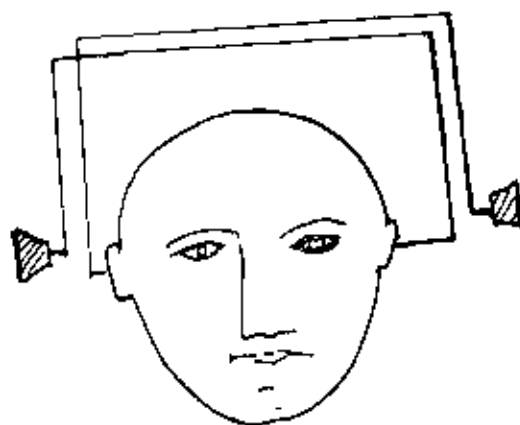


DIAGRAM OF HUMAN EAR.

PLATE NO 2



A MAN WEARING PSEUDOPHONE

SEMI-CIRCULAR
CANALS

NERVE
IMPULSES
TO BRAIN



EUSTACHIAN
TUBE

Fig.

NO 2

the amount of the sound. To understand any sound we must know its frequency and its intensity. The velocity or speed of sound in air is about 1100 ft., sec., in water about 4400 ft. sec. and 11000 ft. sec. in steel.

Characteristics of Human Ear: Ref.

The ear is divided into three parts: the external ear, the middle ear, and the internal ear. The only visible part of the ear is the Pinna. In man, the pinna is little more than a flap of skin.

In addition to the pinna, the external auditory canal carries sound waves to the eardrum, or Tympanic Membrane, a membrane separating the external ear from the middle ear.

In the middle ear there are three small bones: the malleus, incus, and stapes. When the eardrum vibrates, these bones transmit the sound to the oval window. This window is a membrane in the bone of the cochlea, which separates the middle ear from the internal ear.

The cochlea is a snail-shaped structure in the bone of the skull. The word "cochlea" means "snail". The organ of Corti, located in the cochlea, is a marked region of importance to us are the hair cells and the organ of Corti. When these are shaken by sound waves, they trigger neural impulses in the auditory nerve.

How Sound Travels

When sound waves travel through the air, they are compressed and rarefied. The pinna and funnel down the

external auditory canal. The physical sound vibrations then transfer to the eardrum and next to the ossicles. From the ossicles the vibrations enter the fluid of the cochlea through the oval window. The fluid transfers the vibrations to the basilar membrane and the organ of Corti. On the organ of Corti are hair cells that pick up the vibrations. The vibratory movement of the hair cells triggers nerve impulses in associated receptor cells. These nerve impulses then travel to the brain via the auditory nerve. Thus we see that what were first acoustical vibrations, triggered nerve impulses, which in turn led to the perception of sound a psychological experience.

Sound Localization and Measurement of Loudness Levels

To a certain extent we can tell where a sound comes from by listening to it. When a sound comes from directly overhead, it is extremely difficult to locate, however. Indeed, we tend to confuse all the sounds that come from directly in front of us, directly behind us, or directly overhead. That is to say, we tend to confuse all sounds in a plane cutting through the center of the head exactly between two ears. We can localize best of all those sounds located straight out from the right or the left ear.

A number of physical clues are used in sound localization. For instance, a sound coming from the right side gets to the right ear more quickly than to the left ear. It also sounds slightly louder in the right ear than in the left. Thus both time of arrival and intensity are useful clues in localization.

We use our eyes and ears together to locate objects in our environment. It is really disconcerting to watch a sound motion picture when the loud-speaker is off to one side instead of behind or in front of the screen.

There is a piece of apparatus called a "Pseudophone" (Ref. Plate No. 2) which permits the sounds from our right to come

into the left ear and the sound from our left to come into the right ear. When this pseudophone, as it is called, is first put on, we are utterly confused in our localization of sounds. After a time, however, we become accustomed to the reversal of clues and are able to point out correctly the various sound sources. Thus we see that as long as sensory clues are consistent, our brains are able to interpret the incoming impulses. The impulses from each sense are like a complex code, and the job of the brain is to decode them.

In the study of hearing the logarithmic unit used to measure the physical sound energy is called the decibel. A decibel (db) is defined as one-tenth of a bel (a unit named for Alexander Graham Bell). It is a measure of the relative loudness of a sound to the physical ear. The number of bels indicates the power to which 10 is raised to show the increase in energy. For example an increase of 3 bels (or 30 decibels) indicates an energy increase of 10 or 1,000 times; likewise an increase of 9 bels (90 decibels) shows an increase of 1,000,000 times the previous energy level.

In other words, the decibel rating is a ratio and as used in measuring city noise it expresses the ratio of the sound in question to the smallest distinguishable noise, e.g. if two sounds are in the ratio of 10:1, the sounds are said to differ by 10 decibels; if they are as 100:1 (or 10^2 :1), the sounds differ by 20 decibels; if they are as 1,000:1 (or 10^3 :1), they differ by 30 decibels, and so on and so forth. Stated mathematically, the common logarithm of the intensity ratio multiplied by 10 expresses the ratio in decibels, e.g. one sound is 1,000,000 times as intense as another. The common logarithm of this number is 6. Accordingly the sounds differ by 60 decibels. This fact is clearly indicated in the table below for various noise intensities corresponding to various indicative sounds as measured in decibels.

TABLE 1

Decibel Noise Intensity	Indicative sound
0	Just audible
10	Rustle of leaves
20	Whisper
30	Suburban street
40	Average dwelling
50	Commercial premises, quiet automobile
60	Ordinary conversation
70	Noisy street, loud conversation
80	Heavy urban traffic, loud radio
90	Pneumatic drill, motor cycle
100	Riveter # 35', loud auto horn
110	Metal working shop
120	Airplane propeller
130	Painful sound

It will be noted from the above table that the acceptable limits of noise in daily living varies from 30 to 60 decibels, with 40 as the concentration most commonly encountered in the home.

A noise survey is normally undertaken to provide information for determining methods of control, location of sounds causing risk of hearing loss, and to evaluate them. One such noise survey was carried out by the National Physical Laboratory in our country, to ascertain the noise menace in three metropolis, namely, Bombay, Delhi and Calcutta, recently. The survey party consisting of doctors, selected in Bombay, places like Kemp's Corner, Opera House, Kalbadavi and Bhendi Bazar, experiencing maximum traffic nuisance. In Delhi the places like Vinay Nagar South Avenue, West Patel Nagar and Daryaganj, having medium to heavy traffic were chosen for the purpose. In Calcutta the localities were selected on similar lines. The study team evaluated comparable results for maximum and minimum noise levels during day and night time. The tables given below indicate the characteristic of traffic noise expressed in decibels, for the above mentioned cities. The table No. 2-B, gives the Noise Survey report for the New York City. The results are comparable, and represent average values.

TABLE 0-2-A

Characteristics of traffic noise in decibels

Source of Noise	Average Noise Level		Maximum Noise Level	
	Day	Night	Day	Night
Heavy Traffic	95	74	101	79
Medium Traffic	93	88	96	92
Light Traffic	94	79	104	91
Very Light Traffic	98	92	104	98
Heavy Traffic	76	68	83	75
Medium Traffic	64	64	71	68
Light Traffic	83	77	97	89
Very Light Traffic	89	88	98	94
Heavy Traffic	69	Characteristics: some what resembling to the above metropolis	79	Characteristics: some what resembling to the above metropolis
Medium Traffic	62		77	
Light Traffic	64		81	
Very Light Traffic	68		80	

TABLE 0-2-B

Noise levels in New York City

Source of Noise	Average Noise Level in decibels
Heavy Traffic	70 db
Medium Traffic	64 db
Light Traffic	63 db
Very Light Traffic	53 db
Very Light Traffic	52 db

From the above table No. 2-A, it can be seen that in Delhi, noise levels in localities with heavy and medium traffic mostly range from 70 to 100 decibels with occasional peaks of greater loudness. In localities with light traffic, noise levels in many busy areas range from 60 to 75 decibels. In localities with very light traffic, noise levels range from 50 to 55 decibels. The noise levels recorded in Bombay

were attributed to the Sky Scrappers enclosing busy roads. The noise levels mentioned in table No. 2-B, clearly indicates that many cities like New York in western countries need urgent measures, to check the noise menace.

Noise Measurement: Equipments and Speech Interference Level (SIL)

Noise measuring instruments show the sound intensities in decibels as compared with the smallest noise distinguishable to the human ear. The measurement of noise is generally done by an equipment known as Audiometer. It is an instrument for determining our absolute thresholds of loudness for tones of various frequencies. Sound level meters can be used to measure the overall noise level in an area. These are now obtainable with an octave band analyzers for measuring sound intensity frequency bands making possible the isolation of specific damaging noises in order to get

at the real source to reduce or eliminate it. There are many other types of equipments that are commercially available for making noise measurements, e.g. (a) Microphones classified as crystal microphone or moving coil microphone. (b) an equipment having Electrical calibration arrangement.

- (c) Noise Measuring Amplifiers
- (d) Indicator type devices
- (e) Analytical devices and
- (f) Magnetic tape type recording devices.

Noise measurements may be done out-of-doors or indoors. when it is done out-of-doors, noise levels at given positions, noise sources, effect of distance, existence of artificial obstructions like high walls or natural ones like trees, etc. are the vital factors to be considered for significant results. When the same is carried out indoors, the factors to be considered generally are noise levels at given positions, direct and reverberant sound, absorption in rooms and reverberation time (in seconds). It is expressed as the 5% ratio of the volume of the room

in cubic feet, to the total absorption of sound in that room (in sabines) viz.

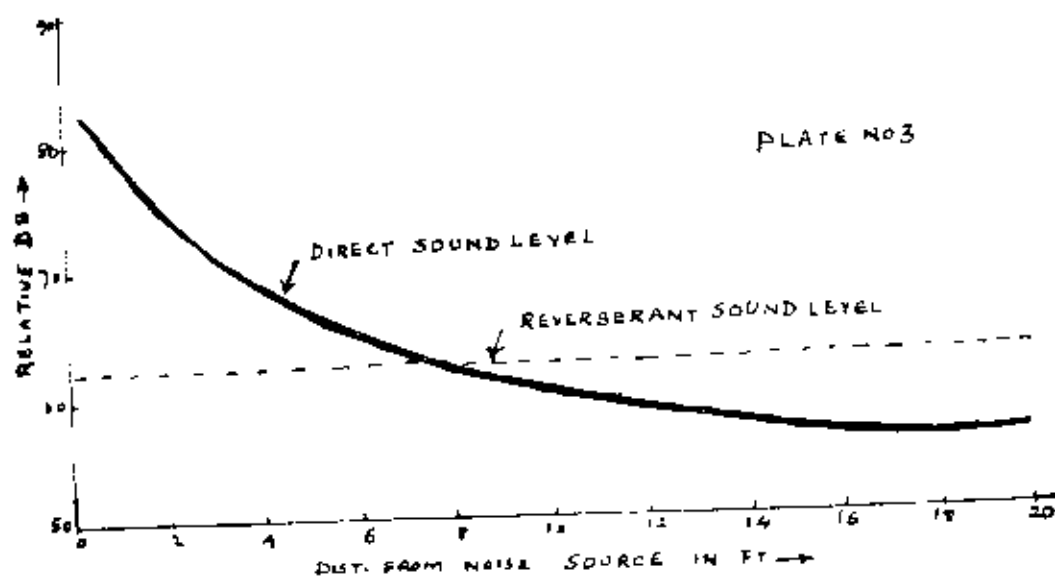
$$R.T. = \frac{0.05}{A} \text{ Here,}$$

$A = 2.5 \sum S_n \alpha_n = S_1 \alpha_1 + S_2 \alpha_2 + \dots$ where S_n etc. are areas in sq. ft. and α_1, α_2 etc. the absorption coefficients.

This basic relationship was first put into a quantitative form by W.C. sabin towards the end of the 19th century. The reverberation time is also termed as the time required for the sound to decay by 60 db. W.C. sabin called the units "Open Window units" because they are the equivalent in absorption to a similar area of open window from which of course no reflection can occur and hence coefficient of 1.0. They have since been renamed 'Sabins' to commemorate his name.

How Distance Affects Sound Intensity?

When a noise source is operating in a room, the noise level at any position may be regarded as being made up of two parts. The first part is the direct sound i.e. the sound travelling directly from the source to the position under consideration, and the



DECREASE IN INTENSITY OF SOUND WITH DISTANCE FROM SOURCE

total absorption of
(cabines) viz.

$S_1, S_2, \dots$
sq. ft. and α_1, α_2
coefficients.

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W.C. Sabine to
19th century. The
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they are the equi-
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and Intensity?

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any position may
up of two parts
sound i.e. the
from the source to
eration, and the

3

10 20

SOURCE

is the reverberant sound i.e. the
the position after multiple
from the room surfaces. A noise
may be either non-directional, i.e.,
radiate noise equally in all directions.
or it may be directional i.e., it may radiate
in some directions than it does
in others. The intensity of the direct sound
falls off as the distance from the source
by 6 decibels every time the
distance is doubled. On the other hand
the intensity of the reverberant sound will
be uniform throughout the room volume.
When measurements of
are made in a room it may be
to determine whether it is pre-
dominantly the direct or the reverberant
sound being measured.

what the problem is
are more interested in the direct
than in the reverberant sound. If it is
the noise being transmitted
from the source to the other, then it will
be the reverberant sound
because it is this sound
that is reflected by the room surfaces and
fills the room. If it is a
disturbing people in the same
room then either the direct or
the reverberant sound may be important.

coordinates for a few
in practice this means
operating a machine (whether
in a factory such as a pneu-
matic drill or in an office such as
a typewriter) will be in the area where the
noise is produced. In a factory
the noise is so loud as to cause per-
sonnel assuming the
noise must be modified so as to
be tolerable to the operator of the
machine or to the public.

and SIL

that interferes with speech
conditions are known, when
conditions and has a reasonably

continuous spectrum. The noise levels are
defined in terms of the "Speech Interference
Level" (i.e. S.I.L.). The application of
the S.I.L. criterion is straight forward. If
the noise source is in the same room then
obviously, from measurements of the noise
level it is possible to decide under what
conditions speech will be possible or it is
possible to decide by how much the noise
must be reduced to make speech under a
given condition possible. If the noise is
not in the same room it will usually be a
question of deciding how much sound in-
sulation between the noise and the room
will be necessary to make speech possible
e.g. an office adjacent to a factory and in
which speech in normal voice at 2 ft. is
necessary. This calls for an SIL of 59
(Refer Table No. 3). A suitable partition
that will give this insulation can then be
selected. For this particular case any solid,
homogeneous partition weighing about
3 lbs. sq. ft. would be suitable. When a
woman is speaking the permissible levels
should be reduced by 5 decibels, because of
the characteristic low tones of female.

TABLE 3

Voice level and distance conditions needed to
insure satisfactory speech intelligibility for
SIL values.

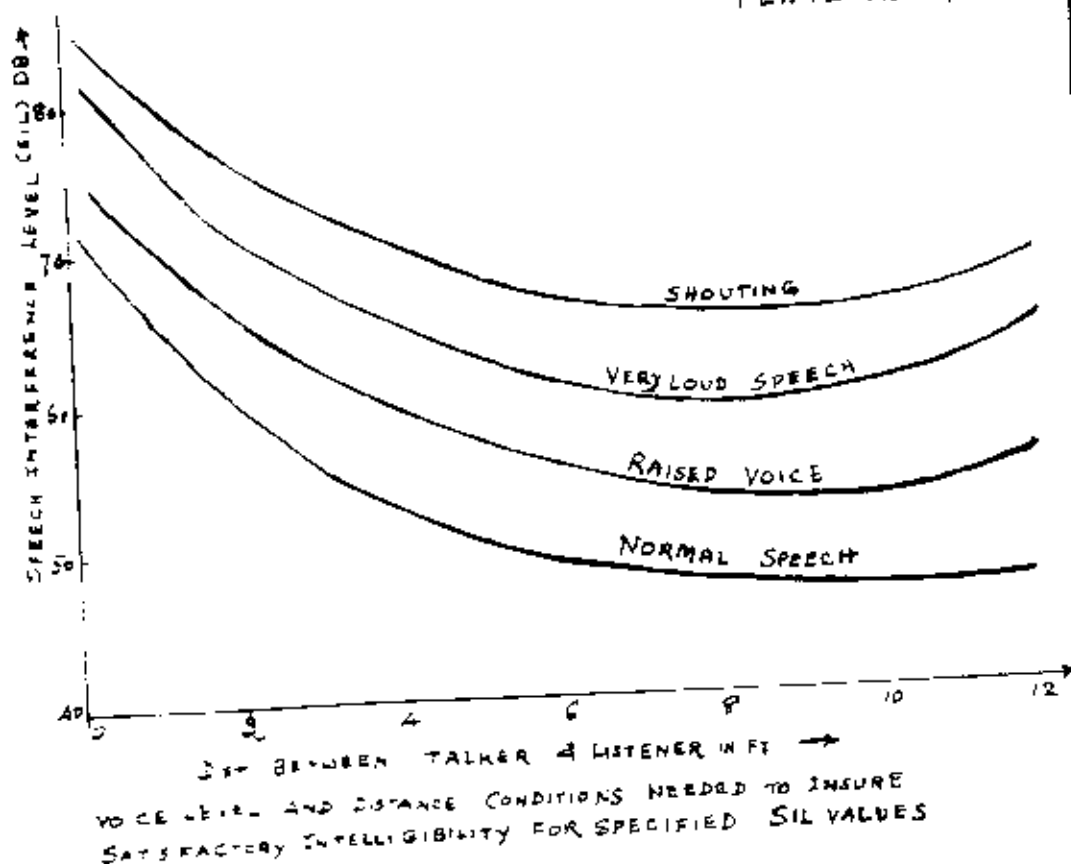
Distance between Talker and Listener in ft.	VOICE LEVEL IN DECIBELS			
	Normal	Raised	Very loud	Shout- ing
0.5	71	77	83	89
1.0	65	71	77	83
2.0	59	65	71	77
3.0	55	61	67	73
4.0	53	59	65	71
5.0	51	57	63	69
6.0	49	55	61	67
2.0	43	49	55	61

The table No. 3 above indicates the speech
Interference Levels in decibels which
barely permit reliable conversation at the
distances and voice levels mentioned. The

figures given in the table apply when there are no reflecting surfaces nearby and the listener and talker are facing each other. The same fact can be represented graphically shown in Plate No. 4. It can be seen from the characteristics of the curves that for a distance of 12 ft. between the talker and the listener, the SIL values for Normal

and very loud speech are 49 db and 61 db respectively. The corresponding figures for raised voice and shouting are 55 db and 67 db respectively. An office with an SIL of about 30 db will be considered 'quiet' by its occupants, while if the SIL is about 55 db it will be considered 'noisy'.

PLATE NO. 4.



In some rooms where there are helpful reflecting surfaces, then for the larger distances between talker and listener the noise levels could be a little higher than shown above. To ensure that noise emanating from factories and like should not interfere unduly with nearby residential buildings it is possible to specify the maximum noise levels that should be permitted at the boundary between the two types of buildings. Such specifications are rare at the present

time but they will probably become more common.

How Noise Menace Affects Human Beings

Some sixty years ago, Robert Koch, bacteriologist and a Nobel laureate said 'The day will come when man will have to fight merciless noise as the worst enemy to his health'. It is said that continuous exposure to noise could make a person deaf, a heart patient neurotic and increase the

49 db and 61 db
 corresponding figures for
 are 55 db and
 office with an SII.
 considered 'quiet'
 the SII is about
 and 'noisy'.

FIG. NO. 4.



FIG. NO. 5.

...ly become mo
 Human Being
 Robert Koch,
 laureate said
 man will have
 worst enemy
 continuous
 a person de
 and increase s

... diseases. Women in an
 stage of pregnancy, when exposed
 registered quickening of the
 with possible damage to
 In August 1970, a study
 Delhi revealed that 12 out of
 who had assembled to
 selection trials for the
 world shooting competi-
 hearing because of con-
 noise. A survey
 of discotheques
 revealed that the noise created
 of dancers and by the re-
 there was often high
 hearing. Yet another
 by a team of All India
 Sciences revealed that
 around Delhi
 damage hearing
 exposure to noise
 symptoms. Guinea
 periods of supposedly
 swollen in-side-
 and inner-ear hair
 have been destroyed
 be damaged by
 the sound level
 and is associated
 cycles per second
 cycles per second
 and hazardous to hu-
 requiring mental
 below 60 dec-

... in the engine
 Sweden show-
 of four workers en-
 A noise survey of
 showed that about 54
 were between
 and 95
 from the machines.
 industries were
 with those
 second. The
 levels in

decibels, associated with various machinery
 employed in various sections of common in-
 dustries as mentioned.

TABLE 4
 Noise Associated with various Machinery.

Industry	Overall (decibels)	Total loudness (Fones)
(a) Food :		
Canning machine, meat	92	150
Fudge molding machine	95	170
Candy wrapper	100	160
(b) Woodworking :		
Planer, furniture parts	112	940
Cut-off saw, comp. air, furniture parts	107	600
Shaper, furniture compo- nents	87	110
(c) Fabricated metal products :		
Nail machine, roofing nails	110	850
Automatic drop hammer, small tools	111	1100
Corrugating machine, sheet steel riveting	114	1200
(d) Air manufacture :		
Pneu. riveting gun, subassem- bly	133	5800
Riveting jig, wing assembly	116	1800
Circular saw, cutting metal	105	460
(e) Textiles :		
Combing machines	95	230
Spinning frames	86	97
Weaving shed	102	490

Impairment of hearing from industrial
 noise was reported in 1830 by Feshbroke,
 who studied hearing loss among Black-
 smiths, and in 1862 by Weber, who report-
 ed on Boiler-makers and Railwaymen.
 The temporary or permanent deafness
 seems to be associated with continued
 exposure to high noise levels. It is
 difficult to prove conclusively that they in-
 terfere with production or produce extra
 fatigue. Adverse effects of noise on man
 include temporary and permanent hearing
 loss, speech disruption, loss of performance,
 incapacity and annoyance. Harmful effects
 depend on various circumstances including
 individual susceptibility, character of the
 noise itself and length of exposure.

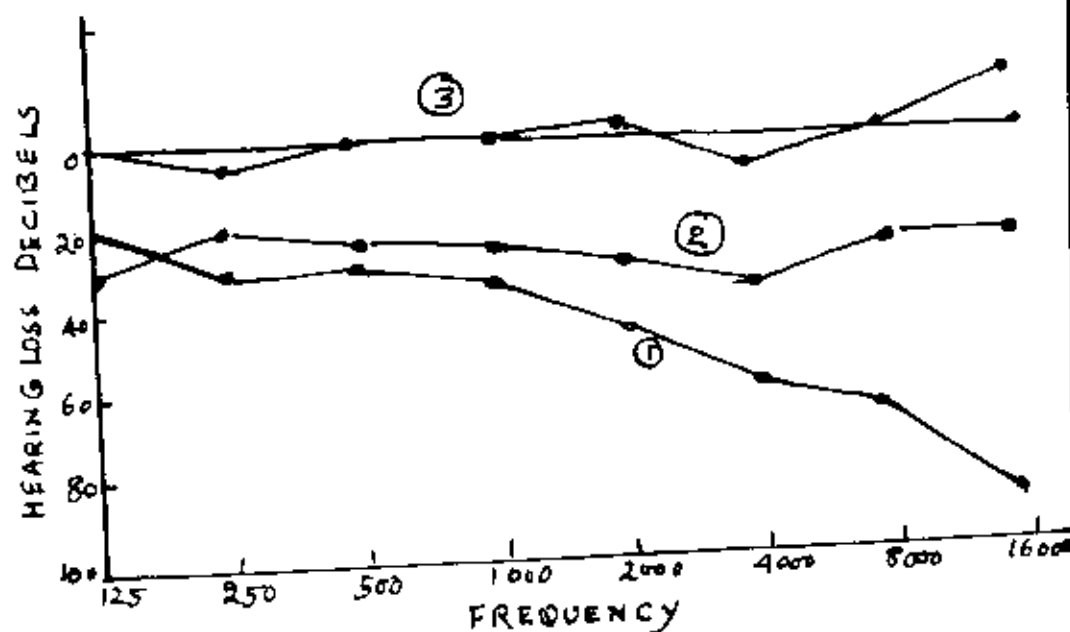
Plant studies by an acoustical engineer helps in attacking noise problems. Increase of exposure time to excessive noise increase the magnitude of permanent hearing impairment. This incidence at 4,000 cycles per second caused by daily exposure of 5 to 8 hours reached a maximum after about 12 hours. Additional loss was caused by the individual ageing process. It has been found out that loud excessive noise levels can constrict blood vessels, make the skin pale, muscles tense and adrenalin suddenly to be injected into the blood stream which can increase tension and nervousness. Noise of any kind cannot be shut out from the ear as light can be shut out from the eyes. This means that the reflex effect

which causes constriction of blood vessels occurs with equal intensity during sleep as during wakefulness.

According to the World Health Organisation Committee: one of the most important tasks of architects, acoustics engineers and public health personnel is to ensure that both in the general urban environment and in dwellings, noise and vibration are kept to a minimum.

In hearing, as in vision, different people have different auditory thresholds of sensitivity, which can be measured with an electronic sound equipment. Several ear, nose and throat specialists of the western countries have carried out research work to study

PLATE NO. 5



TYPICAL AUDIOGRAMS.

1. NERVE DEAFNESS
2. CONDUCTION DEAFNESS
3. NORMAL HEARING.

ation of blood vessels
density during sleep and

World Health Organisation
the most important
astics engineers and
is to ensure that
an environment and
vibration are kept

son, different people
thresholds of sensi-
measured with an elec-
Several ear, nose
of the western coun-
research work to stud-

PLATE NO. 5



PRIZE DISTRIBUTION

(Academic awards)



Shri S. K. Idnany
B.E. (ML)
(Best Student)



Dr. M. N. Nish



Shri Vijay S. Churi
B.E. (C)



Shri T. S. Sanghvi
T.E. (M)

Guess Who is this Scholar?



Shri J. B. Kasabwala
T.E. (C)

Shri S. Sanghvi
S.J. (M)



Shri S. P. Parekh
S.J. (F)



Shri S. D. Doshi
S.J. (M)

Kasabwala



Shri D. M. Chaudsadar
B.E. (M)
(English Debate)
First prize

SPORTS AND TEAM EVENTS



Shri. Alton Fernandez
F.E. (F)
(Football)



Shri. Mohan Hemmady
S.E. (V)
(Volley-ball)



Shri. Surve P. P.
B.E. (M)
(Cricket)



Shri. Sawant H. M.
B.E. (L)
(Badminton)



...to absolute and differen-
...for tones of var-
... It has been observed that
...tribes in Africa, the older
...much less from presbycusis
...perceptive deafness, than people
...age in the United States. This
...the African live in an atmos-
... The noise of every
... an important etiological factor,
... responsible for presbycusis.
... Fig. No. 5 shows three audiometric
... obtained in a typical study by
... The upper audiogram is
... the lower one indicates
... tones of the higher frequen-
... the middle shows conduction
... deafness ordinarily
... of disease of the nerve fibres
... ear. Nerve deafness is very
... because nothing can be done to cure
... deafness results most often
... disorder in the middle ear. In
... sounds are not conducted
... through the middle ear. This
... can sometimes be cured by
... and can be partially corrected
... of hearing aid or similar

Prevention and control: How best to cure?

...problems involve three
... the noise source, the recipient of the
... the path between the two. This
... be simple, such as the air betw-
... machine and a man standing close
... it may be complicated, such as the
... the roof, wall and windows,
... or again between an aircraft in
... a man in a room. Most annoy-
... the many dissonances which rise
... the many fear of sound. Depend-
... the type of problem involved suit-
... measures can be adopted.
... noise abatement is im-
... is reduction in industry often

presents difficult problems. In order to have reasonably quiet conditions in all kinds of buildings and developments, the following measures can be taken.

- (1) Separating all noise sources from areas requiring quiet by the greatest practical distances.
- (2) Introduce sound-absorbent materials to reduce overall sound levels, and provide partial or complete screening either to the man needing quiet or to the machine making the noise.
- (3) Plan buildings or rooms not particularly susceptible to noise to act as screens or baffles between noise sources and areas requiring quiet.
- (4) Locate the rooms from which noise may originate on any part of the site where there is likely to be noise from other (exterior) sources. Conversely, locate room requiring quiet on a quiet part of the site or side of the building.
- (5) Locate machinery and any other noise sources which radiate some of their sound by contact with the building, low down in the basements if possible.
- (6) Remember the loopholes: an open window or a flimsy door in a heavy and otherwise highly sound-insulating wall will bring the overall insulation down to a very low value, in spite of the best intentions.
- (7) Introduce a 'break' by plating a thick belt of trees along the boundary adjoining residential areas, to absorb some of the noise.
- (8) For reducing noise from running trains, expansion joints on tracks should be welded, carriage wheels and rails should be designed so as to efficiently absorb vibrations.

(9) Introduce reasonable and enforceable antinurse ordinances defining unnecessary noises. Policemen should have the responsibility of enforcing the ordinance.

(10) Some agency should be established to coordinate antinurse activities and keep the matter before the public. The commission should be made up of interested persons and city officials, with a sanitary engineer from the health department as technical consultant. In the U. K., the Noise Abatement Society, which has 4000 members, forced parliament to pass the Noise Abatement Act in 1960. The Society maintains a troop of noise wardens to keep the public informed of its rights and duties under the Act.

(11) Steps should be taken to restrict noisy trades, to create more silence zones, to regulate traffic in residential localities, and to restrict the use of blaring loud-speakers. Trading and business areas should be segregated from residential localities. Commercial goods traffic at night should be diverted to roads which do not pass through residential areas.

(12) Educate the public in order to eliminate avoidable noise sources like noisy brakes, rattling tracks, unnecessarily loud radios, automobile horns, riveting the steel structures, etc. (or this welding should be adopted widely).

Personal protection in the form of ear-defenders should be provided against noise levels of up to about 110 db which are fairly common in factories. The ear-defenders which are commercially available are of the following types.

(a) Insert types: i.e. plugs which are inserted into the ear canal and made

of rubber or plastic and sometimes with metal weights to increase the mass or with valves that close only at high levels.

(b) Cushion types: i.e. enclosures made of rubber or plastic which enclose the whole ear, being kept in place with headbands.

(c) Helmet types in which whole head is enclosed.

The helmet type is not normally used in factories, and the cushion type is rare, although they are thought by some people to be more comfortable than the insert types. The insert types are the most commonly used but as the shape of the ear canal varies considerably between individuals, the correct size must be chosen. They must be tightly fitting because quite small leaks considerably reduce the effectiveness.

Conclusion:

Health is a state of complete physical, mental and social well-being, and not merely an absence of disease and infirmity. It is no longer sufficient that public health departments protect the citizen from impure milk, contaminated water, and communicable disease. They must also help to protect him from the seemingly limitless noise to which he is exposed. It is time for a reorganized public health influence to be exerted on the acoustic environment of this nation. Pay immediate attention to the noise sensitive areas, such as hospitals, schools, churches and theatres. To achieve a quiet city will require a new type of public health specialist—a humanist, who will have to understand acoustics and acousticians, sociology, psychology, architecture and planners. He will have to co-operate with city planners. Noise abatement is a problem of tremendous size, and involve otologists, neurologists, endocrinologists, psychiatrists, the entire spectrum of the medical profession.

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to achieve a quiet
of public health
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otologists, ne
psychiatrists
medical prof

The overall effects of noise exposure on
The amount of energy in the noise.

The distribution of energy as a func
of frequency.

The time of distribution of the ex
posure during a workday, and

The total duration of the noise ex
posure during a life time.

being a man to be permanently im
being those constantly exposed to
a traffic policemen, taxicab
order makers, structural
and factory workers. Noise
of workers. Reduction
percent in an office was
per cent by 12 per cent.

to the nervous system
to overcome the effects of
the internal states, neces
to maintain
Noise interferes with
actual wakefulness may
Normal development of infants
by constant loud noises.

grow faster under quiet
more food. Noisy
to young and old.
speaking the en



the spectrum of higher as well as lower
mammals. Environmental pollution due to
noise should therefore be effectively abated.
Our Union Ministry of Health so far has
taken little steps in this direction.

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Electronic Computer—a Brief—Review

V. G. BUCH S. E. E (CLASS)

SINCE the upsurge of Life on this earth. Human being has been the only creature endowed with the sense of reasoning with the gradual evolutionary developments of his faculty of thought, he has incessantly endeavoured towards the understanding of nature and the beneficial utilisation of his understandings for the betterment of his mode of living. Using the self developed concepts, he has developed many systems that involve the harnessing of various forms of natural elements and their utilisation at his will and desire. The use of Electrical energy is just one of them. Today, we see many commodities involving controlled utilisation of Electricity. Depending upon the field of application to which it pertains, a number of developments have been made to the date and consequently a stage of development has reached when unparallel sophistications and developments exist.

An Electronic Computer is probably the most recent system of the type just described. It is to be admitted that though it's a creation of human being only, it is far more superior to us in many aspects.

However, as with almost all projects undertaken by human beings, with beneficial uses piling up, a number of destructive activities foster upon these and outweigh the former in some sense. (The example of Atomic energy is most ideal). Though quite new, it is feared to bring in some evils which will cause the feeling that "charity to undeserved" has occurred. With increasing developments, humans are feared to lose their own identity and submit himself to such material systems. It's left to the description of self to avoid such a development and to utilise our achievements fully for the benefit of mankind, using the natural gifts, we are endowed with.

However, we shall not go much along such philosophical appreciations as they hardly lead to constructive understanding in view of technical know how. Hence hereafter we shall not bother about such aspects and adhere to technicality of subject matter in general.

An Electronic Computer is an assembly of machines controlled electronically-working in perfect harmony and synchronism to be highly useful when made to work in a proper manner.

It basically consists of three main stages called the feeder (Input stage), the central processing unit (C.P.U.) and the output stage. Being a system of machines based on developed concepts, it has its own mode of operation. Hence, it requires the "feeding" of problem in a particular way, pre-determination of operations to be performed on data fed and a proper mode of interpretation of the output obtained.

Thus the general mode of utilisation of computer involves (i) the systematisation of situation to be analysed, (so called "programming") then (ii) the proper feeding of situation to input stage, which is done with the help of a system called Punch Card System, explained later, (iii) informing C.P.U. (Computer Unit) about operations to be performed on the data (including the order in which the operations are to be carried out) and finally, (iv) systematic interpretation of output results. Thus, a problem to be solved is "programmed" and converted into a "language acceptable to machines. Many such languages are in current use and preference made on the basis of the nature of problem at hand. The programmed data is "punched" on cards so that it can be conveyed to the C.P.U. Punching of a

Review

not go much along with appreciations as they are not of a technical nature. Hence, I do not bother about such technicality of sub-

ject. Computer is an assembly of electronically-worked parts and synchronisation is made to work in

three main stages (input, processing, and output). The central part of machines has its own motion and requires the "feeding" of data in a particular way, for operations to be performed in a proper mode of interaction to be obtained.

Mode of utilisation of the system is analysed, (so called) the proper feeding stage, which is done by a system called Punching Unit (later, (iii) information Unit) about the data fed on the machine which the operation is performed and finally, (iv) the output results are solved is "punched" into a "language". Many such languages and preferences in the nature of problem data is so that it can be punched of a

of programmed data in "holes" and "no holes" where the expression of data. The C.P.U. is provided with the operation, data with the data to give the final stage. The output so can be read in our ordinary language or in other forms; usually a computer. This is general representation of working of an electronic

is a student of Electrical Engineering. I could not help imagining and the presence of this particular structure of C.P.U. structure; the analysis of my

computer system essentially is a operation upon a principle. This is a desired result can be had using a circuit and a signal. The network adjustments are made for a given signal, it is a network that can be used to give a desired result and if a given signal be fed to various parts of the network as a response to the network with structure of network. The C.P.U. basically consists of various units like multi-sensors, activators, and "punching" the C.P.U. means essentially the arrangement of such networks in a sequence of operations that means, if a given signal be fed, the network reacts and respond in a manner to yield the designed result. The signal is fed through a set of holes which are punched in the "language" of the C.P.U. and other places "no holes" are punched by special sensors. The network consists of two brushes which are in a network. Whenever

holes appear, an electrical contact exists between the two brushes establishing a particular voltage level. When "no hole" appears, the voltage drop would be at some different level (we conveniently call these levels as 0 and 1 levels). The application of such an impulse goes to the C.P.U. It is operated upon by different networks (defined by the location of signal in or with reference to time) and the response goes to output display unit. The movement of punched card (in space and time) resulting in the sensing of "holes" and "no holes" (reading of information by C.P.U.) is in perfect synchronism with the adjustment of networks to which each signal goes. Thus, using only one basic type of signal (the other being the absence of first) it is possible to have different operational results. All this occurs at the enormous speed of electrical signals and this explains the fabulous speed at which computer works.

Almost all computer assemblies, in addition to the above discussed units is provided with the two other accessories called the "memory unit" and the "Random access" unit. The latter being developed and utilised because of its predecessor's major limitation. The operations and information that are likely to be used repeatedly in future are "stored" or recorded on a "magnetic tape", analogous to our musical tape record. It requires a special unit to recapitulate the information so stored. Its advantage over the preservation of cards lies in fact that the tape greatly reduces the space required for a given amount of information; the usual capacity being about 10 cards per inch length of tape. Second is the ease of handling. However, the major drawback of such a tape is the fact that when intermediate information is sought, all the preceding information is required to be checked and this may prove costly affair. In the "Random access" system we have disc carrying information and when an intermediate information is

sought, it is fed to a special mechanism where it is rotated. A sensor moves across such a disc and when "matching" of information is established, the disc stops and the information can be had immediately.

However, increase in cost may be an important factor in going in for a "Random access" system.

The applications of computers are tabulously wide. They include solutions of highly complicated, tidiously long and extremely time-consuming, technical and commercial problems, the engineering design work (including even drawing work), the high precision control of many industrial processes and the execution of remote controls, the most famous example being that of Apollo series of NASA. Some time back even a cricket test match was "played with a computer", an exact replica of actual game, taking into consideration even

sensitive reactions of pitches to weather conditions?).

The high precision and miraculous speed of operations call for very high cost of computer which runs into thousands of dollars and as such it cannot be installed unless its economical implications are rigorously thought and carefully analysed. And therefore, experts make variety of surveys before installation including even the return of the computer that can be recovered during the period its most efficient operation. Even the maintaining of such a system is quite important and demands a good deal of careful planning prior to installation.

Lastly, as a concluding note, it should be mentioned that the foregoing review is only the "In principle" one so that actual techniques and methods are quite involving and complicated and further my technical ignorance limiting the technicality of subject matter.

★ ★ ★

Electron

KAMAL AGA

(B.E. Elec.)

Lighter than the hozy air of a spring's down
Capricious as the breakers from the gurgling
sea:

Spinning and whirling round the nucleus
'like a honey bee'

Born of family planned by Pauli:
Hopping from hand to hand,

With the radiance of joy for the world to see
You strike, and collide and brighten the
path you tread.

Omnipresent like Him and like Him
The whole universe is your abode.

OUR TWIN CITY

D. B. DAVE B.E. (Civil)

the mounting pressure as they have to adjust to a lesser and lesser moving space not only while working but also while living and relaxing. There are many other intricate problems such as the shortage of water, traffic jams, ever crowded streets, buses and trains, unhygienic and unsocial atmosphere, alarming growth of slums, ever increasing problems of unemployment and a horrible increase in the road and rail accidents. It is no wonder if the living conditions deteriorate and social unrest prevails.

The Bombay city which has been the pride of our country and so to say a miniature India can never continue to be so, if the problems facing Bombay are not tackled immediately. The problems of Bombay have seized the attention of the State Government. The Bombay Metropolitan Regional Planning Board was formed three years ago. The board has the task of analysing the situation and prepare a regional plan for the future growth of Bombay.

The Bombay island is separated from the main land by Thana creek and the sea along the harbour side. Without overlooking the present importance of the South Bombay, a counter magnet or a twin city can be planned on the main land along the harbour. This proposed city on the main land can have a proposed port (Navi Sheva) and industrial areas at Trans Thana Area and at Talaja. The proposed city includes Uran and Panvel regions. The bridge across the Thana creek will bring the twin city together. The new city will have an integration of industries, work centres and Township facilities. This will

As an alternate to twin city, if the present Bombay problems are to be solved by taking a new road development programme, water supply programme, rapid transit programme, and Bombay development programme, the cost would be over 1200 crores as estimated by the experts. If the population is absorbed in the new city project area, some of the above programmes can be deferred and in some cases altogether avoided. The facilities of Water, Transport,

Housing etc can be provided in a much lower cost in the new city. The new city can usher in a happier life in modern housing colonies with well planned, schools, hospitals, shops, libraries, sports facilities and social and community centres. The new city on the new land can also be further developed without increasing the density of population, by planning a horizontal growth in contrast to the vertical growth of the city in the present Bombay. The twin city can even meet the problems of population of over 10 millions in a much more economical and better way.



provided in a much better city. The new city will have a better life in modern houses, well planned, schools, hospitals, sports facilities, community centres. The land can also be further used by increasing the density of planning a horizontal growth of the vertical growth of the present Bombay. The city must meet the problems of the millions in a much better way.



VIBRATIONS IN STRUCTURES

R. M. JOSHI M. E. (HONS)
Lecturer in Civil Engineering

SYNOPSIS

Vibrations are caused in structures due to various reasons. The effect of vibrations on buildings and machine foundations have been studied by various authorities. An attempt is made here to review the cause of vibrations, their effect on structures and suggest the remedies for destructive effects of vibration on these structures.

INTRODUCTION

It is known that the structures are subjected to vibrations due to various reasons. Some of them are earthquake, blasting, moving loads on the structure, fast moving machines, air fans and machines put up in the structure. The same damage to structure is caused by these vibrations.

The vibrations are in two types depending on the source. (1) Natural vibrations of the ground-earthquake vibrations.

These vibrations due to earthquake are very difficult to forecast the occurrence of the earthquake also. It does not cause much and cause more damage to the structure.

The other vibrations can be caused by machines. Their effects on the structure are not so much. These vibrations can be studied and their effects on structures can be studied and suitable measures can be taken to reduce them or modify them before they cause damage.

MEASUREMENT OF VIBRATIONS

The vibrations are measured in terms of the amplitude of the vibration.

Amplitude can be defined as the maximum displacement of the vibrating body from its position of equilibrium. Frequency of the vibration can be defined as the number of cycles per unit time say per second and it is normally denoted by 'f'.

All measuring instruments for vibrations make use of inertia of a body, i.e. tendency of a heavy body to remain in its own position. This can be easily seen from suspending a heavy plumb bob from the hand and observing its movements as the hand is also moved.

Whenever the frequency of the vibrating body and the source which causes the vibrations are same they are said to be in resonance. In this condition the effect gets added and it is dangerous to the structure.

Vibrations are classified as free vibrations and forced vibrations. Vibrations caused in a spring by an impulse or sudden application or removal of external force are called free vibrations, while whenever there is a load applied in addition to the gravitational force the vibrations caused are called forced vibrations. Forced vibrations can be subdivided as shock excited vibrations such as caused in the case of a house subjected to sonic bangs from aircraft. Continuous stationary random vibrations occurs very rarely in civil engineering works. (Ref. No. 2). Harmonic vibrations occur widely and usually are in between these two types or compounded from two types or more.

The building vibrations can be measured with the instrument known as building vibrator (Ref. No. 7). While more sophisticated instruments can be used for measuring vibrations caused by various reasons. They range from simple instrument to elec-

tronic instrument, and strain gauges (Ref. No. 2).

4. EFFECTS

Effects of vibrations are manifold. They depend on vibration intensity, the source and distance from the source. Human sensitivity also should be considered. It was seen that limit of tolerable vibration due to frequency of 25-1 is 5×10^{-3} inch. While vertical vibrations caused due to 30 mph electric train will cause amplitude of 2×10^{-3} inch at the frequency of nearly 24 cycles, at 20' from the train (Ref. No. 5). The vibration is unpleasant if the acceleration reaches a value of 0.04g to 0.05g (g being gravitational acceleration). But structural damage caused by this type of vibration is very rare.

Earthquake is the most severe hazard which a building may be subjected on account of vibrations. In this high values of horizontal accelerations and large amplitudes of motion occurs. The Masonry buildings may not stand these magnitudes of accelerations and vibrations due to it if proper care is not taken. Tall buildings often have sway period of 1 sec. and there is a possibility of resonance with earthquake which is more or less one (Ref. No. 1). Hence tall structures are likely to get damaged to a larger extent. The water towers, bell towers, with heavy top portions will have deflections and sway and thereby increase the stresses beyond the permissible limits. This is a dangerous condition for safety of the structure as a whole.

Attempts have been made to assess the effects of vibration on structural units. The results of the various investigations can be summarized as follows:

Cracking of Plaster

It has been observed in the experimental set up that if no damage occurred for the plaster within the first few minutes of sus-

tained vibration, then it is unlikely to occur even after some hours of continued vibrations of the same intensity.

For damage to plaster it is necessary to have large amplitudes of vibration of order of 0.1". Acceleration required for the same result is of the order 1 g. (Ref. No. 1).

However it is interesting to note that even from a severe source such as blasting or pile driving and forge hammer operations the amplitudes of vibrations in nearby structures are not likely to exceed 1/10th of the above value (Ref. No. 1).

Glass Panels

Vibrations and shock transmitted to a building through ground is unlikely to cause damage to the glass panels unless the shock is of severe nature. However vibrations set up by high speed aircrafts flying at low altitudes have been known to cause damage to window glass panels. This is because of increase in the air pressure upto 5 lbs ft² caused by vibrations set up by these planes.

Damage to Brick Work

This was observed by conducting various experiments on brick work of different length to height ratio. It was concluded that if the amplitude of ground vibration did not exceed 0.0082" there is no risk of cracking of mortar. Critical amplitude for brick work is taken as 0.15". At 0.24 amplitude the brick work is entirely destroyed. (Ref. No. 1).

Floor Vibrations

A vibration having amplitude of about 0.02" at frequency 5 cycles/sec and 0.001 at 30 c/s is unpleasant to people using the floor. The timber floors can withstand large magnitudes of static deflections and hence severe vibrations will not cause failure.

Most of the domestic floors have resonant frequency in the range of 10 cycles to 30 cycles per second. If they come in a

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case as the source there is a reso-
and the amplitude of the floor system
go up to 10 times that of any other part
structure. Thus floor vibrations are
most severe. (Ref. No. 1).

Section of Fatigue

is observed that effect of vibrations
by the machines to structures is
not few weeks or months rather
years. Additional stresses caused by
are very small for structural damage.
The effect is more on plain concrete or
work where there is a possibility of
long tensile stresses. While in the
of steel, r.c.c. and prestressed concrete
effect of fatigue is very less.

Earthquake damages are only case
it is not possible to forecast it and
effect is to investigate it experimentally.

Earthquakes can be classified into
Frequent earthquakes; (2) Maxi-
mum probable earthquake; (3) Abnormal
earthquake. Depending upon the im-
portance of the structure, zone in which it
is located the structures can be designed
for the appropriate earthquake.

In Zealand during earthquake tail
chimneys failed at roof level.
The tiled roof of Nelson college

got damaged. The top heavy warehouse
got distorted due to lack of sufficient hori-
zontal bracings. The poor foundations
caused some buildings to tilt and some to
overturn completely. (Ref. No. 7).

However a study of damage due to earth-
quake shows that fortunately there is a
seldom serious structural damage to the
wooden houses. Even 4" x 4" wooden frame
can have a considerable resilience and can
withstand great deal of distortion before
structural damage can occur. The reinforced-
or steel framed buildings possess both
strength and flexibility and they can be ex-
pected to remain sound after even a large
earthquake.

5. REMEDIES

The structures are designed with sufficient
factors of safety for vertical loads. But
even with a small horizontal force of say
0.1 W where W is the total weight may
cause the tension in the masonry structure
where it is not desirable. It can be seen
from calculation as shown below consider
a 3 meter high wall pier with thickness of
30 cms and 0.30 meter in length. Accel-
eration is taken as 0.1 W (Ref. No. 4).
Weight of brick masonry is 1920 kgs/m³.



M	1.50	172.80
F	259.20	kgm
Z	1	30
	6	1

$$4500 \text{ cm}^3$$

M	25920
Z	4500

$$5.75 \text{ kg/cm}^2 \text{ tension or compression}$$

Hence resultant stress at lowest section.

$$f = \frac{1728}{900} = 5.75 \text{ kg/cm}^2$$
$$= 1.81 \pm 5.75 \text{ kg/cm}^2$$
$$7.56 \text{ kg/cm}^2 \text{ compression}$$
$$3.94 \text{ kg/cm}^2 \text{ tension.}$$

Even though tension is small it is not desirable in the brick masonry.

The various methods to eliminate or avoid damage to structures on account of vibrations which are used so far can be summarized as follows—

Length to width ratio should be less than 3. The structure should be light, and C.G. should lie as low as possible. The vibration periods of earthquake have a rate of 1 to 2.5 seconds. The self vibration periods of r.c.c buildings vary between 0.30 and 0.50 seconds for buildings upto 27.50 meters in heights. For greater heights vibration periods may be similar to those of earthquakes and hence there is a possibility of resonance for building higher than 27.50 meter height, so greater heights should be avoided. If it is not possible the detail dynamic analysis and model analysis should be carried out for investigations. (Ref. No. 4)

The steps for protection from vibrations can be summarized as follows.

(1) All design calculations should be done by IS 1893 for earthquake resisting structures.

(2) Tie all parts of the building firmly so as to deflect the entire structure as one unit and hence reduce vibrations.

(3) Arrange floors and crosswalls continuously throughout the building try to arrange symmetry for cross walls.

(4) Keep openings away from outside corners so that there is a effective bond between two walls which are at right angles to each other

(5) Try to arrange approximate coincidence of centre of mass and centre of rigidity otherwise take forces due to rotation into consideration. This can be done by avoiding more openings in one side of the room.

(6) Separate out adjacent buildings or parts of the same building of different stiffness with joints suitably designed which are called crumple sections. This will localise the damage if any separation should be carried out upto foundation.

(7) For minimising timber floor vibrations arrange the joists in a such a way that the deflection of it would not exceed 0.034 in. under a concentrated load of 222 lbs. (Ref. No. 1).

(8) Arrangement for the fire protection should be done as fire normally breaks out after the earthquake

Measures to reduce vibrations in structures. Following precautions should be taken to reduce the structural vibrations. (Ref. No. 1).

(1) Provision of the trenches around the building after investigating insitu properties of soil in regard to the transmission of waves through it.

(2) The use of sand and gravel under the foundation.

(3) The choice of the most suitable building material and type of construction

(4) The insertion of special antivibration pads under beam supports and column bases.

(5) Mounting the complete building or particular part of it on a suitable spring system.

If vibrations are caused by Machinery then the following measures can be taken (Ref. No. 3).

1) Investigate the possibility of the reduction of the speed, which may reduce the frequency and hence resonance will be avoided. It is observed that even 3 to 5% reduction in the speed the amplitude changes to the great extent. (Ref. No. 3).

2) Wherever it is not possible to change the speed it is necessary to change natural frequency of the structure. This is generally done by increasing its rigidity. This in turn depends on machine, foundation and vibration etc.

3) To decrease the vibrations in the walls of the room of the machinery it is necessary to take it out from resonance. This can be done by providing the R.C.C. walls and counterforts.

4) For decreasing the vibrations in external wall, the wall can be tied to the frame structure with r.c.c. antiseismic belts installed in the wall at the level of each story.

Methods for decreasing vibrations of existing foundations.

1) In case of Reciprocating engines suitable counter weights should be designed so that inertial forces in moving parts of the crank mechanism will be reduced. The counterweight, its distance from axes of rotation can be suitably designed.

2. Chemical stabilization of soil.

Soil stabilization is used to increase the rigidity of the base and consequently increase in the natural frequency of the foundation. The limit of stabilization zone type and their shape can be decided after detailed investigations. Normally the depth 1 to 2 meter and 30 cms beyond the edge of the foundation is sufficient.

3. Structural measures.

The difference between the two natural frequencies i.e. foundation and machine should be increased. This is done by in-

creasing the area of contact, increasing the rigidity of its base by means of piles. Two machine foundations which are very close may be attached to each other. If additional bars are left additional mass of concrete can be put up. Heavy slab may be attached at a suitable level to the existing level of foundation to decrease foundation

Conclusions

(Structures are subjected to vibrations due to various reasons. These vibrations can be measured with simple to highly sophisticated electronic instruments. Dynamic design considerations should be given while designing these structures. For existing structures subjected to vibrations a thorough study is necessary and a suitable measurement can be employed for reducing the vibrations).

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(5) Structural precast concrete by C. W. Glover.

(6) Structural design in Steel Masonry and Timber by A. S. Arya

(7) Earthquake by G. A. Ljby.

(8) Indian Concrete Journal, Dec. 71.

(9) Vibration Problems in Engineering by Timoshenko and Young.

ELEMENTORY CONCEPTS OF

INTEGRATED CIRCUITS

By PATEL DEEPAK MOHANLAL

B. E. (Electrical)

THE performance and availability of Electronic equipment is being greatly affected to an increasing demand by the semiconductor manufacturers. The contribution of new semiconductor product developments in a space age electronics and in a defence field increases rapidly. Although the integrated circuit developments started since last one decade, it can provide lesser cost, competitive advantage and higher performance, and even new product feasibility to the space age solid state electronics.

A small chip of solid material generally a semiconductor upon which, by various techniques like diffusion processes, an array of active and/or passive components have been fabricated and interconnected to form a functioning circuit. Thus it is possible to fabricate transistors, diodes and capacitors within a single wafer of silicon. The elements of these circuit can be isolated from the silicon substrate by a reverse biased junction and interconnected to form a complete circuit, by evaporating leads across the insulating oxide. A typical digital network contains 16 transistors, 4 diode and 16 resistors (totally 50 K 11) in a 50-by-50 mil wafer. Circuits are commonly available in flat packages. Most of the integrated circuit utilize a semiconductor such as germanium or silicon part of which performs as a passive device like semiconductor

resistor, diode and junction capacitance and part of which performs as a active device like transistor, tunnel diode etc.

Fig. One shows a solid integrated circuit device. The circuit shows the 'P' substrate into which several active and passive components have been integrated.

Two different approaches have been followed in terms of fabrication techniques employed, one centering on active device techniques used for building transistors the other centring on passive device used in fabrication of resistors and capacitors. The construction of a simple integrated circuit is as follows.

The substrate of integrated microelectronic circuits is a paper thin silicon wafer which is sliced from a crystal grown with an impurity to make it either 'p' or 'n' type. The following are the steps in processing one of the many circuits on a single wafer. The completed circuit contains number of resistors as well as two transistors made up of alternating 'p' and 'n' type layers.

The substrate, in case of 'p' type material (Fig. 2) is exposed at a high temperature to a gaseous silicon compound containing an 'n' type impurity forming a layer of 'n' type silicon, while still hot the surface of 'n' type layer is converted to protective sil-

CIRCUITS

DEEPAK MOHANLAL
B. E. / Electrical

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'p' type material
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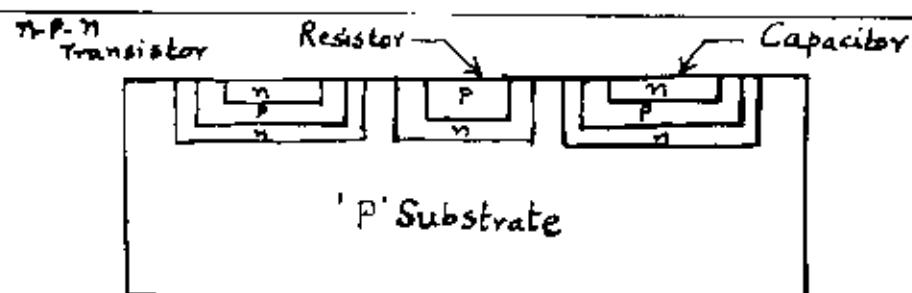


FIG. 1

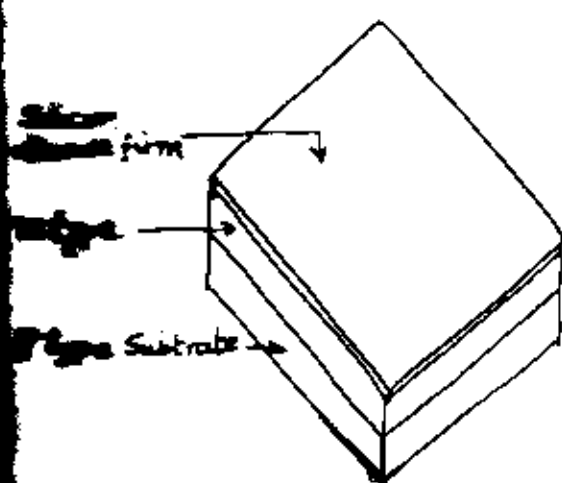


FIG. 2

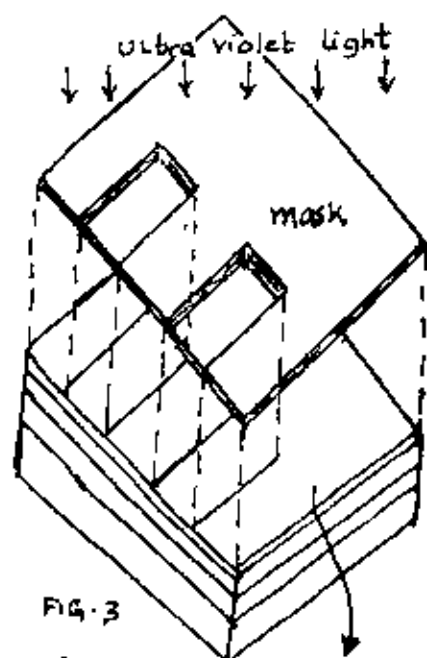


FIG. 3

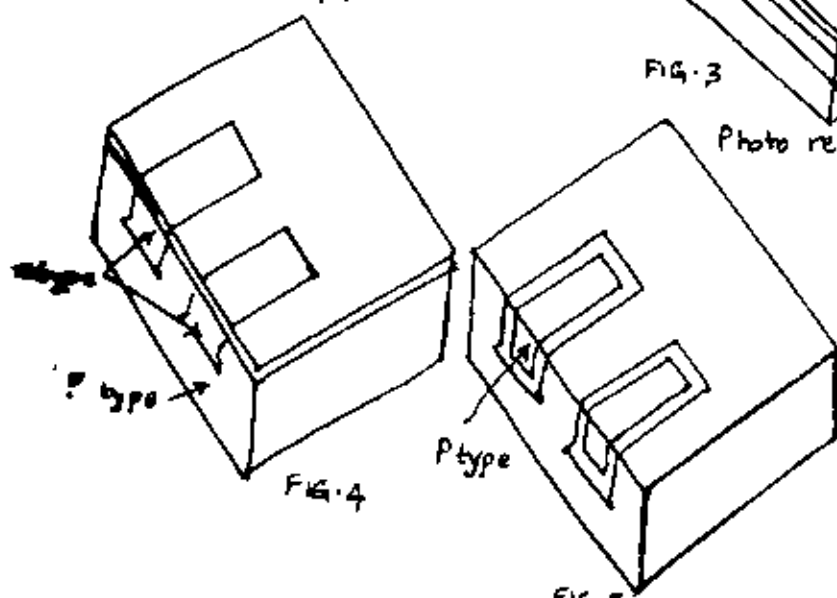


FIG. 4

FIG. 5.

con dioxide film, producing a three layer structure.

Using a masked photographic technique specific areas are treated with a photographic emulsion (Photo resistance Fig. 3) and ultraviolet light to form a barrier to the diffusion process that follows.

The subsequent 'p' type diffusion leaves two islands of 'n' type material, parts of which will form the collector of transistors (Fig. 4).

Using similar procedure 'p' type region are then diffused within the 'n' type islands

followed finally by 'n' type regions that are diffused within the 'p' type regions. Part of the 'p' type material will form the bases of the transistors, all of the final 'n' type material will form the emitters of the transistors.

The principle advantages of I.C.'s are extremely small size, potentially low cost and high reliability. The practical fabrication of microelectronic integrated circuits are still possible in which all the elements of the circuit transistors, diodes, resistors capacitors are included and all connections are an integral unit. Due to light weight, it is extremely reliable in military system.

★ ★ ★

DID YOU KNOW.....

R. SRIDHAR F.E. III

That a wheel-less electro-magnetic train has been designed in West Germany which runs on magnetic fields just a centimetre above steel rails mounted about a foot above the ground?

That solar energy is used in a telephone where the one watt of power required to operate the transistorized radiotelephone is generated by the sun's rays collected through a panel of photoelectric cells?

That wood can be made as strong as steel by treating with ammonia and then compacting under a pressure of about 255 pounds per square inch?

That the fourth state of matter is plasma which is in general a kind of highly ionised

gas, a mixture of free electrons and positive ions appearing electrically neutral?

That the proposed Boeing SST will have an overall length of 306 feet, a wing area of 9,000 sq. feet, a height of 48 feet, maximum take off weight of 675,000 lbs., a range of over 4,000 miles at a normal cruising altitude of 64,000 feet?

That oxygen and hydrogen atoms in a water molecule H_2O are bonded at an angle of 104.39° ; if only the angle was greater, water would have been a gas like hydrogen sulphide?

That according to a survey taken by the Education Ministry in 14 universities only 6 per cent of the books prescribed to the engineering students are by the Indian authors?

★ ★ ★

Can We Quench Their Thirst?

Vijay R. Nadkarni
B.E. (C)

IN a land of shortages like ours where lack of drinking water creates a serious problem almost every year, much more emphasis must be laid upon increasing the quantity of drinking water by methods other than the orthodox ones viz. those which depend upon the collected stuff in the reservoirs. The orthodox methods are unsatisfactory in two ways. Firstly they can't cope with the increasing demand and depend upon the mercy of the annual rainfall. Secondly, they can't be employed in lands where rich rivers or streams are rare or the rainfall is poor. Unfortunately we have squandered the unlimited stock of water that has been gifted to us in abundant measure by nature herself. Our country is surrounded by oceans from all the sides except the north. If we are able to remove the undesirable salty matter economically and easily from sea water, the problem may not be so pinching as we think today.

As we are heading to short circuit the natural hydrologic cycle by manufacturing fresh water directly from sea and also claim it's technically feasible, it must be tested whether the water so produced would compete water from natural sources economically. If careful investigation is done, it is found that sea water contains about fifty elements. Fortunately many of them are present in such small quantities, that they may be tolerable in most of the uses for fresh water. The largest concentration may be of chlorine, sodium, magnesium, sulphur, calcium and potassium. Their presence upto 1000 ppm is desirable with the limit of 500 ppm for human consumption, though actual presence may vary from 100 ppm to 35000 ppm.

The average salinity of ocean water may be taken about 35 gms. of salt per 1 kg. of sea water. If the contents of salt are very high, the separation of water from salt proves to be more economical than separation of salt from brine. The general methods that have been used are either the distillation systems or freezing systems. In the former, a unit of multiple-effect-evaporator may be used; as has been installed in Kuwait having the capacity of 5,000,000 gallons per day. Such units are designed to recoup a sizable portion of the latent heat of water vapour. Initially, steam is supplied to the first effect evaporator which vapourises salt water partially. This heated vapour is passed through a secondary operation so that it condenses and heats more sea water, the vapour of which passes through the third effect where it condenses and heats more water. The freshly produced vapour ultimately passes through a final condenser where much of the remaining heat is extracted and is transmitted to the inflowing raw salty water. [Fig. 1]

Recently vapour compression evaporators are designed which work on the heat pump principle. In this method, a pump is used to withdraw vapour from an evaporator shell. It's compressed to increase the condensation temperature and brought back to heat exchanger in the shell. Here its latent heat is utilized to produce fresh water and evaporate more saline water. This method is more efficient than the previous one. [Fig. 2]

R. C. D. Hickman has invented a rotating evaporator condenser yielding high overall heat transfer coefficients. This reduces

Fig.1 MULTIPLE EFFECT EVAPORATION.

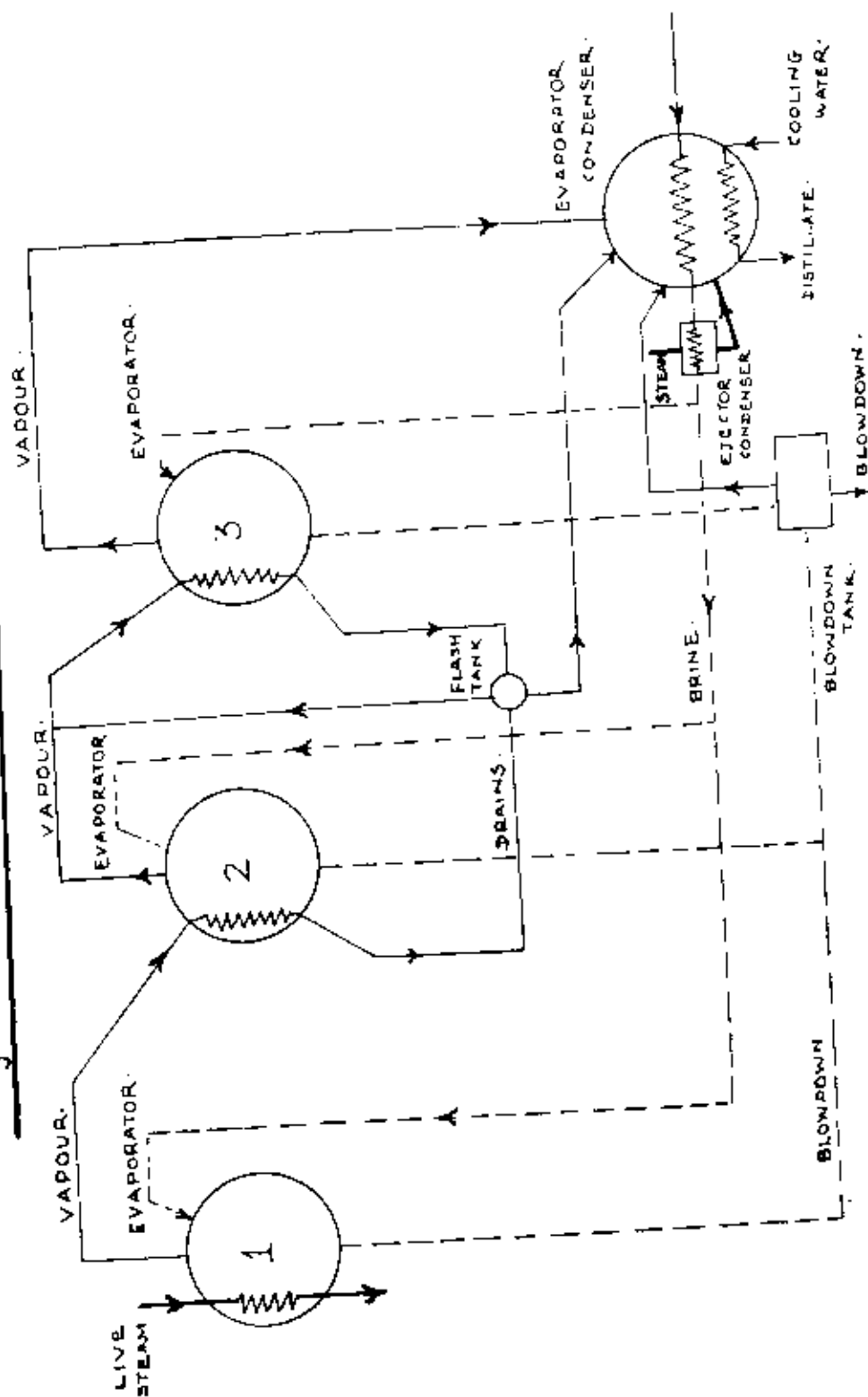
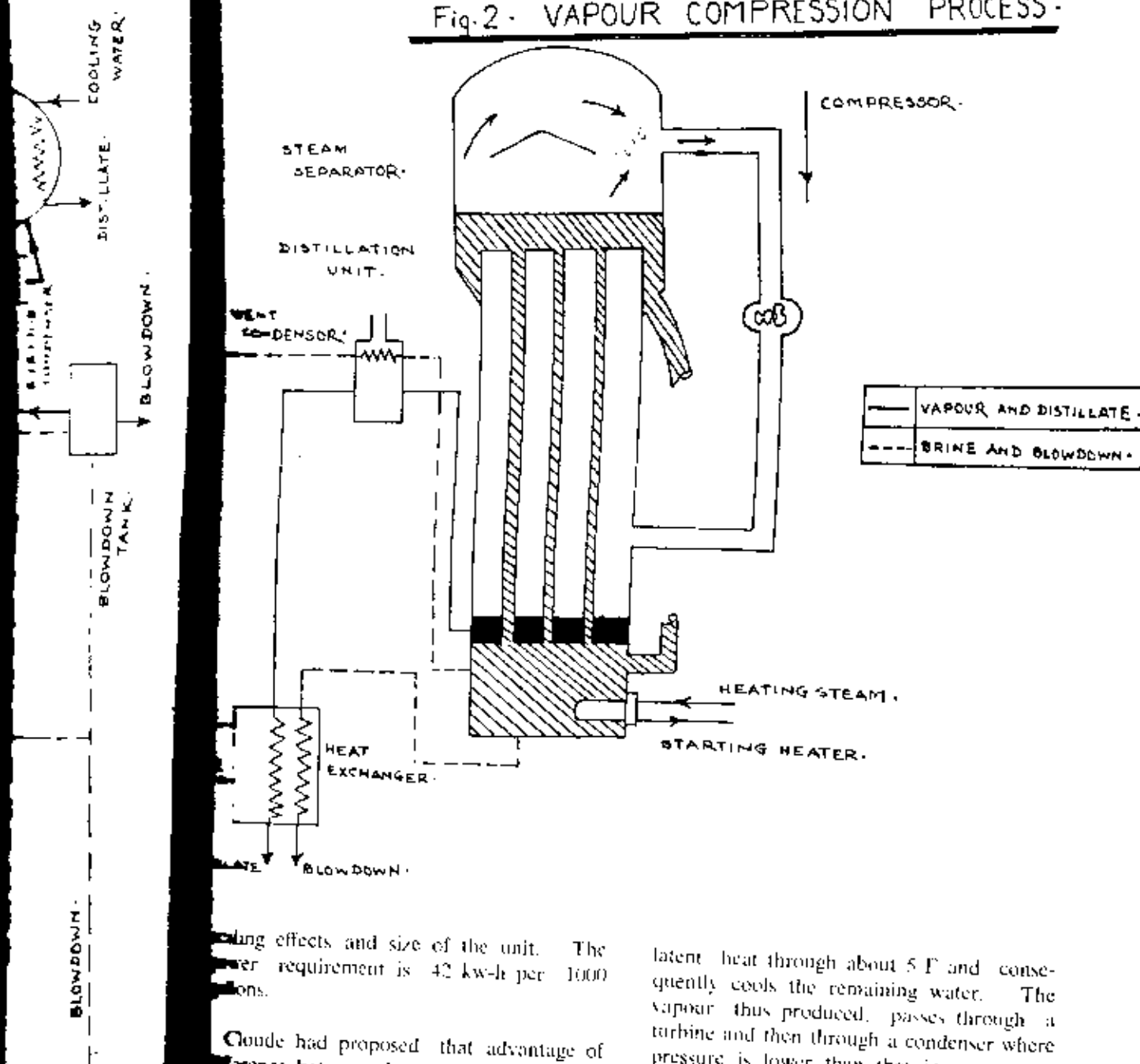


Fig. 2. VAPOUR COMPRESSION PROCESS.



ing effects and size of the unit. The power requirement is 42 kw-h per 1000 tons.

Cloude had proposed that advantage of difference between the temperature of surface water and deep water of oceans can be taken to produce potable water. The method is modified by the scientists in California. Warm sea water is piped into evaporator under reduced pressure. A portion of the water evaporates gaining its

latent heat through about 5 F and consequently cools the remaining water. The vapour thus produced, passes through a turbine and then through a condenser where pressure is lower than that in evaporator. The vapour is condensed by colder sea water.

Solar-energy evaporators have been used commonly since World War II. It consists of glass covered wooden trays to hold brine and pipes are installed to fresh water condensate after it has formed on the inside of

the sloping glass. The solar energy, after passing through the glass, heats the bottom of the tray. It's remitted in the infrared range to be trapped in the still. This evaporates water which condenses on the glass. The method is undergoing improvements and efficiency of 35-50% of the solar energy is reported. This method is disadvantageous in regions where utilization factor may be imposed by gloomy weather.

In the fractional freezing methods the fresh water ice crystals are separated from saline water. The latent of vaporization of water is seven times its latent heat of fusion. Though the difference is insignificant in operations where heat is recovered, the efficiency of recovery is limited. Particularly when freezing temperatures are involved effective heat transfer is more difficult and costlier than for processes occurring at high temperatures. Also separation difficulties are to be faced due to ice crystals entrapped in the saline water. Recently, the frozen slurry is washed by countercurrents.

Sometimes Osmotic Systems are also found interesting. When fresh water and saline water are separated by a semi-permeable membrane in a cell, the fresh water diffuses into the saline water till the pressure equilibrium is reached. It's possible to reverse the flow by inducing greater pressure on the saline side than equilibrium osmotic pressure. The value of reversal pressure is about 350 lbs per square inch for sea water. This is more economical than the heat exchange processes as it doesn't involve heat losses. The membranes of cellulose acetate

are found to be very efficient for osmotic systems.

Friends, you may be surprised to hear that the scientists are thinking of exploding nuclear bombs to convert sea water to fresh. The idea was proposed by Livermore Laboratory of University of California and was supported by Atomic Energy Commission. It involves exploding a thermonuclear bomb of one MT at the bottom of a well about 6000 feet deep, reaching into a thick salt stratum. The well would be located in the ocean off-shore so that sea water would flow under gravity down through one of two concentric pipes to the cavity formed by explosion. The cavity would be filled with molten salt acting as heat reservoir. After converting the sea water to water vapour, the vapour would rise in the other tube condensing to liquid fresh water and would transfer its heat to downward flowing sea water in the pipe. Though the method is in its initial stages it is believed that the method may prove to be more fruitful than other methods. The low cost of thermal energy for a bomb, low cost of equipment, a well and piping and avoidance of cost of constructing reactor are the features making it economical.

In this age of scientific advancement, it's shameful that thousands of people die of thirst in the famine hit areas every year. These modern methods would prove to be a blessing to the millions living in deserts in India. In the overpopulated cities like Bombay where water shortages are frequent, these methods would prove to be the showers of nectar.



SUPER FLYWHEEL CAR

A SOLUTION-TO AIR POLLUTION?

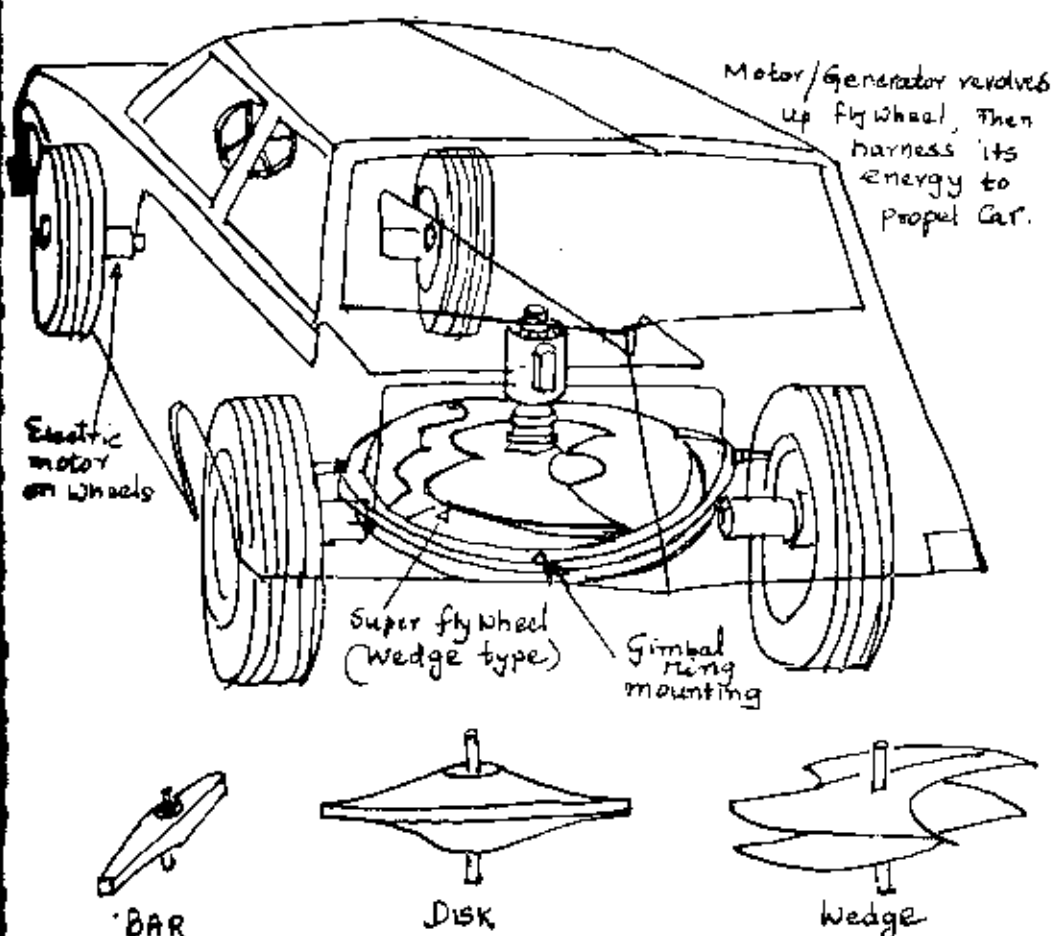
By RAJAN M. BADLE S. E. (ELECT)

WITH today's fast developing traffic conditions, even a layman knows something about the much talked Air Pollution problem. Nearly all progressive cities are affected by it. Among the worst affected are New York, Washington and many cities in Japan, Bombay and Calcutta are following the same path, though it is mainly due to the out of date vehicles still in use. Many efforts have been made to minimise the EMISSION of Inter-

nal combustion engine but it still has a certain minimum.

The Super Flywheel car originated by D.W. Rubenhorst, an aeronautical engineer at John's Hopkins University USA, may perhaps be a solution of this serious problem.

The tiny 975 pound car has no engine or batteries to propel it but it can speed from standstill to 60 mph in just 15 seconds and cruises at 55 mph.



A glance into the rear compartment shows what propels it. A 222-pound flywheel 30 inches in diameter and revolving at 2370 RPM in a vacuum can. At this speed the velocity at the edge of the flywheel is 2000 mph. By whirling so fast the flywheel can store energy sufficient to drive the minicar for two hours at cruising speed or 120 miles. After that the flywheel can be revolved up enough to run for equal duration within 24 minutes with the help of the electric motor.

Flywheel is an energy storing device just like an accumulator. The maximum energy that can be stored in it before it is torn by the centrifugal forces depends upon the maximum speed it can attain which in turn depends upon the strength of its material.

Till now the flywheels have always been made of materials equally strong in all directions. But Rabenhorst's Super Flywheel uses instead, a material very strong only in the outward direction of the stress.

Strong wires like high strength steel music wires have tensile stress of about 600,000 pounds per square inch are very strong along their length than the parent material in the bulk form. The wires could be bent to form radial filaments to make a super flywheel. The high strength boron or graphite fibres and very strong and pure crystals called whiskers embedded in plastic or metal provide excellent materials. The fibres or whiskers could be so aligned as to give extra strength in radial direction. The super flywheel made of these materials could be of any shape such as bar, wedge or disk shaped as shown in the figure.

The super flywheel provides a light and compact energy storing device. The super flywheel made of present day material can store about four times the energy per pound as today's storage batteries. And this super flywheel made of new material can

store 23 million foot pounds of energy safely, enough to take the 1300 lb car with its 325 pounds payload to the top of an 18,000 ft. high mountain.

To charge, the super flywheel has an electric motor which is just plugged into an outside power source to run the rotor up to the required r.p.m. Then the motor becomes generator being driven by whirling flywheel and supplies current to the individual electric motors on the car's wheels. The motor generator and flywheel are linked with a magnetic couple using $3\frac{1}{2}$ inch magnetized disks which require no direct connection through the vacuum can.

The conventional brakes are replaced by the motor generator itself. Thus the kinetic energy of moving car is recovered instead being wasted and is fed back in the wheel. This reduces the operating cost of the minicar which is estimated to be about 0.8 paise per mile. Unlike batteries flywheel can be charged and discharged infinite number of times without any loss in efficiency.

A simple tachometer (rpm dial) shows the energy still left in the flywheel and it should be recharged. If you by chance happen to ignore the warning and the wheel runs down on road, all you have to do is press a button and a small auto-charger spins it fast enough to get home. This charger could be a small fuel hot gas turbine or even a four horsepower super flywheel kept only for the emergency power.

Even the hydraulic motors drive pumps mounted in tandem could run the wheels. They give the positive synchronization of wheels speed for non-skid which is the distinct advantage of electric motors. (Relief valves could prevent differential wheel speed in turns).

Super flywheel could run many things besides the car such as silent and

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1300 lb car with its
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flywheel has an elec-
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free boats, scooters and power tools
like drills and saws which could do away
with electric cords. A separate charging
motor unit could be provided permanently
in the workshop and the tools could be
brought to it and magnetically coupled to
charge the flywheel.

A few vehicles have actually used the
flywheel power during recent years. A 70
passenger Swiss bus was propelled by a
3300 pound 64 inches flywheel which could
run it for more than 30 minutes. At each
bus stop, it would raise contact arms to the
electric supply lines and recharge the fly-
wheel for 2 minutes. According to Raben-
horst, the bus could have travelled entire
route without recharging with the help of
the Super flywheel. To overcome air drag,
the flywheel of the Swiss bus was made to
spin in hydrogen atmosphere. The small
conventional flywheels used in modern air-
craft control have speeds about 5000 to
9000 rpm, and to keep one such rotor in
motion would take 160 h.p. hence the fly-
wheel is made to rotate in high vacuum of
100 atmospheres.

Like a gyroscope the flywheel precesses
it tilts according to motion of the car and
the increases load on the bearings hence in
Rabenhorst's car the flywheel is mounted on
gimbals so that it can tilt freely in any direc-
tion unrestrained by the bearings.

Rabenhorst's Super flywheel project was
revealed in his 60 pages report "*Primary
Energy Storage and the Super Flywheel*"

sponsored by U.S. Naval air systems com-
mand.

Since then a couple of important improve-
ments were made: (1) an extremely effec-
tive high vacuum seal which permits the
flywheel shaft to extend outside the
vacuum can and (2) an improved bearing
that makes this possible. Magnetic particles
suspended in liquid give a magnetic fluid
which can be held around the flywheel shaft
to form the new "ferrofluid seal". The new
air bearing has no solid parts in contact and
it supersedes the dry lubricated bearings,
furnished with Molybdenum disulphide
within the vacuum can.

Ideally mass of the flywheel would be all
in its rim and for advantage of maximum
lever arm and most kinetic energy from fast
running they are made heavily rimmed. It
would be true for the unbearable flywheel
which unfortunately does not exist. But
Rabenhorst discovered that a plane disk
flywheel can store 50% more energy than
heavy rimmed one and flywheel bulging at
centre can store further 50% energy.

Hence Rabenhorst suggests that a simple
super flywheel could be a bar shaped bundle
of wires clamped at the centre and free at
ends, like a wire brush rotating on central
axis.

It will not be very long before we see
Rabenhorst's Super Flywheel cars on road,
for model testing has already been proved
to be successful.



Solid State DC Motor Speed Control

Contributed by: **A. VIJAYAKUMAR** B.E. (Elect.) M.E. (Elect.) (Electronics)
(Associate Lecturer in Electrical Engineering.)

On account of sustained research in the field of solid state devices, it forms an important link between applied electronics and electrical machines. Industry demands certain performance from a motor under certain specialised application. By the circuit techniques of applied electronics and available motor characteristics any types of required motor characteristics can be evolved. Where constant speed is required, with increase in torque, electronic speed control is the only solution which will be economical.

For constant speed requirement, a shunt motor is invariably employed, as it has an inherently good speed regulation. With application of torque, the speed falls a little as in figure 1.

Electrical parameters that affect the speed of a motor are, the input voltage and the field current. From the functional equations of the motor, it can be deduced that speed variation up to the rated speed, can be achieved by varying the motor voltage upto the rated level with the field current being constant and the speed variation above the rated speed can be realised by reducing the field current with the motor voltage being constant. These electrical functions are achieved electronically.

Controlled voltages and currents are fed to the motor circuit by electronically controlled rectifiers. The moment when the motor operates from the controlled rectifier, its speed torque characteristics worsen as in figure 1 due to inherent functional mechanism of the electrical equivalent circuit of the motor together with the characteristics of the controlled rectifier. This makes it more necessary to incorpo-

rate a feedback control system to compensate the speed drop.

A system of speed control of a DC shunt motor is given in block diagram 2. The block diagram clearly indicates the direction of signal flow in the feed-back system. Figure 3, gives a detailed lay out of the control circuit.

The controlled rectifier consists of a hybrid bridge with two SCRs and two silicon diodes connected in a bridge. The bridge is fed from a single phase transformer. The SCRs act as electronic switches which can be made to close at a desired instant in an AC cycle. Consequently the out-put of the controlled rectifier can be varied as desired. The SCRs are triggered by a Unijunction Transistor trigger circuit. The advantage of the bridge configuration is that the transformer will not carry DC flux.

The unijunction transistor trigger circuit operates from a Zener-clipped full wave rectified voltage. This gives synchronisation with respect to the AC frequency as the peak voltage of the UJT varies in synchronisation with the AC cycle. Resistance R_1 provides a soft start system for the motor. Fixing the range of R_1 fixes the range of the input voltage to the motor. R_2 stabilises the operating point of the UJT against the temperature variation. Discharge current I_C through the primary of the pulse transformer in the B_1 lead of the UJT furnishes triggering pulses for the two SCRs in the hybrid bridge.

Connecting an NPN transistor across C , the discharging of the C can be controlled by furnishing a control current to the base of the transistor. This technique is termed

AUGUST MELODY

(Electronics)

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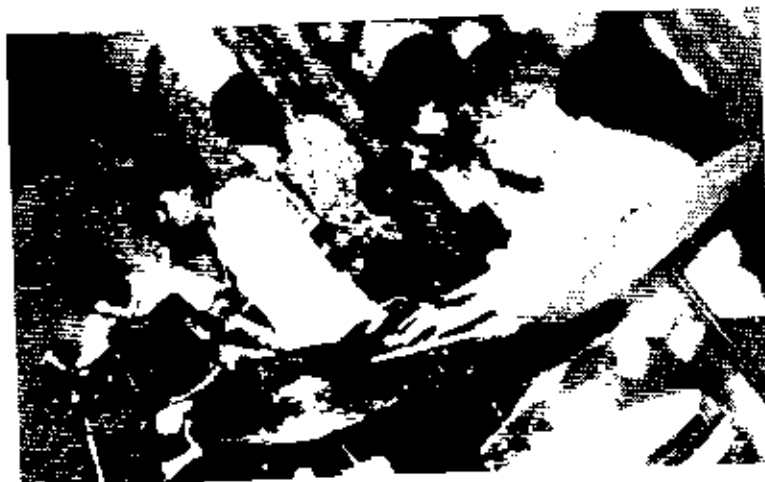
Honny Whisky in a hilarious mood



Distinguished Audience



Enjoying A Joke



Master Perilus 17 years old: Supurb Mastero Drummer



Babla Jr. and Party



The College Cultural Group

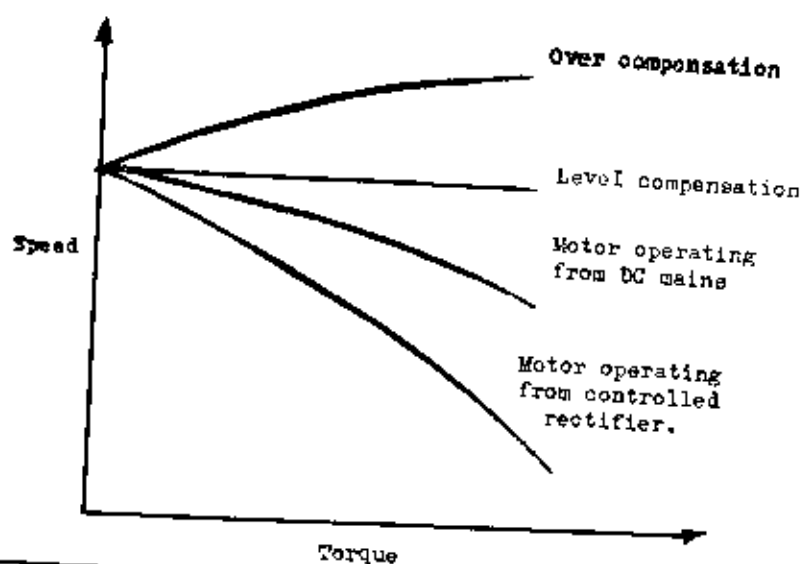
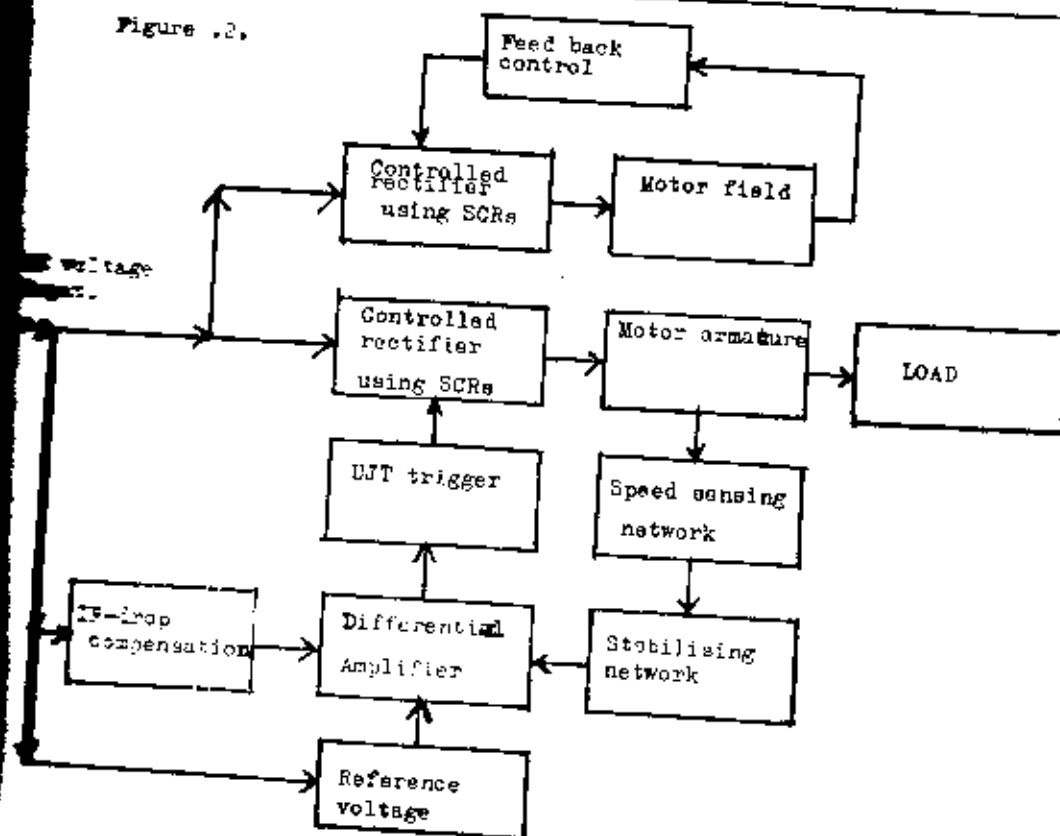


Figure 1.

Figure 2.



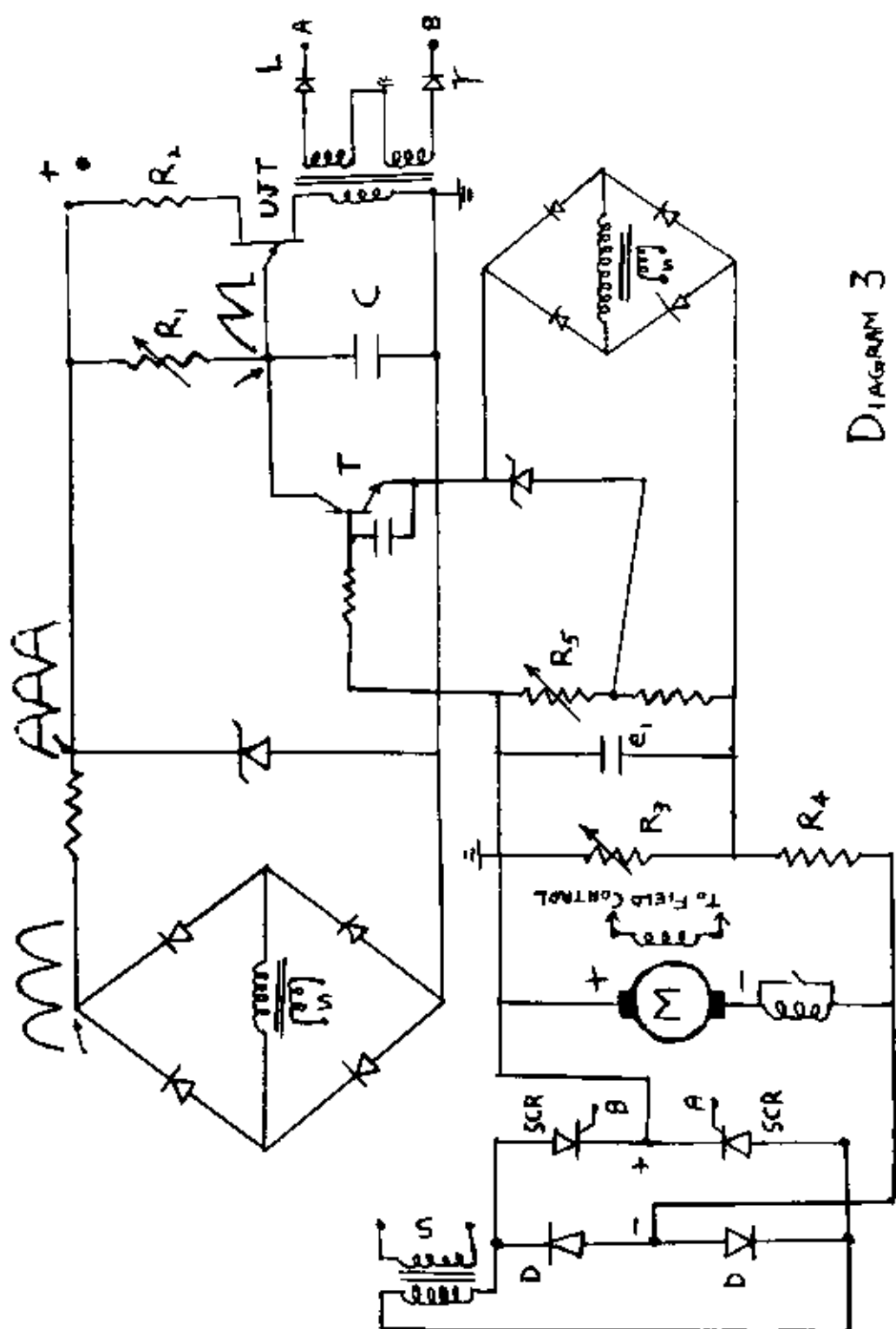


DIAGRAM 3



is a shunt transistor control of the UJT trigger.

The speed signal is a voltage approximately proportional to the motor armature voltage which is taken off a potential divider network (R_1 , R_2) connected across the motor armature. As the armature voltage waveform contains harmonics this voltage must be filtered to an effective level, otherwise cycle to cycle hunting of the unit may result. This voltage is proportional to input voltage to the motor armature. If a voltage proportional to the motor armature drop is electronically subtracted from the above voltage, a voltage truly representing the speed of the motor is available. This IR-drop compensation voltage can be easily generated by obtaining a voltage across a resistance, connected in the secondary of a current transformer, located in the AC line, which can be further processed by rectification and filtering. This voltage is introduced in series with the above voltage with the correct polarity. This speed signal is compared with a reference voltage and is fed to differential amplifier which controls the UJT trigger controlling the SCRs. Thus a change of the speed signal effects in a change of the output voltage of the controlled rectifier.

The action of the whole system is as follows. When the torque on the motor increases, the speed falls whereby the voltage across the resistance R_1 falls. The IR-drop compensation voltage increases. The speed signal changes timing of the trigger pulses so as to fire the SCRs earlier. By this action the motor voltage increases and hence the speed increases to a predetermined level. Also the error voltage reduces to zero and condition is stable. The speed level can be preselected by adjusting R_1 or by varying the reference voltage. IR-drop compensation must be adjusted, as it is a function of armature resistance. If the motor is provided

with a compound winding the IR-drop compensation can be magnetically obtained.

By adjusting the amount of feedback level, level compensation can be achieved as shown in figure 1.

The feedback system may show a tendency to oscillate (hunting). The hunting can be prevented by reducing the magnitude of the feedback or by interposing an anti-hunt circuit between the speed-sensor and the control transistor. Simple RC networks termed as lag-lead networks will prevent hunting. The design of antihunt circuits requires magnitudes of the time constants of the energystoring components involved in the system. Nyquist plots and Bode's attenuation plot facilitates the evolution of the stability of the system.

A similar controlled rectifier can be made to feed the field of the motor. The required voltage and the current level can be present in these rectifiers to obtain the required function of speed from the motor.

Effective functioning of the system depends upon the reliable firing of SCRs. Proper selection of the circulatory, SCRs, and triggering systems ensures this condition. The SCRs and the UJT must be protected from switching transients and over-currents. Proper coordination must be maintained in the protecting systems. A simple HRC fuse may be sufficient to protect the unit from over-currents. A Selenium zener diode can protect the system against over voltages. Electronic circuit breakers have been developed to effect quick removal of the fault from the unit.

A DC motor speed control using SCRs and UJT trigger has been designed and fabricated by the author in the post graduate research laboratory in S.P.C.E. under the guidance of Dr. Shah, Head of the Elec. Engg. Dept.

★ ★ ★

FINITE ELEMENT METHOD OF ANALYSIS

V. S. CHANDRASEKHARA (M. TECH.)
Asst. Professor of Civil Engineering.

[The recent developments in the field of Science and Technology demands new types of structures for which the past experience is either inadequate or totally absent. Heavy structures are to be located on sites which were formerly considered as highly unsuitable and rejected. The design and construction methods have brought revolutionary changes in Engineering. The rational methods of analysis in dealing with these problems have become a necessity. The finite element method is one of latest methods developed for the analysis of complicated structures. The finite element method as a tool of analysis is discussed in this article.]

Introduction :-

Most of the problems in stress analysis ultimately reduce to the determination of an appropriate solution of one or more differential equations with given boundary conditions. Even the two dimensional problems without body forces reduce to the solution of

$$\nabla^4 \delta = 0 \quad \text{or} \quad \frac{\partial^4 \delta}{\partial x^4} + \frac{\partial^4 \delta}{\partial y^4} + \frac{\partial^4 \delta}{\partial x^2 \partial y^2} = 0$$

where δ is Airy's stress function. only in the case of simple boundaries the differential equations can be treated in rigorous manner

When the differential equations cannot be integrated in a closed form, approximate methods of solution are employed. These approximations are based on a series of expansion such as Taylor Series or on some numerical methods, which lead to the evaluation of the unknown integral at specified points by simple arithmetical means.

The numerical methods have become quite popular in recent years for the two fold reasons, viz., (i) highly complicated pro-

blems which cannot be solved in a closed form can be solved by numerical Techniques by a reasonable accuracy (ii) and the numerical technique renders the problems to be easily programmed on a modern computer.

Finite Difference Technique and Finite Element method :

An approximate numerical method of wide application is the finite difference Technique. The finite difference Technique replaces the governing equations and the boundary conditions by the finite differences in terms of a finite number of unknown values of the dependent variables at a number of discrete points within or just outside the domain of Integration. The finite difference equations form a set of linear algebraic equations to solve the set of unknowns. The linear equations can be solved with the aid of a computer. Thus the finite difference Technique aims at providing a mathematical tool to the highly complicated problems in stress analysis.

The complexity in the stress analysis instead of taking recourse to an approximate numerical tool such as finite difference Technique can be solved by generalising the continuum into a finite number of elements. Thus the finite element method is based on the physical approximation of the continuum.

The finite element method is essentially a generalisation of the structural analysis procedure which permits the calculation of stresses and deflections in two or three dimensional structures by the same methods which are applied in the analysis of framed structures. In other words the Engineering structure is visualized as a net work of structural elements interconnected at a discrete number of nodal points. By knowing the force displacement relationship

ANALYSIS

(M. TECH.)
Engineering.

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of equations can
be solved on a computer. Thus
the technique aims at
reducing the highly
complex stress analysis.

stress analysis
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mation by finite difference
method by generalising
the number of ele-
ments. The element method is
an approximation of the

which is essentially
structural analysis
the calculation of
two or three di-
mensions. The same methods
are used in the analysis of framed
structures in Engineering
a network of
elements connected at a
point. By know-
ing the relationship

of individual elements it is possible
to study the behaviour of the assembled
structure. But in a continuum, the real
number of the interconnection points is
infinite and makes the numerical solution
highly complex. So the difficulty has
to be overcome by the concept of finite
elements. The idea of the assemblage of
elements for the continuum is not entirely
new. In a framed structure one dimensional
elements exist. But in the finite
element method a system of two or three
dimensional elements has to be made to

represent the continuum. The elements
in the finite element method have the
same material properties as the original
system. So the linear, non linear homo-
geneous and non homogeneous behaviour of
the materials can be introduced to the ele-
ments. The finite elements are based on the
physical approximation of the continuum
and there may not be any approximations
in the mathematical analysis. The finite
element method is a better and more versa-
tile technique for the analysis of even highly
complicated boundary value problems.

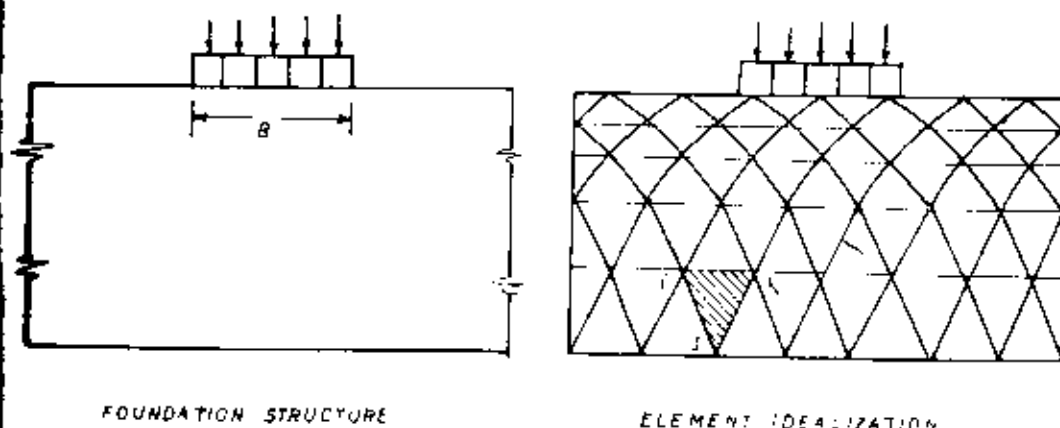
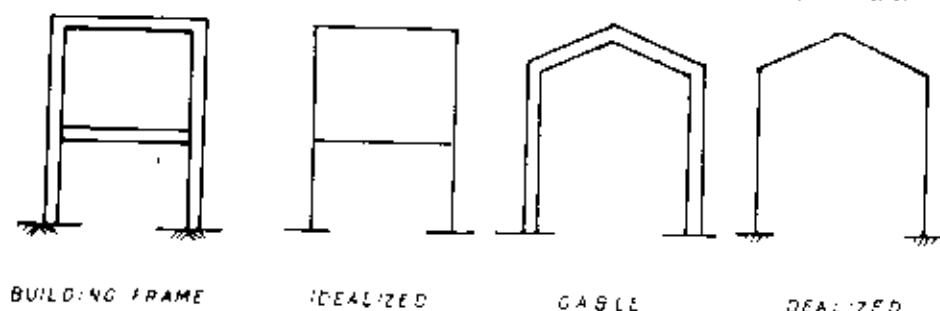


Fig. 1
IDEALIZATION

Basic considerations in the Analysis:

a) The continuum is separated by imaginary lines into a number of finite elements interconnected at a certain number of nodal points. This is called idealisation of the structure. The accuracy depends on the number, shape and size of elements. The shape of the elements may be triangular, rectangular or polygonal.

b) The displacement of the nodal points will be the basic unknown parameters.

c) The selection of the displacement function should satisfy the displacements of the nodal points and define the state of displacement within each element in terms of the nodal displacements. By establishing complete compatibility along the boundaries and within the element the state of strain is uniquely established.

d) These strains and the elastic properties of the material help to find the state of stress within the element and along the boundaries of the element.

e) From the state of stress, a system of forces concentrated at the nodes can be determined such that the nodal forces are in equilibrium with the boundary stresses and the distributed loads if any.

f) For triangular elements of two dimensional problems the displacements can be assumed to vary linearly in each direction. The edges of each element will then displace as straight lines.

g) The above requirement is only satisfied when σ_x , σ_y and T_{xy} are assumed to be constant within each element. Therefore σ_x , σ_y and T_{xy} acting on edges of each element should also be constant. The stresses acting on edges (σ_x , σ_y and T_{xy}) are replaced by the stress resultants which act at the corners of the element. Thus an expression for the corner forces due to unit corner displacements can be obtained. This expression is the stiffness of the element. The stiffness of an element is an

expression for the corner forces acting at the nodes of the element, due to unit corner displacements.

General steps in the finite element Analysis:-

1. Development of the stiffness matrix of an element with reference to a convenient local or member co-ordinate system.

2. Development of the Transformation Matrix to transform the stiffness matrix from local co-ordinate system to a generalised co-ordinate system.

3. Formation of the final stiffness matrix for the entire assemblage of elements incorporating the boundary forces and deflections.

4. Solution of a set of simultaneous equations to get the displacements of the nodes.

It should be noted the stiffness is determined in terms of the nodal displacements as the basic unknown parameter. The stress resultants determined by the stiffness matrix are equated to boundary forces, and the nodal displacements are determined. These nodal displacements are substituted to get the stresses at the nodes.

Method of developing stiffness matrix:-

For the sake of illustrating the method a typical triangular element is considered. The element is defined by the nodes i , j and k . The co-ordinate axes of the element is assumed to pass through the i^{th} node. The co-ordinates of node i are $[0, 0]$. The co-ordinates of the node j are $[a_j, b_j]$ and that of k are $[a_k, b_k]$.

In a plane stress case the stiffness of the element is derived as follows. The displacement field can be written as follows:

$$U_{(x,y)} = U_i + C_1 x + C_2 y, \dots \dots (i)$$

$$V_{(x,y)} = V_i + C_3 x + C_4 y, \dots \dots (ii)$$

By substituting the co-ordinates of i, j, k ,

forces acting at
to unit corner

ment Analysis:-
stiffness matrix
to a conveni-
state system.

Transformation
stiffness matrix from
a generalised

stiffness ma-
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degrees and de-

simultaneous
equations of the

stiffness is deter-
mined by displacements
parameter. The
values of the stiffness
matrix are determined.
The nodal forces
are substituted
into the equations.

matrix :-

Using the method
of virtual work, the
stiffness matrix is
considered. The
displacements at the
nodes i, j, k are
denoted by u_i, u_j, u_k
and the nodal forces
are denoted by F_i, F_j, F_k
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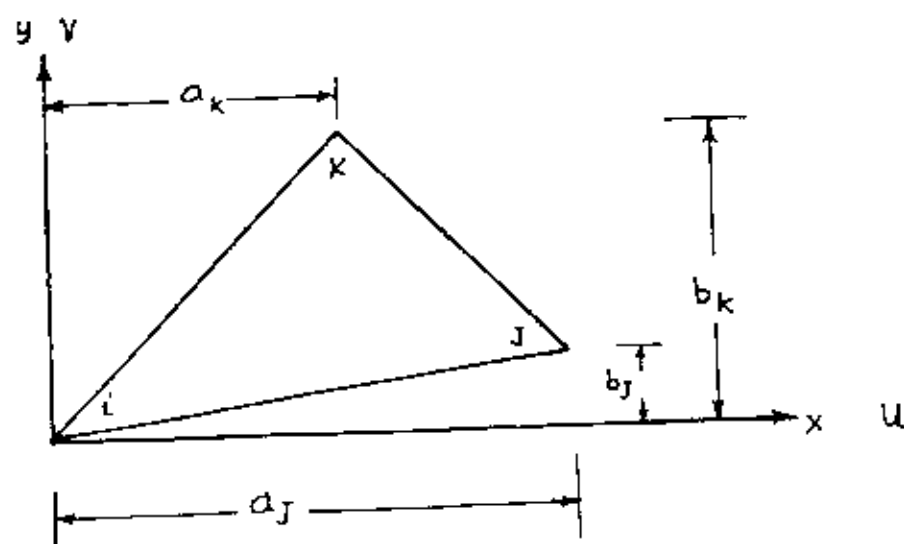
stiffness of
the element

is written as

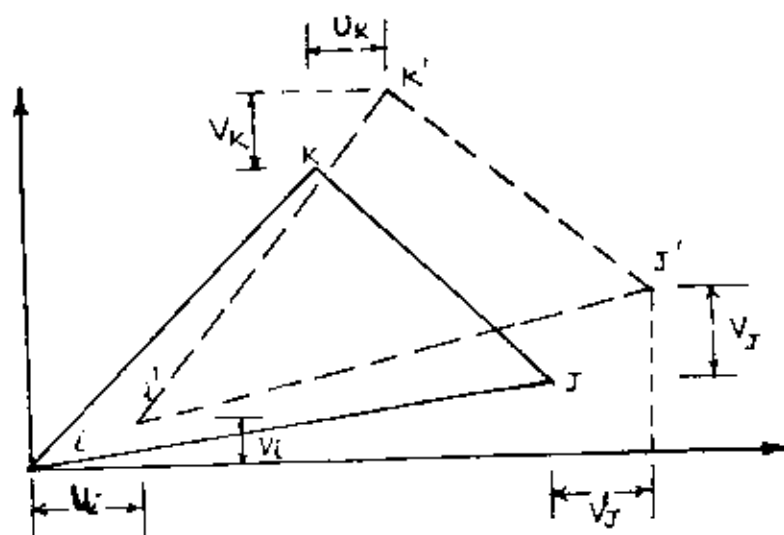
(i)

(ii)

values of i, j, k



ELEMENT DIMENSIONS



ASSUMED DISPLACEMENTS

At the nodes of the element, the constants
 C_1, C_2, C_3 and C_4 can be determined from
the above displacement equations.

we know $\epsilon_x = \frac{\partial u}{\partial x} = C_1$

$\epsilon_y = \frac{\partial v}{\partial y} = C_4$

$$\gamma_{xy} = \frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} = C_2 + C_3 \dots (iii)$$

The values of C_1, C_2, C_3 and C_4 are in-
terms of the co-ordinates a_j, b_j, a_k, b_k and
the nodal displacement $u_i, v_i, u_j, v_j, u_k, v_k$ and
 v_k .

In matrix notation we can write

$$\begin{Bmatrix} \epsilon_x \\ \epsilon_y \\ \gamma_{xy} \end{Bmatrix} = \frac{1}{a_i b_j - a_j b_i} \begin{bmatrix} (b_j - b_k) & 0 & b_k & 0 & b_i & 0 \\ 0 & (a_k - a_j) & 0 & -a_k & 0 & a_j \\ (a_i - a_j) & (b_j - b_k) & a_k & b_k & a_i & -b_j \end{bmatrix} \begin{Bmatrix} u_i \\ v_i \\ u_j \\ v_j \\ u_k \\ v_k \end{Bmatrix}$$

OR

$$\{\epsilon\} = [A] \{r\} \quad \dots \dots \dots (iv)$$

In a plane strain case we can write the stress strain relationship as

$$\epsilon_x = \frac{\sigma_x}{E} - \frac{\gamma}{E} (\sigma_y - \sigma_z)$$

$$\epsilon_y = \frac{\sigma_y}{E} - \frac{\gamma}{E} (\sigma_x - \sigma_z)$$

$$\epsilon_z = 0 \quad \dots \dots (v)$$

From the stress strain relationship we can write

$$\begin{Bmatrix} \epsilon_x \\ \epsilon_y \end{Bmatrix} = \frac{1}{E} \begin{bmatrix} (1-\gamma) & -\gamma \\ -\gamma & (1-\gamma) \end{bmatrix} \begin{Bmatrix} \sigma_x \\ \sigma_y \end{Bmatrix} \quad \dots \dots (vi)$$

From the expression (vi) we can write

$$\begin{Bmatrix} \sigma_x \\ \sigma_y \end{Bmatrix} = \frac{E}{(1+\gamma)(1-2\gamma)} \begin{bmatrix} 1-\gamma & \gamma \\ \gamma & (1-\gamma) \end{bmatrix} \begin{Bmatrix} \epsilon_x \\ \epsilon_y \end{Bmatrix} \quad \dots \dots (vii)$$

$$\text{and } T_{xy} = G \gamma_{xy} = \frac{E}{2(1+\gamma)} \gamma_{xy}$$

We can write the stress matrix as follows.

$$\begin{Bmatrix} \sigma_x \\ \sigma_y \\ T_{xy} \end{Bmatrix} = \frac{E}{(1-\gamma)(1+2\gamma)} \begin{bmatrix} 1-\gamma & \gamma & 0 \\ \gamma & 1-\gamma & 0 \\ 0 & 0 & 1+2\gamma \end{bmatrix} \begin{Bmatrix} \epsilon_x \\ \epsilon_y \\ \gamma_{xy} \end{Bmatrix} \quad \dots \dots (viii)$$

OR symbolically in matrix notation

$$\begin{Bmatrix} \sigma \end{Bmatrix} = [C] \{\epsilon\} \quad \dots \dots (viii a)$$

$$\begin{Bmatrix} \sigma \end{Bmatrix} = [C] [A] \{r\}$$

The stress field is uniform and acts on the edges of the element. The fig. 3 shows how the stresses acting on the edges of the element can be resolved into stress resultants at the nodes.

If S_{xi} , S_{yi} , S_{xi} , S_{yi} , S_{xi} and S_{yi} are the stress resultants at the nodes i , j and k and along x and y directions, we can write the stress components as follows:

$$\begin{Bmatrix} S_{xi} \\ S_{yi} \\ S_{xi} \\ S_{yi} \\ S_{xi} \\ S_{yi} \end{Bmatrix} = \frac{1}{2} \begin{bmatrix} (b_j - b_k) & 0 & (a_k - a_j) \\ 0 & (a_k - a_j) & (b_j - b_k) \\ b_i & 0 & a_k \\ 0 & -a_k & b_i \\ b_j & 0 & a_i \\ 0 & a_i & -b_j \end{bmatrix} \begin{Bmatrix} \sigma_x \\ \sigma_y \\ T_{xy} \end{Bmatrix}$$

$$\begin{Bmatrix} u_i \\ v_i \\ u_j \\ v_j \\ u_k \\ v_k \end{Bmatrix}$$

strain relationship

$$\begin{bmatrix} 1-\gamma & -\gamma \\ -\gamma & 1-\gamma \end{bmatrix} \begin{Bmatrix} \sigma_x \\ \sigma_y \end{Bmatrix}$$

.....(vi)

From (vi) we can write

$$\begin{bmatrix} 1-\gamma & \gamma \\ \gamma & 1-\gamma \end{bmatrix} \begin{Bmatrix} \epsilon_x \\ \epsilon_y \end{Bmatrix}$$

.....(vii)

$$= \frac{E}{2(1+\gamma)} \begin{Bmatrix} \epsilon_x \\ \epsilon_y \end{Bmatrix}$$

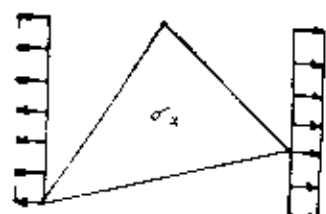
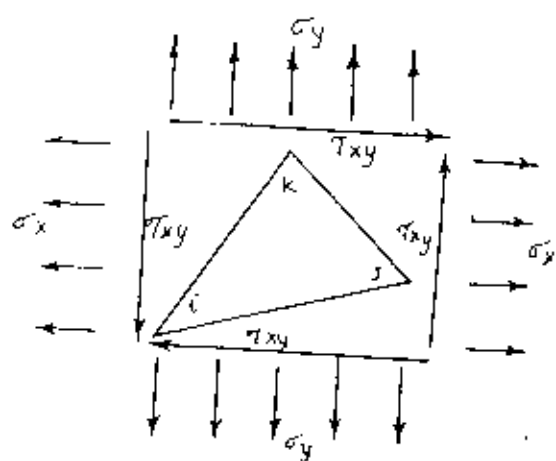
$$\begin{Bmatrix} \epsilon_x \\ \epsilon_y \end{Bmatrix}$$

.....(viii)

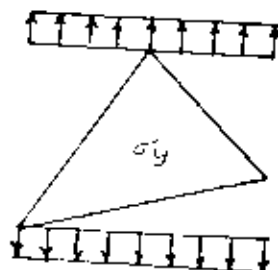
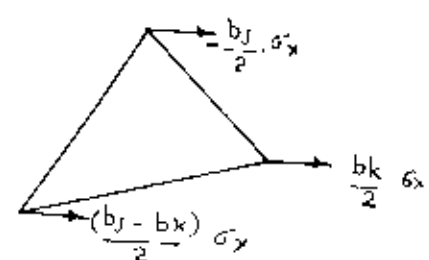
Since S_{ij} and S_{jk} are the nodes i, j and k respectively, we can write as follows:

$$\begin{Bmatrix} \epsilon_x \\ \epsilon_y \end{Bmatrix}$$

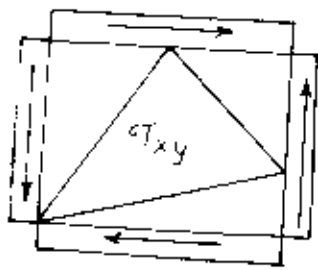
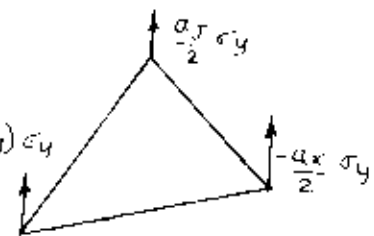
.....(ix)



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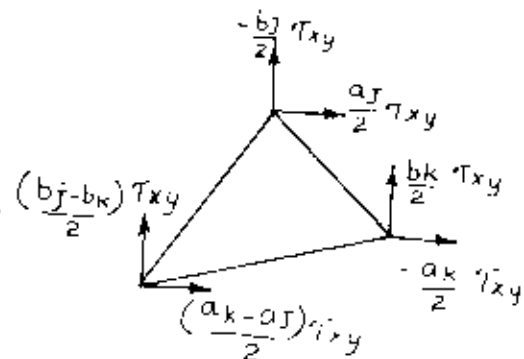


FIG.3

STRESS RESULTANTS AT NODES

In the matrix notation

$$\begin{aligned}[S] &= [B]^T [C] \\ &= [B]^T [C] [A] \{r\} \\ [S] &= [k] \{r\}\end{aligned}$$

Where $k = [B]^T [C] [A]$ Stiffness matrix.

- $[B]$ = Force transformation matrix
- $[C]$ = Elasticity or stress-strain relationship matrix
- $[A]$ = Geometry matrix = Displacement transformation matrix.
- $\{r\}$ = Nodal point displacement matrix

Assembly of Elements Stiffness of the Complete Structure :-

The stiffness of the complete structure can be found by assembling the stiffness of the individual elements.

Over all stiffness matrix is obtained by the systematic addition of the stiffness of all elements in the system.

In general $[S] = [K] \{r\}$ for a typical element q can be written as

$$\begin{aligned}S_l^q &= \begin{bmatrix} S_{11}^q \\ S_{12}^q \end{bmatrix} \text{ where } l = i, j, k \\ r_m^q &= \begin{bmatrix} r_i^q \\ r_j^q \end{bmatrix} \text{ where } m = i, j, k\end{aligned}$$

The stiffness terms $S_{lm}^q, l, j, k, \dots$ etc. can be expressed as k_{lm}^q where $l = i, j, k$ and $m = i, j, k$. Thus k_{lm}^q represents a 3×3 matrix and each term of the k_{lm}^q is a sub matrix of the order 2×2 . The term k_{lm}^q represents the forces developed on an element q at the nodal point l due to the displacement at nodal point m . So it is evident that l and m should be adjacent nodes or l and m should represent the same node.

The solution of Equilibrium equations: -

The Stress Resultants thus determined should be equal to the external force component acting at that node. The external

force component at the node depends on boundary conditions and the nature of the force system to which the continuum is subjected. In other words $[S]$ must be equal to $[R]$ the external force component at the node. The equilibrium of the complete system of elements can be expressed as

$$[R] = [K] \{r\}$$

- Where $[R]$ = Nodal force matrix
- $[K]$ = Over all stiffness matrix
- $\{r\}$ = Nodal displacement matrix.

It should be remembered $[K]$ the stiffness matrix of the assembly is in terms of the only unknown parameter viz. the nodal displacements. $[R]$ being known, the set of simultaneous equations represented by $[K] \{r\} = [R]$ can be solved and the unknown nodal displacements can be determined. Having determined the nodal displacements the stresses can be determined by substituting these displacements in the stress matrix equation.

$$[\sigma] = [C] [A] \{r\}$$

Knowing the stresses σ_{11}, σ_{22} and τ_{12} represented by the stress matrix $[\sigma]$, the Principal stresses and the maximum shear stress for each element can be found out

$$\begin{aligned}\sigma_1 \text{ or } \sigma_2 &= \frac{\sigma_{11} + \sigma_{22}}{2} \pm \\ &\pm \sqrt{\left(\frac{\sigma_{11} - \sigma_{22}}{2}\right)^2 + \tau_{12}^2}\end{aligned}$$

$$\text{and } T_{max} = \frac{1}{2} (\sigma_1 - \sigma_2)$$

The direction of the principal stress is found from the expression $\tan \theta = \frac{2 \tau_{12}}{\sigma_{11} - \sigma_{22}}$

The most important step in the analysis is the determination of the unknown displacements of the nodes by solving the equilibrium equations. Even in a plane stress or strain problem the number of displacements for each node will be two. If

the node depends on the nature of the continuum. The words $[S]$ must be the force component equilibrium of the components can be expressed as

Nodal force matrix

Global stiffness matrix

Nodal displacement matrix.

where $[K]$ the stiffness matrix is in terms of the parameter viz. the nodal displacement. The set of equations represented by $[R]$ can be determined. The nodal displacements can be determined by substituting the values in the stress

stress matrix $[\sigma]$, the maximum shear stress can be found out

$$\tau_{\max} = \frac{\sigma_1 - \sigma_2}{2}$$

$$\tau_{\max} = \frac{1}{2} \sqrt{(\sigma_1 - \sigma_2)^2 + 4\tau_{xy}^2}$$

$$\sigma_1 = \sigma_2$$

Principal stress is found

$$\sigma_{1,2} = \frac{\sigma_x + \sigma_y}{2} \pm \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

step in the analysis

of the unknown stresses by solving the

Even in a plane stress

the number of

will be two. The

if the continuum is divided into an assembly of elements having n nodes, the number of unknown displacements to be determined is $2n$. Handling of such large number of simultaneous equations for determining the unknown displacement requires a computer. The solution of these simultaneous equations can be found by MATINV. [Matrix inversion program.] or by iterative methods.

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GEMSTONES

Kum. R. Vatsala, M. Sc. Lecturer in Chemistry

THE chemical kingdom comprises various kinds of minerals including certain precious minerals which have been known for their wonderful qualities. They are the gem stones. Although these minerals do not reveal their full beauty in their native state, they turn out excellent and attractive when polished and shaped. The gem stones include diamond, ruby, sapphire, aquamarine, emerald, topaz, garnet and various other stones.

A number of ancient races such as the Persians, Indians, Greeks, Romans had treasured these valuable gem stones. The Israelites had used even engraved stones. History says that these stones were used for sealing purposes. They were also used in sacred works of art. India was the chief supplier of finest diamonds, sapphires, rubies and pearls for many centuries.

The stones which are used in jewellery are divided into transparent, translucent and opaque stones. The transparent varieties are divided into tinted stones and colourless stones. A coloured stone often depends for its attractiveness upon its intrinsic colour rather than upon the mode of its cutting. The dashy red colour of ruby, the royal blue of sapphire, the verdant green of emerald and the golden yellow of topaz are all pure colours.

The translucent stones include opal, moonstones, which reflect light from the interior.

The opaque stones such as turquoise, lapis-lazuli and jade absorb light and then

scatter. A deep coloured stone often appears black since no light is emitted due to total absorption.

Most of the gem stones show a vitreous lustre, the harder and more refractive stones being more lustrous.

The colours of the gem stones are due to the presence of certain metallic oxides in minute amounts. Iron in ferric state imparts yellow colour while bottle green colour is obtained with ferrous state of iron. The presence of Chromium causes red tints in ruby and green tints in emeralds. Titanium gives blue colour. Pink shades are obtained by either Lithium or Manganese. Vanadium, Cobalt, Nickel, Gallium and Caesium produce various colours.

The colour of the gem stone often gets altered on heating due to some re-arrangement of the tinctorial agent. Yellow topazes on heating turn pink, and the green coloured diamonds change to brown colour on heating. Exposure to irradiation from a nuclear reactor also causes a colour change in certain gems.

Practically all the gem stones used in jewellery can resist mechanical and chemical actions to some extent. The stones of slight porosity are often affected chemically. The turquoises when dipped in liquids lose their bluish green colour due to oxidation and turn yellowish. The moonstones and opals are slightly affected if dirt or grease penetrates into their interior.

It is rather difficult to place the different gem stones in an exact order. However

red stone often ap-
pears is emitted due to

stones show a vitreous
luster. Some refractive stones

stones are due to
metallic oxides in
ferrous state in-
stead of ferric state in-
stead of bottle green
ferrous state of iron.
In causes red tints
in emeralds. Tita-
nium. Pink shades are
due to iron or Manganese.
Cadmium, Gallium and
other colours.

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lose the green colour-
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affected chemically.
When in liquids lose
color due to oxidation.
The moonstones and
if dirt or grease
on them.

place the different
order. However,

No. Mineral	Colour of the Gem-Stone	Chemical Composition	Hardness	Refractive Index Range	Specific Gravity Range	Special Properties	Principal Uses
1 Diamond	Various Colours	Carbon	10	2.402-2.465	3.516	Hardest	High precision instruments
2 Corundum	(i) Red-ruby "pigeon blood" red (ii) blue-sapphire "conflower blue"	Al_2O_3 with Traces of Fe_2O_3 , Cr_2O_3 , Al_2O_3 with Ti	9	1.769-1.779	4	Hard & tough	Bearings in watches & high precision instruments; grinding and polishing; softer stones, steel, metals etc.
3 Topaz	Various shades	Floresilicate of Aluminium $Al_2(F, OH)_2 SiO_4$	8	1.607-1.640	3.5-3.6	Readily cleaved; pyro-electricity	Jewellery
4 Beryl	(i) Grass green-emerald (ii) sea-blue-aquamarine	Beryllium-Aluminium silicate $Be_3Al_2(SiO_3)_6$ with traces of Helium and alkali metals	7.5-7.75	1.560-1.590	2.67-2.75	Colour is unaffected by heat, light	Jewellery
5 Spinel	Various Colours	Magnesium-Aluminium Oxide, $MgAl_2O_4$ with traces of Chromium, Iron and Manganese	8	1.72-1.75	4-4.6	—	—
6 Garnet	(i) Pyrope-Firey red (ii) Almandine-crimson-Violet (iii) Spessartite-red or brownish red (iv) Grossular-Golden yellow, orange, pink shades (v) Andradite-emerald green (vi) Uvarovite-green	Double silicate $X_2Y_2(SiO_3)_4$ $Mg_3Al_2(SiO_4)_3$ $Fe_3Al_2(SiO_4)_3$ $Mn_3Al_2(SiO_4)_3$ $Ca_3Al_2(SiO_4)_3$ $Ca_3Fe_2(SiO_4)_3$ $Ca_3Cr_2(SiO_4)_3$	7.25 7.25 7.25 7.25 6.5 7.5	1.73 1.73-1.751 1.751-1.811 1.79-1.81 1.74-1.748 1.888-1.889 1.87	3.7-3.8 3.65-3.82 3.9-4.2 4.12-4.2 3.45-3.5 3.82-3.85 3.77	— — — — — — —	Jewellery " " " " " " "
7 Chrysoberyl	Cat's eye-yellowish-green	$BeAl_2O_4$	8.4	1.741-1.750	3.7-3.73	—	Jewellery
8 Opal	White, black and red	SiO_2	5.5-6.5	1.444-1.464	2-2.2	Exhibits opalescence	Jewellery

they can be arranged in order of their hardness. The scale of hardness was drawn by the mineralogist Mohs.

Diamond when is often called as the king of gem stones is the hardest of the chemical substances possessing high refraction, brilliant lustre and colour dispersion. Its brilliance and lustre are due to its maximum total internal reflection of light. Although it is the hardest substance, it is brittle and damaged easily. This is due to its cleavage property. It is transparent to X-rays. It phosphoresces under the effect of the rays beyond the violet end of the spectrum.

Chemically diamond is a crystallised form of carbon. Each carbon atom is covalently bonded to four other carbon atoms in a tetrahedral shape. The giant molecule thus contains all the electrons paired, and this accounts for its extreme hardness. As there are no free electrons, it does not conduct electricity.

Diamonds exist in various shades of colours. The presence of iron is an im-

purity produces yellow colour. If graphite is present in traces, it produces a blackish tinge. Diamonds can be made to acquire colour artificially by irradiation. The bombardment with neutrons produces a green colour. On heating, the green coloured diamonds change their colour through various shades of yellow and a total removal of colour is impossible even at high temperature. The bombardment with electrons produces blue colour. The colours produced in such irradiated diamonds are probably due to radiation damage to the crystal structure which is only partly regained on heating.

Apart from use in jewellery, diamonds have extensive industrial applications. They are used in equipments meant for cutting, drilling and engraving glass and porcelain. Modern electrical devices, drills of all sizes are set with diamonds. Many tools of high precision used by aircraft and automobile industries contain diamonds.

The table gives useful information regarding some of the important gem stones.

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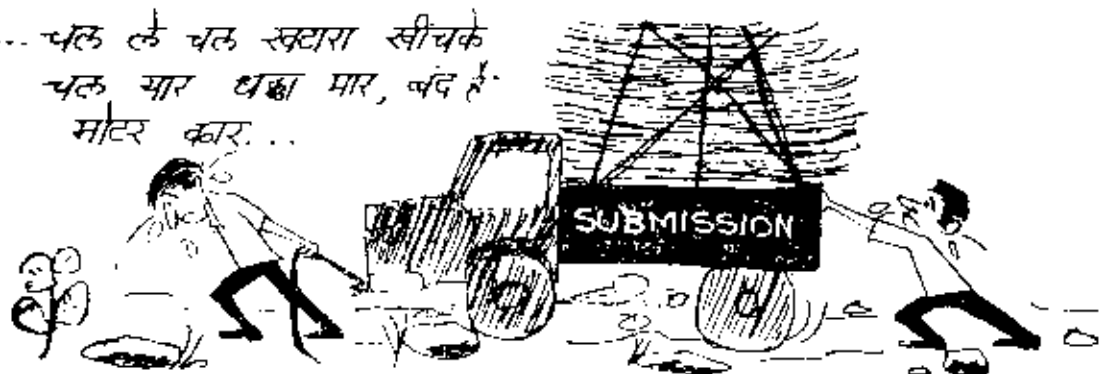
WITH THE BEST COMPLIMENTS
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PLIGHT OF ENGINEERING STUDENTS



तुझे प्यार करते हैं करते रहेंगे..

... चल लें चल स्वयं सौचके
चल यार धक्का मार, बंद है
मोटर कार...



जाने कहीं गये वो दिन



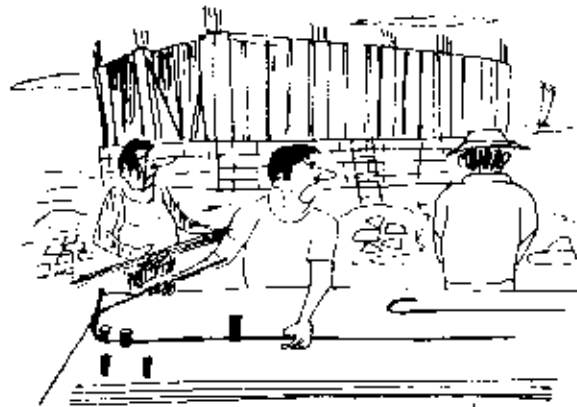
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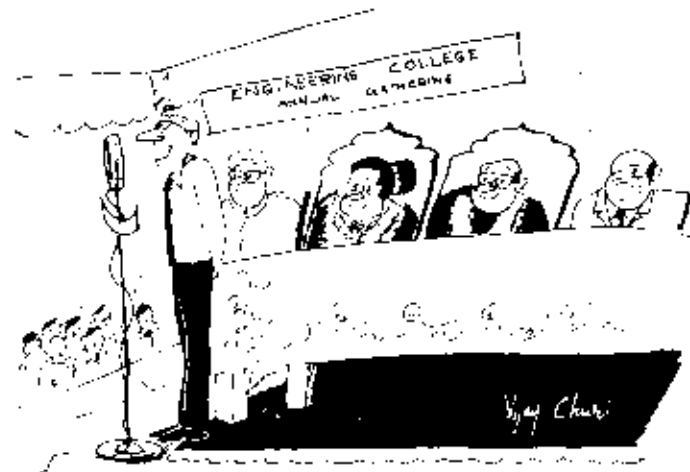
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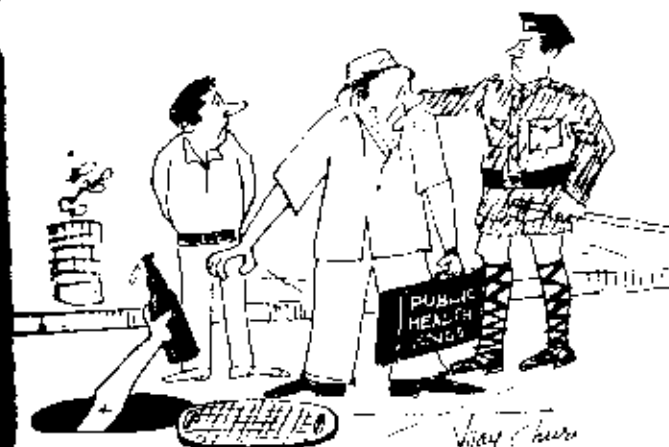
Vijay Chav

आया बड़ा हमको सीखाने को...
इसको क्या मालूम हम खुद इंजि-
नियर हैं।

Journals which you are copying
are originally written by our
guests.



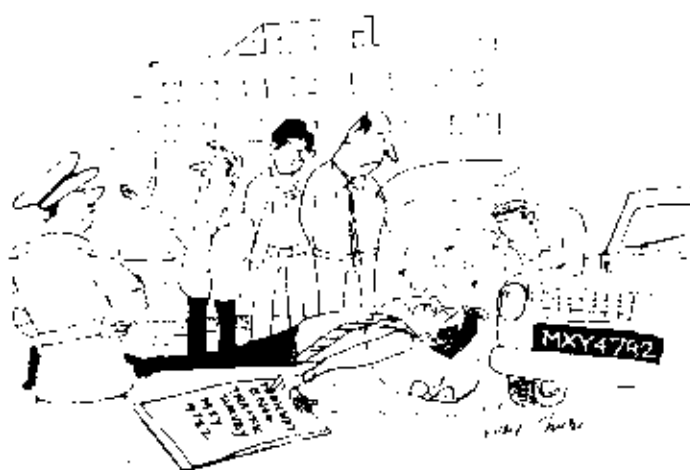
Vijay Chav



Vijay Chav

You are mistaken Havildar...
It's a waste water sample

*I could just stand there and watch
he was "Hawdard".*



*Who has asked you to provide
Special Space for beggars and
Huckers.*

*It was a long time ago, but I
remember it well.*



Mod

Contributed by

LOOKING back
relieved of an
ate unleashed on m
compassed in an in
resisted always),
small doses and relax
relaxation misfires a
ceased to exist. I
into new planes of
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the substrate
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ejected into the
risk of the probabl
predictable. The
risk of inhibition

Moods and melancholy

Contributed by : A. VIJAYAKUMAR, B.E. (Elect), M.E. (Elect) (Electronics)
Lecturer in Electrical Engineering.

LOOKING back on it, I feel greatly relieved of an impossible burden of fate unleashed on me and now I feel encompassed in an innate indolence (which I resisted always), which I enjoy now in small doses and relax. Artificially doctored relaxation misfires and I ceased to exist. The mind got projected into new planes of perspective. Lingering weightlessness trailed off into gravitational climax. The physical existence vanished, though the physical inertia existed. I turned around an imaginary axis which cyclically changed its orientation in space. Suddenly I was engulfed in the conventional world. The relief descended with a bang. After a while, again the pulse of experience overwhelmed me. I was centripetalled into an unknown and ominous world. A floating and then a sinking feeling gripped me. A brutal and forceful courage invaded me which made me feel like a superman grinding me into annihilation everything including self. The heartbeats increased to a new high level. Oxygen-starved brain flashed lunatic signals into the mind. The psycho cybernetics were put in a state of unbalance. The biological thermal equilibrium was shattered. I felt fire surging in my veins. The new life injected into my system, made me hundred times life-size. It was like myself refracting through a magnifying lens. New courage drifted into my mind. Hatred which I entertained in me and flashed out from the substrata of the mind, under the pressure of social and personal conventions, got ejected into the mind and the framework of the probable actions went awry and unpredictable. The mechanism of the reflex of inhibition collapsed. The mind

ceased to be my controlling centre. Something ominous, vile and unknown ruled me. Everything, mean and ugly I could conceive in a rational state of mind, came welling into the wounds inflicted in the innards of the fibres of the mind. Forbidden thoughts and strange behaviour patterns, gone into hibernation, under the pressure of social conventions and rationality, resurrected with fortified strength and supreme animation.

Every muscle on the body convulsed in response to an involuntary stimulus. I was aware of this phenomenon and nothing in my power could check it. This thought of helplessness lead to a degree of fear descending into me. The experience came in pulses. A cataclysm of pandemonium tore into the peaceful mind which touched off a strident, sonorous reverberations of hallucinations in the slab of passion-fermented zone of mind. I did not want another pulse of such experience. The uncontrolled anticipation of such an event made me realise the power behind the naked fear, sharp as razor, cutting into me. It was no ordinary fear. It was hundred times dangerous and powerful as a million volt electrical discharge. It was that kind of fear that no rational and sober human mind can assimilate. Fear chased me. I knew I would be an easy victim of its jaws. There was no escape. I knew it was after me. Yet there were no avenues for escape. This made me panicky. This phenomenon gave a positive feed-back into the reflex controls of the brain, giving a cumulative effect. This led to the amplification of the fear-complex which chased me, engulfed me and tried to annihilate me. This state of mind came in

pulses. I was verily aware of his incoming and vanishing. But the triggering function was absolutely involuntary, which made me hate myself as I was helpless to get free. Above all, forbidden thoughts staged a laugh-parade before the eyes. I saw coloured square areas tracing the pattern of cycloids and epicycloids out of spacey nothingness. Eventually, the self-correcting mechanism of the mind came out of its oscillatory excursions into the realm of unconventional perspectives and forced a slab of slumber into the empty con of mind. I dissolved into a deep slumber. When I came out of the trance I saw monotony and dejection welcoming me.

Relaxation when administered in lethargic proportions, will disintegrate into monotony. Monotony is something I wish to avoid, as it ushers in the most melancholic moods. Melancholy triggers into vision of the past, a disarrayed stream of events originating from nostalgia. Looking back on it, I wonder how events drifted into a man's life. Vertical rains violated the chastity of virgin Earth. Lingering aroma of the rain-washed atmosphere replenished a new enthusiasm in me. Mind was busy planning the permutations and combinations of the movements of chessmen. I moved the black knight which resulted in a forking check leading to the loss of the Queen of the opponent who did not exist. Intuitive senses registered a pair of unknown eyes following each of my movements. I could visualise a system of light rays emanating from the chess-board, a large gold and black one, after refracting through an expensive optical system of a looking glass, reaching a charming destination. This made me a little nervous. I grounded the game with the pleasure of a sadhist.

Walking briskly in long strides, I reached the research wing of the electronics laboratory. I reached for the recordings from the strip-chart recorder, recording the vibra-

tions of the motor control unit. It was amazing. The peak of the recordings was less than four microns which was quite satisfactory. It was one of those moments, when agony gave way to ecstasy. I was confronted with a grave problem of vibration in the solid state motor control system which I was working on for my post doctorate thesis. But when I looked at the temperature recorded, recording the case temperatures of a bank of SCR-heatsinks, the euphoria of ecstasy vanished and agony was back again grinning on my face. The cyclic peaks of temperature, recorded were more than the permissible level. I had to launch an elaborate experimental research in the design of SCR-heat dissipation, as I found the data supplied by the manufacturer were incorrect for specialised application.

Looking back on it, I realise how time can be one's enemy. Time gives you the slip and you are doomed. With all the resources at your disposal if you do not handle time without elaborate care, the climax of your failure will mirror the cause. Man is the moulder of his destiny. The probability of a man moulding another man's destiny is not entirely ruled out. Or an element of time can also play a vital role in moulding one's life. If it is against you, "liquidation by delay" will be the motto assumed by the element of time.

The gold and black squares and knights of chess had come to identify chess with me. When the passion-torn me huddled up in feeble melancholy, mundane elements like golden eagles and black-knights came out of their suspended animation and paraded before me. Sinister divinity in the Golden eagles and Black knights, resurrecting out of the oblivion the gold and black squares ease you into the realm of illusion of transient ecstasies.

A deceptive courage of a transient nature displaced the fibres of acute in-

control unit. It was the recordings which were quite different from those moments, to ecstasy. I was confronted with a problem of vibration control system, for my post doctorate. When I looked at the recording the case of SCR-heatsinks, vanished and agony on my face. The nature, recorded were the level. I had to experimental research heat dissipation, as I had by the manufacturer specialised appli-

I realise how time gives you the. With all the re- if you do not rate care, the cli- mirror the cause. of his destiny. The moulding another entirely ruled out. Or also play a vital life. If it is against delay" will be the element of time.

squares and the come to identify one the passion-tern mind melancholy, mo- golden eagles and of their suspended before me. Sinis- eagles and Black of the oblivion are ease you in transient escapism.

age of a transi- of acute mood

A melancholy and this exodus paved way to escapism which caused an insurgency of Easiness relief and comfort. It was then P' swarm into the fabric of vision. A soul armed with a disarming smile came into my life unexpectedly. The inspiration from this tiny goddess had an almost magical effect on me. Surging with new excitement and enthusiasm, I set forth in my venture of realising a post doctorate accomplishment. Armed with an air of confidence, enthusiasm and the required level of knowledge in the field of electronic I stepped ahead with the solid state motor control system.

A sudden explosion clipped the excursions of the mind and I was projected into the sad reality of silence that prevailed in the atmosphere. When I was to myself, I realised what had happened. The electronic crowbar circuit sensed an over current and tripped the air circuit breaker, protecting the expensive bank of Silicon Controlled Rectifiers. The familiar humming tone of the motor stopped. The instrument panel reflected an utter paralysis of activity, except the strip chart recorders and the DC coupled Cathode ray oscilloscopes connected in the circuit. Electronic circuits have no inherent failure mechanisms. They are faithfully faithful to the designer. I pressed the reset button. With a click and whimper the efficient soft-start system incorporating a unijunction transistor, promptly started the motor, with a predetermined acceleration rate. The instrument panel was active again. The vibration transducer promptly responded to the peak of vibration around the critical speed of the motor. With everything under control, the mind slipped into its vagaries.

Looking back on it, I get a shudder creeping all over me with all those frustra-

tion-mounted days and nights fiddling over the heartless electronic instruments like cathode ray oscilloscope, digital frequency meter strip-chart recorders and analogue computer and fiddling with a Fabrecastelli to make elaborate calculations governing the intricate functions of the more intricate electronic circuitry. Frustration was the driving element. Frustration was the only passion that existed within me. Frustration was life. The result was just fantastic. Slowly but surely, the control-circuitry was taking shape. Component by component the castle of electronic fantasy rose before my eyes. The element of frustration got diluted with the element of sheer joy resulting from the intellectual fulfilment. The fatalist in me seemed to be breathing his last. The pessimistic anticlimax was neutralised by optimistic climax.

The test-run of the motor control unit depicted a good transient recovery performance, responding to the square wave loading of the coupled generator. The anti-hunt circuit effectively checked the possibility of instability in the system. Hours of spending with Nyquist's criterion and Bode's attenuation plots yield predetermined degree of results. My joy had no bounds. One thing that pained me was that 'P' was not near me to share the happiness evolved from my success. She was probably gliding amongst the golden sheaves of paddy plants dancing to the tune of the evening breeze, totally unaware of my success. My soul craved for the warmth of her presence to multiply the strains of the joyous tune formed by touching off the chords of my heart.

A parker-21 carved royal blue information into sheer white expanse of the paper. Gas lighter spot flame to a flickering which flickered with ecstasy. The unmistakable rhy-

thin of Remington rattled off my fate into black and white. I could feel the melody of life splashing all around me. A film of melancholy enhanced its effectiveness. A tenuous fibre of melancholy induced by nostalgic moods was as effective as a breeze in a hot summer-moon.

Looking back on it, I feel confident of surmounting the roughest hurdles of life. Now my status is that of series motor on no load which gives infinite speed trying to rip the motor out of its windings. Infinite energy and tormenting thoughts try to rip me apart so that I may glide into non-existence.

Obtaining a post doctorate degree made me feel as if the whole world was in my pocket. Alas! This accomplishment did not fetch me a better placement in life though my intellectual wants are satiated. In spite of these feeble incongruities in life I often ride peaks of joy more often ending up in a reverie. A fast car. A Minnesota highway Speed checked by Radar...Pleasing P by my side...

Do reveries come true. Reveries are spices of life. When life is a mirage, the farther it gets away from you, the nearer you get toward it. reverie soothes the soul by masking the effect of disillusionment by presenting illusionary visions that are true.



"Bite has kept this day reserved for the Home Industries"

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THE RECRUIT

By VASANT DAVE, S. E. Electrical

A LITTLE hesitantly the young recruit aimed at a woman shuffling round a corner. And pulled the trigger. The next moment he hoped that he had missed.

He had not. The woman fell and wriggled like an exposed earthworm. For the first time he noticed that she was not alone. A cute little child was precariously held close to her breasts. It raised its unsuspecting head, woolly locks of hair sweeping down its cheeks.

"Well taken!" came an encouraging pat on the back from his immediate neighbour, and then, "Let's see how good I'm at that...."

Before the recruit got what he meant, the soldier had fired. The pretty little head was there no more.

* * *

Gruesome as it was, the incident decided the recruit's mind. For the rest of the day, while his companions broke into roses and shaved their bayonets into a thousand human sheaths, he stayed out in a tank, concentrating on snipers.

However he tried, he could not erase from his mind the picture of the dying woman and her child. Back at the camp, all were in high spirits except him. They had wiped out an entire treacherous township, leaving behind rotting corpses and burning houses. That was good enough for a day's work and they could not gauge why the youngster was silent. Perhaps that was beyond them.

A military van rocked into the cantonment. It brought along stifled feminine sobs of utter despair, occasionally injected by obscene barking.

A crowd of leitering soldiers assembled round the vehicle in which were huddled like sacrificial goats, about a dozen female forms. The girls were young and more or less naked. Trembling like pipal leaves, they wept hysterically. Their captors laughed with an air of supreme achievement.

The girls were pawed and pinched. They were pushed around like air-filled rubber dolls at a playboys' party. Their panic-stricken shrieks appeared to provide a divine entertainment. The more they shrieked, the more they were prodded.

Then they were paraded towards the officers' quarters. The frustrated soldiers followed, howling.

Alone, the recruit stood in a corner. He felt sick and isolated more than ever before.

* * *

An occasional howling from the distant trees and a regular chirp rode the breeze. They were more inviting than the faint merriment that now drifted forth from direction of the officers' quarters.

Impulsively the recruit slid towards the woods. He was barely a hundred yards short when a voice pierced the air.

"Stop, coward! Or I shoot!"

He froze. So someone had smelt of his intention. If caught, death was certain. There was no lighter punishment for deserters. He decided to make an attempt, whatever the odds.

Like a wild cat he leapt aside and dashed for the nearest tree. Rat-tat-tat reported a tommy-gun. He fell.

Whoever fired, did not care to confirm the result. He was hit on the left arm. Had he not leapt, the bullet would have ferretted through his heart.

"The Almighty, he praised," he murmured. He was indeed thankful.

Pressing hard his wound, he crept laboriously towards the woods. Each breath that he took felt like leaving him forever. The arm bled on.

It dawned upon him what the wretched woman might have gone through at the impact of his own bullet.

After what seemed almost an age, he reached the cover. With a great effort he writhed out of his uniform and tightly dressed the wound. The arm hung limply, a part of him already dead.

Among the trees it was relatively safer to travel. And easier too. He managed to find a strong branch and using it as a prop walked slowly away, away from the uncomprehending mankind.

* * *

Early at dawn, as birds twittered above, above luxuriant as ever, the recruit stopped. He was tired and his wound tortured him mercilessly. His body ached. All this time he had tried to divert his mind away from the pain. And succeeded only a little.

He listened to the small birds singing, each its own song. They were free. None was the ruler, none the ruled. None was the oppressor, none the oppressed. The at-

mosphere was that of a perfect harmony. The birds created it.

"Lord!" he spoke aloud, "Why didn't you create the Man like the bird—why? Why can't we stay together? Why can't we sing together?"

Not expecting an answer he hobbled on.

He watched the followers in full bloom, fresh and colourful, emanating aroma. They all looked different. And yet, each brightened the surrounding in its own small way. There was an invisible something within them which gave an impression of eternal co-existence.

"Father!" he addressed again. "Why didn't you make the Man like the flower? Why can't we bloom together, Why can't we fill the world with fragrance. Why?"

And he dragged on.

Suddenly his eyes conveyed a change of thoughts. Right in his path stood an old man in rags, carrying a home-made gun. His face carried a mixture of military sternness and human understanding. "What a contrast," thought the recruit.

"Who are you, my boy?" asked the stranger kindly. "A poet?"

The youngster was amused by the question.

"No, 'chacha'," he said with a melancholy smile, "what made you think so?"

"I heard you admire His world," replied the armed man, perceptibly moved by the respect the boy showed. "I see you are wounded," he observed.

"That's my reward for following the conscience!"

"I guessed so. You lack the looks of your Satanic colleagues the scoundrels who shot dead my only daughter and her child and fed their carcasses to dogs..."

... perfect harmony.

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COLLEGE GET-TO-GETHER

(Om Sahawan Bhuraktu)



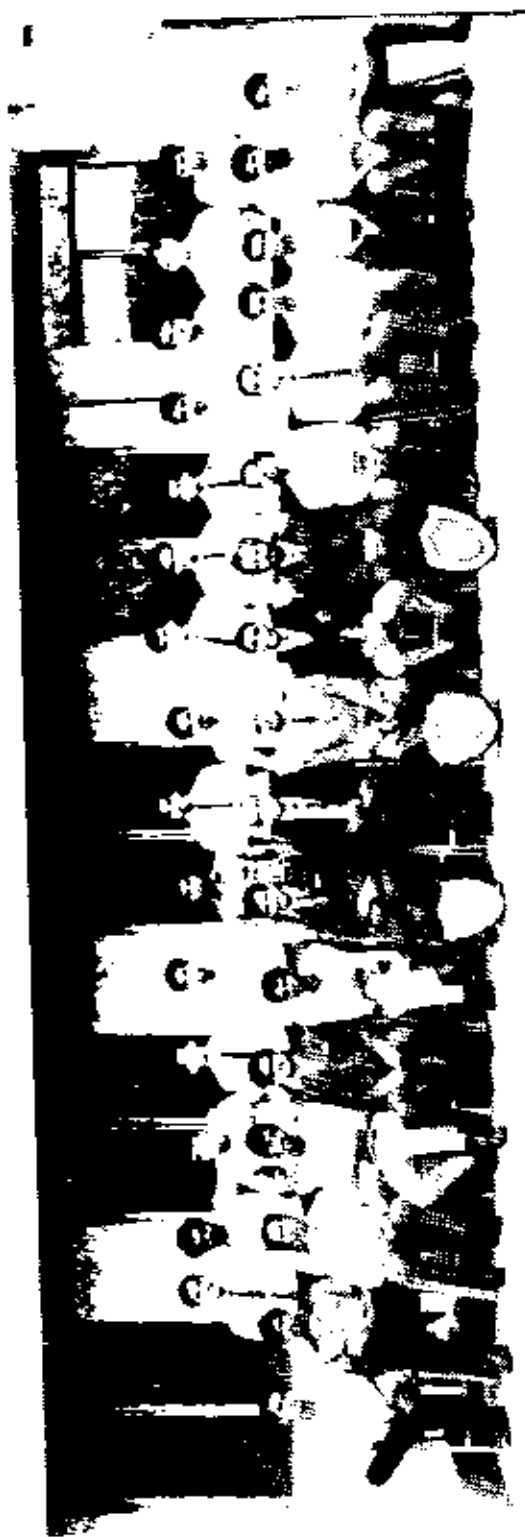
Chief Guests



Staff members



Students



Prize and Academic Award Winners

The old man quivered for a brief moment. He was too touched to notice the expression on the recruit's face. He regained composure and continued.

"I was hard to resist the temptation of treating you the same way just to avenge my subs. . . but He has saved you—and me."

He abruptly stopped and caught the boy half way down his unconscious fall. He gently laid him on the wild turf

* * *

The recruit woke up in a cosy little room. His arm felt as if injected with new life. There was a slight click. His blurred

vision gradually cleared to behold an elderly nurse beaming with a smile.

"Thank God! you're awake at last!" She took a breath of relief. She handed him a glass of fruit juice and a letter. "Here's a message for you, young man."

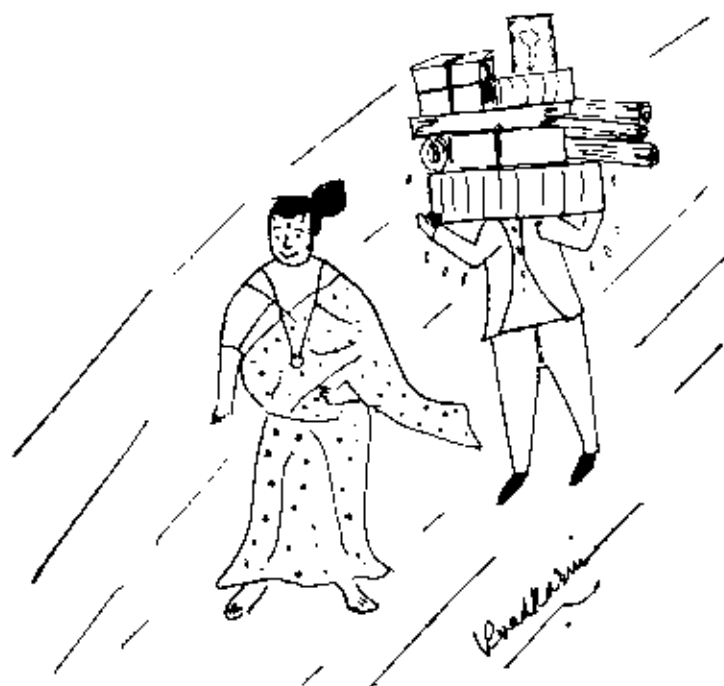
It read: "Brave boy! You are with the freedom fighters. We understand why you have deserted the Army. And we respect you for that. You are a friend to us, not a prisoner-of-war."

—Chacha."

* * *



"अही चला की भर भर । काय मेला रंगाळत जावायची संकट नरी" ।



A NEW LOOK AT OUR LIBRARIES

J. G. PANJI, Librarian

IN good old days, three 'R' (Reading, Writing, Arithmetic) were taught in old ways, which was the order of the day. Since then, much water has flown into the sea in the realm of development of educational programmes. Various techniques are introduced to impart education in its true perspective. Library also have changed its concepts regarding its holdings by introducing new ideals and by taking up the task as an information centre for the community. Libraries have started collection of "NON-BOOK MATERIALS" for their clientele. It is in fitness that the University Grants Commission of the United Kingdom, in their report in 1963 has observed that 'Non-Book Materials' term "A mode of communication which makes both an oral and visual appeal with the lecturer, selecting the aid most helpful to him and to his students, promises to be more successful than simple oral communication".

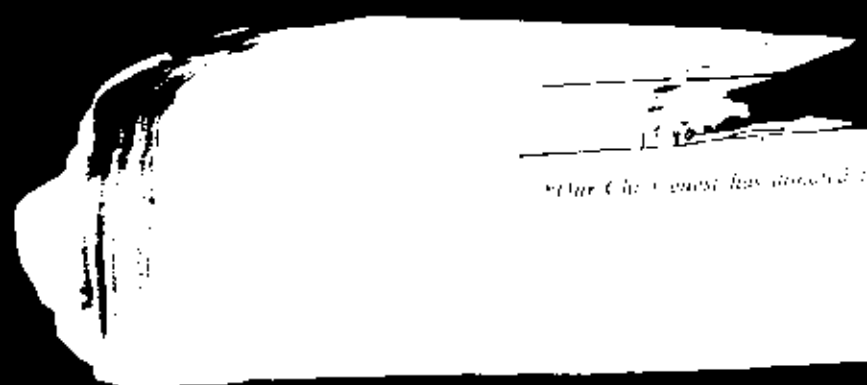
Library is not to remain stagnant but has definite contribution to make as an information centre by tapping all resources at its command to spread knowledge for healthy, intellectual and creative environment in the society in which it lives. Library, which hitherto catered only to the printed materials, such as books, magazines, learned periodicals, pamphlets etc., has now taken up the task of collecting 'AUDIO-VISUAL MATERIALS' as part of their collections. These materials have a greater impact to convey the message straight to the masses. This is properly reflected in the U.G.C. Committee report earlier referred to which inter-alia says - "The Library of the National Centre should collect and catalogue mate-

rials for reference, loan or purchase. These materials should not only include books, journals and thesis but catalogue on films, video-tapes, slide collections, sound recordings and teaching programmes".

Now let us concentrate on the salient features of the Audio-Visual Materials, and analyse their objectives in terms of 'What' and 'How'. The salient features are 1. to stimulate the attention; 2. to arouse interest; 3. to clarify the information; 4. to help to retain the knowledge for longer period; 5. to increase discernment of social significance; 6. to develop the desirable attitude; 7. to increase appreciation and aesthetic value; 8. to stimulate interest and further study; 9. to arouse to think in proper perspective and act; and 10. to bring brevity, simplicity, logical sequence and psychological appeal.

Why Audio-Visual Materials?

These materials permit study at individual's own paces. It also gives ample facility for self study without disturbing others. It is equally helpful to group study or at seminar meetings. The presentation of information is in a systematic sequence. Picturization often has a greater impact on masses. These materials are often used as good guides for effective teachings. Even problems can be solved by the most fact approach. It is equally possible for careful study of the subject matter because of the systematic presentation. To stimulate attention, and simultaneously arouse interest, Audio-Visual Aides help in the right directions. Even the information sought for is better clarified and hence can be re-



"Our Clientelist has directed..."

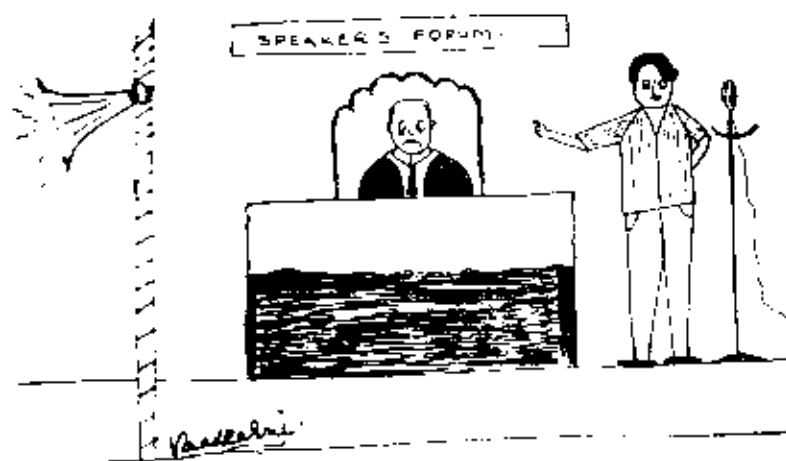
K. Bulletin boards are like our notice boards. Its specific use of displaying general information benefits all. The materials displayed are of varied interest. Hence, display materials should invariably be made eye-catching.

L. Copying Equipments: These equipments are an aid to get multiple copies of documents and of any other materials to cater the needs of research scholars.

1. Microfilming Units with readers: Where storage problems arise, and it is likely to occur with lapse of time. These units give a helping hand to preserve the valuable materials.
2. Reprography Process: There is an equipment for getting multiple copies from any printed materials. This is a labour saving device for getting large copies where demand is great and is

not available readily. This is always found useful for taking copies from learned periodicals.

Under-developed countries, where Audio-Visual Materials were once considered to be items of luxuries, have now started rethinking on rational lines. This is all due to active interest taken by UNESCO. Now the time has come when Library should pay more attention by developing NON-BOOK MATERIAL division as and when funds could permit, so as to contribute substantially to the welfare of the society, keeping in view the demands of the present day. Since Library is the only one place which can constantly help in spreading the message of knowledge, it is necessary that library should keep this flame of knowledge (information) burning for ever by innovating new techniques, as the present advancements in the space has narrowed down the barriers of Time, Distance and Language.



"Our Guest has donated this loud-speaker in memory of his wife"

COLLEGE NEWS BULLETIN

GENERAL SECRETARY'S REPORT FOR 1971-72

By Shri Parminderjit Singh

It has always been my ambition and earnest desire to be a useful member of the student community. I was overwhelmed with love and confidence of my fellow students, who unanimously elected me as the General Secretary of the college students Union for the year 1971-72.

For all round development of the Gymkhana Committee, various sub-committee were formed. This year I had two joint secretaries so that work could be carried out more efficiently. We also formed a sub-committee to take special interest in the welfare of the students.

The records of each of these committees for the year speak for themselves. The achievements made by them. We had regular meetings of the Gymkhana Committee in which Principal Dighe, Vice-Principal J. G. Shah used to take keen interest and guide us in making the gymkhana committee purposeful for the students. The valuable suggestions given by Prof. V. S. Chandrasekhar, Dr. Maneck, Prof. A. G. Maskar, Prof. B. H. Pancholi, Prof. M. M. Shah, from time to time were of great help. In our first meeting the importance of having a common room for boys where they could meet and discuss was considered and Principal was kind enough to give his wholehearted support, and a Reading room was opened which is kept open at night for the students to study during examination.

This year the Gymkhana has been operating actively and I am happy that the students have realized that a sound mind is a sound body to go with it. This year could not participate so actively in the collegiate sports the reason being that they were held during our exams. I feel we should request the University to do something in this matter and give as a fair

chance to participate in their activities. This year we started the photographic society, to help and encourage the students who have keen interest in photography.

Our College also participated in discussion and debates. My hearty congratulations go out to the trio Shri Nadekarni, Shri Vaidya and Shri Chandvadkar who have given outstanding performances and won many trophies in Eloquence and Debating. Our cultural activities under the active Secretary of the Cultural Sub-Committee need a special mention here. On 19th August 1971 we had the musical evening popularly known as 'August Melody' in which many of our talented fellow students participated. The most entertaining programme was given by Shri Honey Whisky who made the audience roar with laughter with his mimicry. Then we had the Babla Jr. and Party accompanied by one of the youngest drummer of India Shri Periluis, a small 7 year old boy who left the crowd gaping at the way he played on the drums, his role on the drums was a real classic.

Because of the war thrust upon us by the Pakistanis, the college day programme was upset. The University youth festival was cancelled. So in keeping with the austerity measures of the government we had our college day function on a moderate scale. We decided to donate the money to be spent on the entertainment programme to the National defence fund.

Our Chief Guest for the Annual College day was Smt. Lilavati Munshi, President of Bharatiya Vidya Bhavan. The prize distribution was followed by the dinner. This time under the efficient guidance and help of Prof. Khatri and the secretaries and students volunteers who gave an all out helping hand in the preparation and serving.

The dinner went as a grand success. The dinner was very well appreciated by our chief guest and students also. My hearty thanks for this grand success go out to Prof. Khatri, members of the staff and the student volunteers.

Thanks are also due to Dr. Maneck, Prof. P. P. Vaidya, Prof. Mheskar, Prof. Chandrasekhar, Prof. Agre and all the other members of the staff, for their all sound help, guidance and co-operation from time to time. I express my sincere thanks to Mr. Warrior and Mr. Gandhi who have always been very helpful and co-operative.

Last but not the least, I would like to thank Shri Bhaye, Shri Jagdeep Singh, Shri Parulekar, Shri U. J. Badkar, Shri Kadakli, Shri Lewis Urban and all other secretaries and fellow students for rendering their valuable help all through out the year.

May God bless one and all.

Jai Hind.

Parminderjit Singh
General Secretary



SARDAR PATEL COLLEGE OF ENGINEERING, ANDHERI 'ALUMNI ASSOCIATION'

The Sardar Patel College of Engineering Alumni was initiated in the beginning of this year under the guidance of Dr. J. G. Shah. Since then we have had three meetings. In the first meeting we discussed and passed the constitution. In the second meeting the members were elected as per the constitution. The members of the working committee are as follows:

Chairman

Mr. Parminder Singh

General Secretary

Dr. J. G. Shah

Joint Secretary

Mr. P. Khambatta

Treasurer

Mr. Vijaykumar

Honorary Members

Dr. S. S. Maneck

Prof. P. P. Vaidya

Prof. Chandrasekhar

Elected Members

Mr. M. B. Rao

Mr. Urban Lewis

Mr. Sarabjit Singh

Mr. O. M. Lemos

In our third meeting the various activities and the budget were discussed. It was decided to hold the committee meetings every 3 months and a gathering of all members once a year. It was also proposed to publish a News bulletin twice a year along with the articles sent in by members.

The main objectives of this Alumni is to bring the past students together who have passed out from college, so that they can meet each other and discuss their problems and exchange news. They thus provide valuable advice and guidance and information to the Final year students passing out from our college.

It is my sincere hope that all the Final year students join this 'Alumni'.

For further details and membership forms you are requested to contact Dr. J. G. Shah, in his office.

- Shri Parminder Singh

I would like to thank
Jagdeep Singh, Shri Parminder
Singh, Shri Kadakia,
and all other secretaries
for rendering their
help throughout the year.

and all,

- and,

Parminder Jit Singh
General Secretary.

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Shri Parminder Singh

Report of Secretary for FOOTBALL

AFTER a spell of three years of first round knockouts, we managed to reach the third round this year. (But somebody keeps reminding me that the first round was a bye anyway, it was our luck). This upward trend is, I am sure, definitely going to be maintained, taking into consideration the talent we have not to mention the new (and liberal, mind you!) rules for promotion (for gone will be the days when half the football team used to fail, the other half being ATKIs).

A coach, at least for the "Season", will definitely improve our standard. The Football ground needs levelling. We practise in this mucky ground and when we go to Parel (St. Xavier's College Gymkhana) for the tournament, we find that the ground is just too good for us. The ball seems to move faster and our sense of judgment is completely lost, accustomed as we are to the slow, mucky ground of ours. Our first match (and this was second round for us) was against Malad College of Commerce. We won the match comfortably. Arun Mehta of F.E. scoring both the goals that came off in the match. In the third round, Barauni College of Commerce was pitted

against us. Though the half-time score at 1-0 in our favour, Barauni equalised in the second half through a penalty corner and won the match by netting three more goals in the last five minutes of the match. Anyway, they were too good for us (they reached the semifinals) and there ended our inter-collegiate tournament career.

Now, a word about the inter-class tournament. As expected, the third years students clinched the trophy, for most of our college talent is concentrated in the third year and this is one of the main reasons why I am sure our college will, at least maintain this year's standard, if not do better. Another significant achievement was the selection of one of our starplayers, (and a potential captain for next year!) Allen Fernandes of T.E. (Elect.) as one the first twenty for the Bombay University team. Incidentally, he has been adjudged Best Footballer of the college for the year 1971-72. Finally, I thank Prof. A. G. Mhaskar Ex-officio for Football, for his keen interest and kind help.

Urban Lewis, B.E. (Mech.)

Captain and Secretary.



Report on "Essay Competition"

Our students have participated in the Essay Competitions on various subjects, arranged by

1. Lt-Col, V.R. Mohan (Padma Bhushan), New Delhi.
2. C.K.P. Samaj, Chembur-Ghatkopar, Bombay.
3. Gandhi Smarak Nidhi, Bombay.

4. Kahu-Sahayoga, Nasik.

5. Government of Maharashtra, Bombay.

Mr. Ramesh Behl, F.E. (Elect.), has won the First Prize in the Essay Competition arranged by Bombay Gandhi Smarak Nidhi, Bombay-5.

The results of the other Essay Competitions are awaited.

Report on Elocution and Debating Activities 1971-72

It is a matter of immense pleasure and pride to review here what our students have achieved in the field of elocution and debates during this year. Our teams have participated in as many as twenty competitions held in and outside Bombay.

D.M. Chandvadkar of T.E. (M) class and G.G. Vaidya of T.E. (C) mostly represented our college for competitions in English. For elocutions and debates in Marathi, our team consisted of V.R. Nadkarni of B.E. (C) class and G.G. Vaidya. V.R. Kamat of T.E. (C) also participated in a few.

The A.D. Shroff Memorial Elocution Competition was conducted in the college on Sept 2 1971 by the Forum of Free Enterprise. The objectives of this competition were to encourage public speaking among our students and to help them to overcome stage fright. The Forum distributed three prizes and three consolation prizes to the good speakers. Principal Dighe was kind enough to take the chair. We are thankful to the Forum of Free Enterprise for their services.

The II prize won by G.G. Vaidya and III by D.M. Chandvadkar at the Barrister M.S. Sirdar Inter University Elocution Competition held at Sholapur are quite commendable. V.R. Nadkarni bagged the I prize and the trophy at the Panditrao Memorial Elocution Competition. At the competition held by Tilak Mandir, Parle, V.R. Nadkarni and G.G. Vaidya were the participants. Mr. Nadkarni won the First Prize and the team secured two trophies, one to be retained in the college and the other Rolling.

One of our major achievements was the winning of R.A. Podar College Students' Union Trophy for the third year in succession. In appreciation of this, the R. A.

Podar College presented D.M. Chandvadkar and G.G. Vaidya with a special trophy, in addition to the Rolling Trophy.

In the competition on 'Population Education' held by the Maharashtra Government, the first prize of Rs. 200 was bagged by D.M. Chandvadkar. The other participant was V.R. Nadkarni.

We also wish to mention about (1) the Certificate of Merit won by V.R. Nadkarni at the Dr. Hindle Trophy Elocution Competition held at Ahmednagar in which, the other participant was S. Patwardhan of S.L.(E). (2) Second Prize by D.M. Chandvadkar at the Nanachudasama Trophy (3) Second Prize by G.G. Vaidya at the Extempore Elocution Competition organized by the Bombay University Debating Society.

This year the Youth Festival was not conducted by the University owing to emergency.

This year we thought of experimenting with what can be called a 'Practice Circle' for public speaking. The intention was to give all the interested students, some useful hints regarding public speaking. Many students participated in this. Each was made to speak for three minutes and was watched carefully. Later on comments were made on the various aspects of the speech. In this, much assistance was rendered by G.G. Vaidya, V.R. Nadkarni and D.M. Chandvadkar. Owing to want of time, we could hold only five sessions. We thank the staff-members who were kind enough to be present at this 'practice circle'. We hope to continue with it next year.

We are extremely thankful to our Principal, for encouraging all the activities in Elocution and Debates.

Kum. I. F. Thailaman, Ex-off.
Ramesh Behl, Student Secretary

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Camun, Ex-officio,
Student Secretary.

Sardar Patel College of Engineering

Varsova Road, Andheri, BOMBAY 58

ACADEMIC AWARDS

The following are the Prizes awarded to the students of this College for the year 1971-72 :

Kulapati's Gold Medals

- (1) Shri S.K. Bhami, B.E.(M), the Best allround student of the College for 1971-72.
- (2) Shri P. Jani Rohit, for securing First Rank and First Class in the College at B.E.(C) Examination of April 1971.
- (3) Shri Ekahare Nandu P. and Shri Deshpande Prakash G., for securing First Rank and First Class in the College at B.E.(M) Examination of April 1971.
- (4) Shri Rupani Balram K. and Shri Modak Nisar A., for securing First Rank and First Class in the College at B.E.(E) Examination in April 1971.

Kulapati's Silver Medals

- (1) Shri Sanghvi D.S., T.E.(M), the Second Best allround student of the College for 1971-72.
- (2) Shri Thatte Shashikant S., for securing Second Rank and First Class from this College in B.E.(C) Examination of April 1971.
- (3) Shri Parsurampur R.M., for securing Second Rank and First Class from this College in B.E.(M) Examination of April 1971.
- (4) Shri Pradban Pradeep D., for securing Second Rank and First Class from this College in B.E.(E) Examination of April 1971.

Shri Prithvish Narayandas Killawalla Prizes

- (1) Shri Kinariwala Vijaykumar N. and Shri Parekh Suhrod P., S.E.(E) students having secured highest marks in E.E. Examination and First Class in April 1971 Examination. Rs. 100 (to be shared)
- (2) Shri Shah Mukund P., for having secured highest marks in S.E.(E) Examination in April 1971 and joined T.E.(Elec.) class in this College. Rs. 100.
- (3) Shri Kulkarni A.B., for having secured highest marks in T.E.(E) Examination in April 1971 and joined the B.E.(E) class in this College. Rs. 100.
- (4) Shri Rupani Balram K. and Shri Modak Nisar A., for having secured highest marks with First Class in B.E.(E) Examination of April 1971. Rs. 100 (to be shared).

Shripadrao Dubhashi Prize

- (1) Shri Bhandari, A.Z., for securing highest marks in Design and Drawing papers in S.E.(C) Examination of April 1971. Rs. 75.

Shri Yogesh Ashar Scholarship

- (1) Shri Nerurkar G.B., of S.E.(Elec.) class has been awarded Shri Yogesh Ashar Scholarship of Rs. 250.

Lokramdas Raheja Trust Scholarships

Lokramdas Raheja Trust Scholarships of Rs. 250 each, have been awarded to:

- (1) Shri S.S. Angal, T.E.(M).

- (2) Shri S.K. Govindarajapuram. S.I.
(F).

Merit Prizes Medals

F.E.

- Shri Rego Arthur G.P. (I)
Shri Thakkar Sureshkumar J. (II)

S.E. (Civil)

- Shri Parekh Jayant A. (I)
Shri Gola Laxmichand M. (II)

S.E. (Mech.)

- Shri Parekh Bharatkumar K. (I)
Shri Dighe Shomir S. (II)

S.E. (Elect.)

- Shri Kinariwala Vijaykumar and
Shri Parekh S.P. (I)
Shri Desai Ajay M. (II)

T.E. (Civil)

- Shri Kasabwala Jitendra B. (I)
Shri Kulkarni Surihari M. (II)

T.E. (Mech.)

- Shri Sanghavi Dilip S. (I)
Shri Kale Satish L. (II)

T.E. (Elect.)

- Shri Shah Mukund P. (I)
Shri Shikhare Dileep M. (II)

B.E. (Civil)

- Shri Shah Dhiraj M. (I)
Shri Churi Vijay N. (II)

B.E. (Mech.)

- Shri Idnani Subhash K. (I)
Shri Mody Ramesh J. (II)

B.E. (Elect.)

- Shri Kulkarni Ajit B. (I)
Shri Daruwala Hoshang P. (II)

AWARDS IN EXTRA CURRICULAR ACTIVITIES

BADMINTON

Inter Class Championship

Winners: B.E. (Elect.)

Players:

1. Sri Sawant H.M. (Captain)
2. Sri Malik J.V.

Captain H.M. Sawant to receive the Trophy

SINGLES:

Sri Sawant H.M. B.E. (Elec.)

Runner-up:

Sri Joshi J.V. S.E. (M)

DOUBLES:

Winners:

Sri Sawant H.M. B.E. (E)
and
Sri Rege S.M. B.E. (C)

Runner-up:

Sri Shetty J. S.E. (F)
and
Sri Natraj K. F.I. II

JUMBLD DOUBLES:

Winners:

Sri Sawant H.M. B.E. (E)
and
Sri Dhamale V. T.E. (E)

Runners-up:

Sri Shetty J. S.E. (C)
and
Sri Joshi V. S.E. (M)

CRICKET

Best Batting Prize:

Sri S.M. Rege, B.E. (C)

Best Bowling Prize:

Sri P.P. Raje, B.E. (E)

Best Fielding Prize:

Sri D. Venkatraman. T.E. (F)

Winning Team: B.E.

Captain Sri P.P. Surve to receive the Tro

The Team

1. Sri P.P. Surve, Captain
2. Sri S.M. Rege
3. Sri U.D. Kallbag
4. Sri Dilip Parekh
5. Sri J.K. Desai
6. Sri P.P. Raje
7. Sri Abraham Samuel
8. Sri S.V. Biogate
9. Sri H.M. Sawant
10. Sri Vijay N. Desai
11. Sri Bharat Doshi

FOOTBALL

Best Player:

Sri Allen Fernandes, T.F. (F) Captain

Second Best Player:

Sri Lewis Urban, B.F. (M), Captain

Winning Team: T.F.

Team

1. Sri Allen Fernandes, Captain
2. Sri Tarit Poddar, V, Captain
3. Sri A.B. Nadkarni
4. Sri K. Nizar Hirji
5. Sri W.F. Noronha
6. Sri D.M. Chandvadkar
7. Sri R.A. Iyer
8. Sri R.S. Para
9. Sri R.J. Kapadia
10. Sri S.M. Patni
11. Sri A.R. Venkataraman

INTER-COLLEGIATE, INTER-UNIVERSITY & COLLEGIATE ELOCUTION & DEBATING COMPETITIONS - 1971-72.

Marathi

FIRST PRIZE:

Sri V.R. Nadkarni

SECOND PRIZE:

Sri G.G. Vaidya

CONSOATION PRIZE:

Sri V.D. Kamat

English

FIRST PRIZE:

Sri D.M. Chandvadkar

SECOND PRIZE:

Sri G.G. Vaidya

DRAMA

FIRST PRIZE:

Sri S.B. Rege, B.F. (F)

SECOND PRIZE:

V.G. Sardesai, T.F. (F)

Captain Sri Allen Fernandes to receive the Trophy.

VOLLEY BALL

Best Player:

Sri Hemmady Mohan R., S.F. (C)

Second Best Player:

Sri Patel Hiranshu K., F.F. (H)

Winning Team: S.F.

Team

1. Sri Hemmady M.R., Captain
2. Sri Dangaria J.J.
3. Sri Moosa Ali Pagarkar
4. Sri Rana B.A.
5. Sri Gokhale S.M.
6. Sri Vaidya P.M.

Captain Sri M.R. Hemmady to receive the trophy.

KHO-KHO

Best:

Sri Rege S.M., B.F. (C)

Second Best:

Sri Surve P.P., B.F. (M)

KABADDI

Best Player:

Sri Naber A.B., S.F. (M)

Second Best Player:

Sri Bhandare S.H., T.F. (F)

receive the Trophy

ANNUAL MAGAZINE "SARJANIKA" Vol VI (APRIL 1971)

FIRST PRIZE:

Sri R. Veera Raghavan

SECOND PRIZE:

Sri Bhel Ramesh

CONSOLATION PRIZE:

Sri S. Vijaya Churi

CONSOLATION PRIZE:

Sri V. R. Nadkarni

CONSOLATION PRIZE:

Sri D. S. Solanki

Name of Article

"Earth Satellite and Re-entry Problem".

"True Education".

"For Good Cartoons and Humorous Writing".

"Aare Vedyā Mana Talmalase".

"Swatantrata Paehi".

★ ★ ★ LIST OF STUDENTS WHO HAVE GRADUATED IN 1970-71

B.E. (Civil) First Class

1. Sri Bharwada N. A.
2. Sri Castellino N. B.
3. Sri Dadabhoy R. J.
4. Sri Das P. K.
5. Sri Doshi H. M.
6. Sri Jani R. P.
7. Sri Rana M. I.
8. Sri Thatte S. S.
9. Sri Thiluzathile A. V.
10. Sri Datar N. N.
11. Sri Dattani S. M.
12. Sri Dhari P. P.
13. Sri Geel V. V.
14. Sri Kamat G. N.
15. Sri Raheja M. I.
16. Sri Sankpal R. L.
17. Sri Trivedi V. D.

B.E. (Civil) Second Class

1. Sri Dave P. R.
2. Sri Gilani R. M.
3. Sri Joshi C. B.
4. Sri Kadya R. I.
5. Sri Kapadia P. H.
6. Sri Kapadia R. K.
7. Sri Kulkarni S. K.
8. Sri Lemos O. M.

9. Sri Modak R. V.
10. Sri Nabar A. S.
11. Sri Shah P. K.
12. Sri Shah R. K.
13. Sri Shethia D. N.
14. Sri Trivedi P. J.
15. Sri Desai S. S.
16. Sri Deshmukh P. P.
17. Sri Kapadia A. K.
18. Sri Kulkarni A. B.
19. Sri Kundanani C. W.
20. Sri Menon S. B.
21. Sri Paranjape U. M.
22. Sri Poonawala K. H.
23. Sri Sangharajuku N. M.
24. Sri Shah P. Z.
25. Sri Sidhwani J. S.
26. Sri Zinzunwadia S. D.

B.E. (Mech.) First Class

1. Sri Eklahare N. P.
2. Sri Kamat J. B.
3. Sri Shah K. V.
4. Sri Ahluwalia S. S.
5. Sri Arbhi S. W.
6. Sri Ari J. C.
7. Sri Bibikar D. Y.
8. Sri Deshpande P. G.
9. Sri Deshpande S. V.

(APRIL 1971)

Article

Re-entry Proh-

and Humorous

Talmaluse".

ATED

P

W

H

N

D.

B.E. (Mech.) First Class Contd.

10. Sri Doshi S.N.
11. Sri Gawaskar S.B.
12. Sri Gogate S.V.
13. Sri Kothare K.S.
14. Sri Kulkarni S.M.
15. Sri Mehta S.H.
16. Sri Pai U.B.
17. Sri Parasrampuria R.M.
18. Sri Prabhu R.M.
19. Sri Samel V.B.
20. Sri Sidhaye S.M.
21. Sri Thatte M.L.
22. Sri Vithalani P.D.
23. Sri Wathare B.D.
24. Sri Ashar M.D.
25. Sri Ashar V.J.
26. Sri Botadra N.N.
27. Sri Desai P.V.
28. Sri D'souza A.L.J.
29. Sri Fernandes J.J.
30. Sri Joshi J.D.
31. Sri Mehta A.N.
32. Sri Shah I.S.
33. Sri Shah R.D.
34. Sri Shah S.R.
35. Sri Sheth V.R.
36. Sri Sheth S.N.
37. Sri Vora N.P.
38. Sri Vora S.P.
39. Sri Yogi A.K.

B.E. (Mech.) Second Class

1. Sri Athalye V.D.
2. Sri Bhotika R.C.
3. Sri Chavan S.V.
4. Sri Dalal D.C.
5. Sri Damania S.C.
6. Sri Damle R.D.
7. Sri Deshpande S.N.
8. Sri Devani A.J.
9. Sri Damankar C.B.
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13. Sri Joshi G.P.
14. Sri Joshi V.D.
15. Sri Korgaonkar S.S.

16. Sri Nagda P.D.
17. Sri Patankar V.D.
18. Sri Patel J.M.
19. Sri Pillai V.P.
20. Sri Raykar P.G.
21. Sri Shah C.J.
22. Sri Shah S.M.
23. Sri Shinde J.A.
24. Sri Toscano T.J.
25. Sri Vala A.L.
26. Sri Ahuja S.B.
27. Sri Gulwani A.D.
28. Sri Hemrajani A.J.
29. Sri Kapadia V.L.
30. Sri Rastegar B.K.
31. Sri Shah A.S.
32. Sri Shah N.B.
33. Sri Sonaji P.L.
34. Sri Vira R.P.
35. Sri Wadhwa M.R.

B.E. (Elect.) First Class

1. Sri Gulati A.P.
2. Sri Kulkarni S.V.
3. Sri Pawar N.D.
4. Sri Rupani B.K.
5. Sri Agrawal D.K.
6. Sri Amin M.N.
7. Sri Bhagia T.A.
8. Sri Desai D.L.
9. Sri Gadkari A.L.
10. Sri Gadkari P.
11. Sri Gijare M.D.
12. Sri Hegdekar R.V.
13. Sri Iyer S.V.
14. Sri Jain V.C.
15. Sri Javeri R.J.
16. Sri Kaji B.L.
17. Sri Kalyansunderam P.N.
18. Sri Karandikar A.V.
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23. Sri Mehta J.L.
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25. Sri Naik R.A.
26. Sri Parmeswaram A.V.

27. Sri Parikh K.D.
28. Sri Patel B.R.
29. Sri Pereira G.Z.
30. Sri Pradhan P.D.
31. Sri Puthran H.N.
32. Sri Salkar P.N.
33. Sri Sanya J.M.
34. Sri Shah D.S.
35. Sri Shah H.F.
36. Sri Syed A.K.A.

B.E. (Elect.) Second Class

1. Sri Fernandes G.J.
2. Sri Likhite V.D.
3. Sri Sanghani B.N.
4. Sri Seth A.D.
5. Sri Sundham B.J.
6. Sri Bhind D.P.
7. Sri Choksi P.M.
8. Sri Chowdhary H.V.
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19. Sri Limaye P.M.
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21. Sri Mehta D.M.
22. Sri Mehta J.L.
23. Sri Nanavati G.H.
24. Sri Paranjape V.V.
25. Sri Patke C.G.
26. Sri Patke C.
27. Sri Rajda J.P.
28. Sri Rayani Y.A.
29. Sri Suchanna V.B.
30. Sri Singhavi M.C.
31. Sri Shah C.S.
32. Sri Shah J.M.
33. Sri Shah V.M.
34. Sri Guru P.M.
35. Sri Tambankar D.M.
36. Sri Tare R.J.
37. Sri Vegeed V.P.
38. Sri Vyas A.R.
39. Sri Vyas V.S.

OCTOBER 1971

B.E. (Civil) Pass Class

1. Sri Gandhi J.M.

B.E. (Mech.) First Class

1. Sri Cross G.J.
2. Sri Dhoot K.D.
3. Sri Shah A.N.
4. Sri Shah J.H.

B.E. (Mech.) Second Class

1. Sri Pednekar S.M.

B.E. (Elect.) Second Class

1. Sri Chandavarkar R.D.
2. Sri Shendikar V.G.
3. Sri Deshpande J.S.

B.E. (Elect.) Pass Class

1. Sri Kapadia C.R.

B.E. (Old Course)

B.E. (Civil) Pass Class

1. Sri Mota N.R.

B.E. (Mech.) Second Class

1. Sri Tipnis N.D.

B.E. (Mech.) Pass Class

1. Sri Chavan S.B.
2. Sri Haldavnekar A.G.
3. Sri Heroor A.G.
4. Sri Joglekar P.K.
5. Sri Nilalani A.T.
6. Sri Rajadhyaksha M.Y.

B.E. (Elect.) Second Class

1. Sri Nakhuda A.S.A.

B.E. (Elect.) Pass Class

1. Sri Surve S.S.
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मराठी विभाग

प्रदूषण-समस्या व उपाय

“जगानमधील टोकिओ येथील वहातुक-नियंत्रक पोलीस अध्या तागापेक्षा जास्त वेळ काम करून शकत नाही. इतकेच काय तर काही ठिकाणी तर ऑक्सिजनच्या रिशव्याशिवाय काम करणे अशक्य होऊन बसले आहे.” “ओसाकाजवळील औद्योगिक भागातील विद्याथी तर रसमायकम् घालून शाळेत जातात.” ‘बऱ्याच पक्षांच्या पुनरुत्थावन पद्धतीने दोष निर्माण झाल्याचे खात्रीलायकरीत्या मागितले गेले आहे.” इतकेच नव्हे तर आपण रोज खातो त्या अन्नाबद्दलही काही निव्वमानी खात्री देता येणार नाही असे म्हटले तर अनिश्चिती होणार नाही. ह्या सगळ्या एवढेच प्रमुख कारणे म्हणजे मानवाने ती ज्या वातावरणात राहता त्याचेच मांडवा प्रमाणाने ज्ञानविज्ञाने दूषितीकरण हे होय.

आता दूषितीकरण म्हणजे तरी काय ? ‘निर्गमकी ऑक्सिजन, कॅरेट्रिप्राणोय वायू इत्यादी जी चक्रे आहेत

दिलीप नारायण तळवेलकर
द्वितीय वर्ष अभियांत्रिकी (यांत्रिक)

त्यांच्या समतोलत्वात नैसर्गिक अथवा मानवी कारणांमुळे झालेला बदल म्हणजे दूषितीकरण होय असे थोडक्यात म्हणता येईल. ह्या व्याख्येनुसार खालील गोष्टींचे पाच भोवशा प्रमाणावर दूषितीकरण होत असल्याचे निदर्शनास येत आहे :

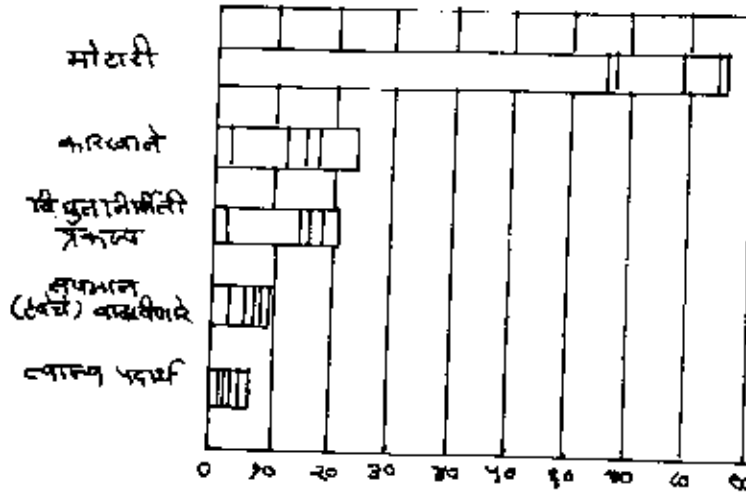
- | | |
|-----------|--------------|
| (१) हवा, | (२) न.मान, |
| (३) पाणी, | (४) वनस्पती. |

हवेचे दूषितीकरण :- हवेच्या दूषितीकरणाची दोन मुख्य कारणे संभवतात :

- (१) नैसर्गिक
- (२) मानवनिर्मित

नैसर्गिक दूषितीकरण :-

(अ) धुळीची तसेच वाळूची वादळे ह्या दूषितीकरणास कारणीभूत झालेली आहेत व होतीलही.



प्राविषी (कोटी टनामध्ये)

दूषितीकरणाची उगमस्थाने

प्रत्येक आयताचे जे पाच भाग पाडले आहेत ते म्हणजे (डावीकडून) ① ८० ② सल्फर ऑक्साइड्स ③ नैट्रोजन ऑक्साइड्स ④ धूळ (Particles)

जळाक पदार्थापासून निर्माण होणाऱ्या दूषितकांचे भारतातील प्रमाण वर्षाविषारा तक्ता

	प्रति वर्षी वापरले जाणाऱ्याचे प्रमाण (कोटी टन)	दूषितक व त्याचे प्रमाण (हजार टनामध्ये)							एकूण प्रमाण
		Co	So ₂	Nox	हेड्रो-कार्बन (हेड्रो-कार्बन)	H ₂ S	NH ₃	HCl	
भट्टानियम (मोडेली विमाने)	१६	३२०	१.६	३२	१२८	१६	३.२	१.६	१६
कोळसा	६३.३	११५	१.३००	२३०	१.६००	८०	५.१६०	८०	५.३१०
तेल (पेट्रोल एविल)	५०	३०	१००	४१	११०	१	१	१	११०
वायु (गॅस)	०.८३	—	०.२	३.६	१.८	०.३	०.३	०.३	३
पेट्रोलियम गॅडीकरण प्रक्रिया	१२.०	२६	१३	११	८	—	१.३	—	६०
जळाक वाफूड	१००	१६३	१२.६०	३५.०	—	१२०	३.१६०	१२०	१२०
गॅस	—	३८	१.५०	२.०	५.६०	२५	३२०	२५	२५
पाने, पालापाचोडा वगैरे	३२	५१	६००	१३०	३२०	३६	११६०	३६	३६
अधोवत जळण	२००	१.६००	१.०३०	१.०००	१.६००	—	१.६००	—	६.०००

गम्यमान कागजाचे वापर व स्टोअरच्या निरण्या कागद तसेच इतर काही कारखाने ज्ञाप्यासून निर्माण होणाऱ्या दूषितकांचे (वगैरे) असे दूषितकांचे प्रमाण कागद मोठा होतानाच (वर्षाविषार लावताच) वर नमोवलेले केलेले नाही.

	पेटिक्युलेटम्	SO ₂	NO _x	CO	हेड्रोकार्बन
वहाने	११	०.३	३.३	५३.९	१५.१
व्याव्य पदार्थ	०.९	०.१	०.५	३.१	१.५
कारखाने	६.८	६.६	०.२	८.८	४.२
जर्मि प्रकल्प उरणता निमिती	८.१	२२.१	१.१	१.३	०.६
मोन्वट्ट टर्म्पारेण	—	—	—	—	३.९
एकूण	१६.९	२९.५	१३.१	७५.५	२५.३

१९६८ मध्ये अमेरिकेने वाहेर (हवेल) मोडेली गेलेली दूषितक (कोटी टनामध्ये) [मेडिकस]

क्र.	HCl	एकूण प्रमाण
१	१.६	८१.०
२	८.०	५.३५०
३	१	२१.०
४	०.२	७
५	—	६०
६	१२०	८.३६०
७	२१	११.९९०
८	२६	२.४६०
९	—	६.२००

होणान्या दूषितकांचा

क्र.	हैड्रोकार्बन्स
१	१५.१
२	१.५
३	४.२
४	०.६
५	३.९
६	२५.३

हैड्रोकार्बन्स

(व) ज्वालामुखीचे उद्रेक-ह्यामुळे दूषितत्वात SO_2 , CO , मत्स्यपुरीक ऑक्सीडी वाफ इत्यादी दूषितकांचे प्रमाण वाढते. उदा. १८८३ मध्ये कंकाटो नर १९६३ मध्ये माउंट आंग ह्या ज्वालामुखीच्या उद्रेकाची परिणती जगभर रंगित सूर्यास्त दिसण्यात आली होती. त्यामुळे पूर्वीचे तपमान देखील ८° से. येवढे वाढले होते.

मानवनिमित्त दूषितोकरण- ह्याची खालीलप्रमाणे वर्गीकरी करून घेईल :

(अ) ज्वलनामुळे होणारे दूषितोकरण :- (पहा तक्ता क्र. १)

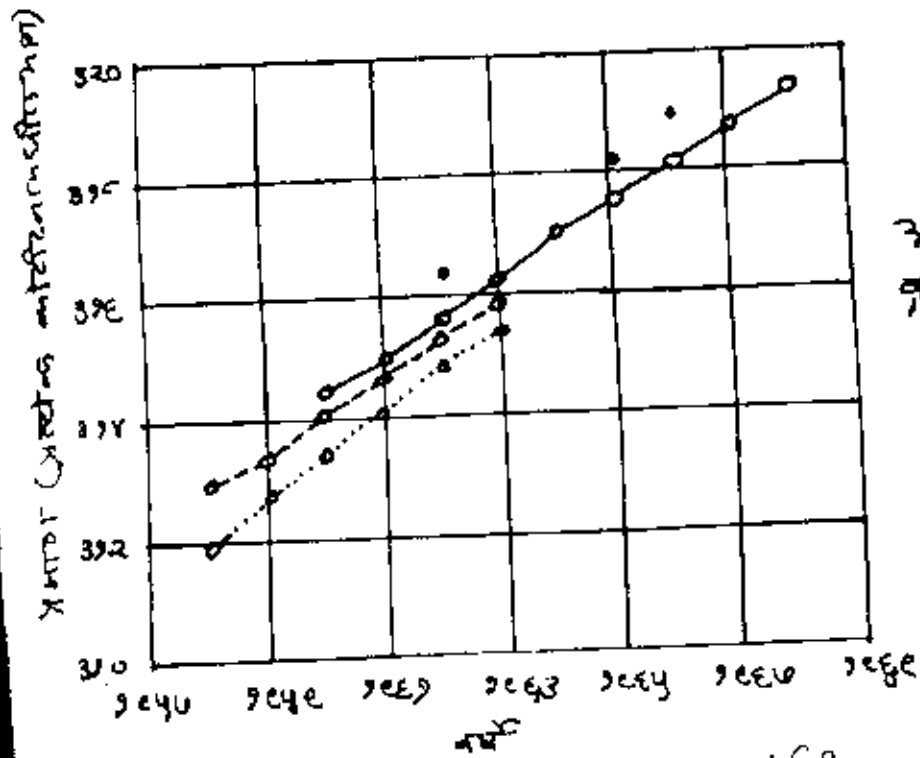
(१) इंधनाचा वापर-घराचरी कोळसा, तेल, नाजूड ह्यांचा अजणानाडी मोट्या प्रमाणावर वापर होत आहे. उष्णतानिमित्ती प्रकलनासाठी तर इंधन

प्रमाणाबाहेर वापरले जात आहे.

निर्माण होणारी दूषितके-मत्सर आणि नेट्रोजन ऑक्साइड्स (१९६५ मध्ये तर एकट्या ब्रिटनमध्ये ६.४ कोटी टन SO_2 हवेत सोडला गेला.)

(२) व्हानूकीभाडी प्रकलनाचा वापर :- उदा. मोटारी, विमाने चालविण्याकरिता लागणारी शक्ति निर्माण करण्याकरिता खूपच इंधन जाळावे लागते.

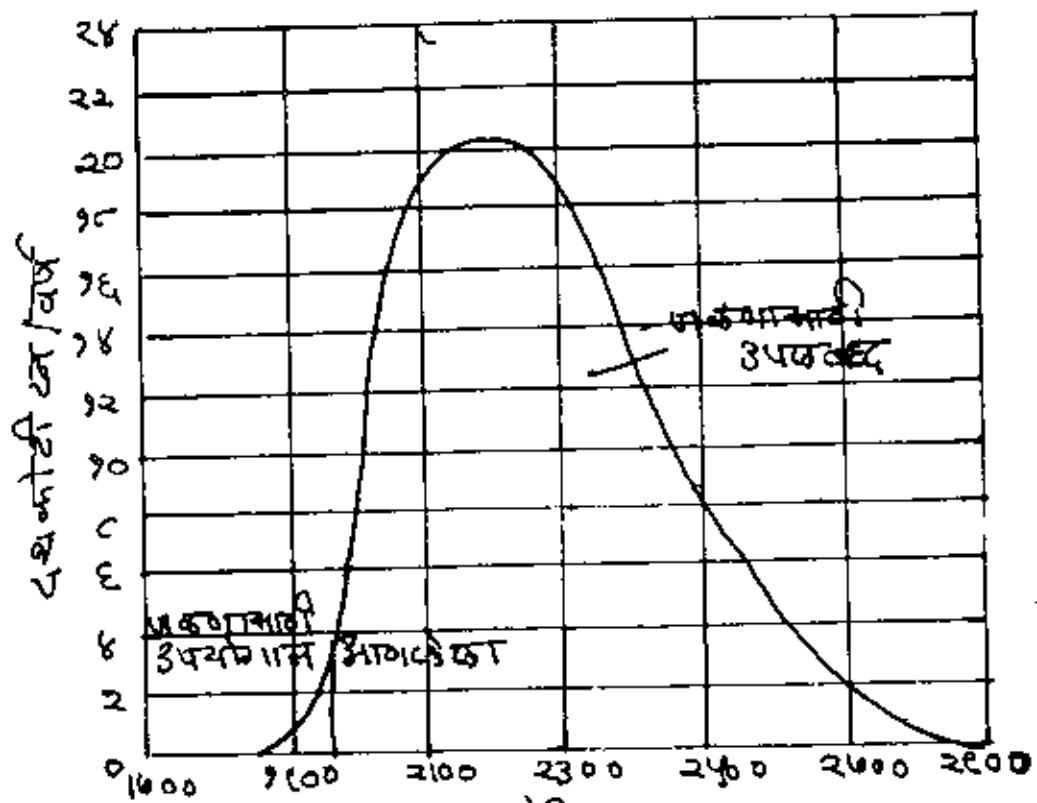
निर्माण होणारी दूषितके :- CO_2 , CO , नेट्रोजन ऑक्साइड्स लेड, SO_2 , अर्नोहाइड्रम, हैड्रोकार्बन्स, कार्बोनी इत्यादि. (उत्तर गोलार्धात ३५००० टन (मेट्रिक) लेड (antiknock agent tetraethyl lead) मोटार एंजिनमध्ये जाळण्यात आले व पर्यायाने हवेत सोडले गेले.



आलेख
क्र. १

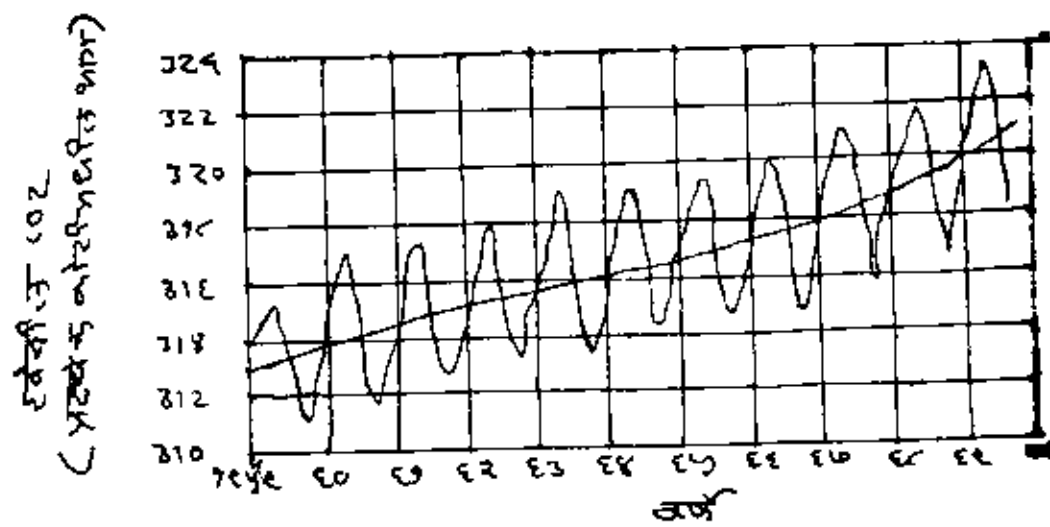
कधीकधी जाणीवपूर्वक वाढीचे प्रमाण दर्शविणारा नकाशा

- ... → बॉस्टॉन युनिव्हर्सिटीच्या मापनावरून
- → स्फॅकटोस युनिव्हर्सिटीच्या मापनावरून
- - - → Mauna Loa in Hawaii येथील मापनावरून
- → मोरारोझाफी संस्थेच्या (Swiss संस्थेक) मापनावरून

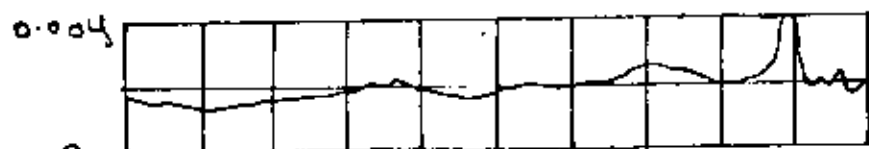


प्रकृति द्वारा उत्पन्न वर्षा

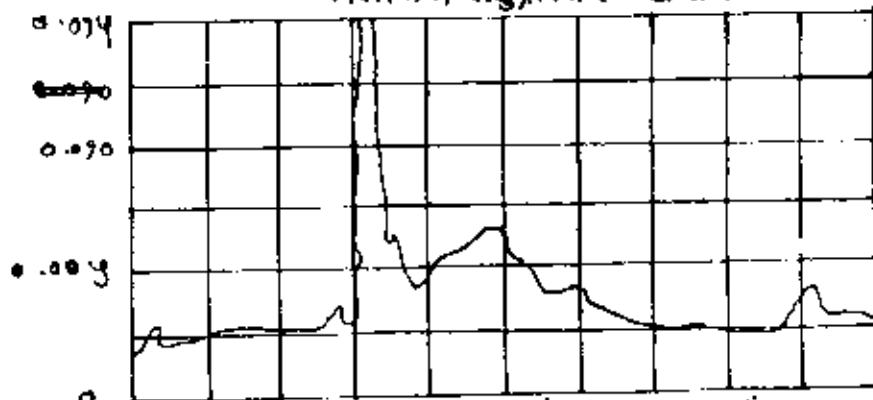
आलेख क्र. २.



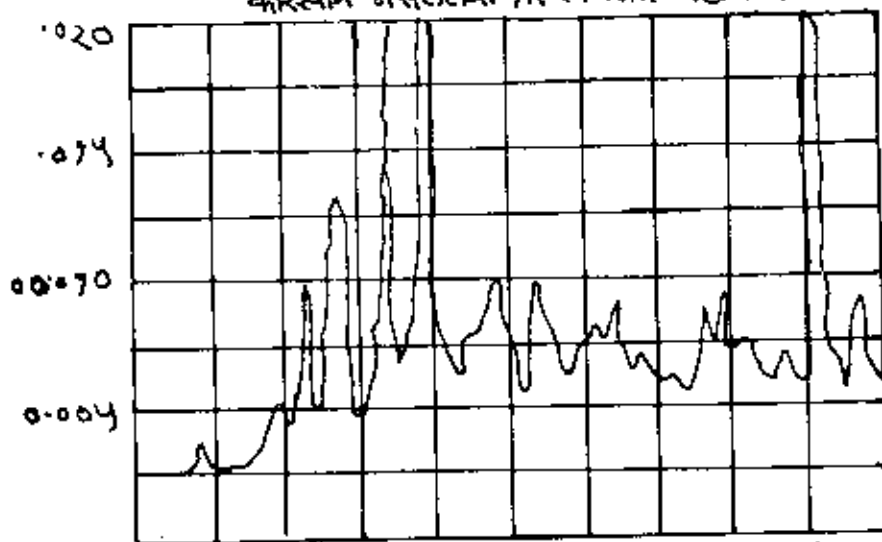
आलेख क्र. ३



કૅલીબ્રેશન સમુદાયકરણ વધારાના



કારણને નસલેલખા પ્રદેશકરણ વધારાના



2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00 18.00 20.00 22.00 24.00 26.00 28.00 30.00 32.00 34.00 36.00 38.00 40.00 42.00 44.00 46.00 48.00 50.00 52.00 54.00 56.00 58.00 60.00 62.00 64.00 66.00 68.00 70.00 72.00 74.00 76.00 78.00 80.00 82.00 84.00 86.00 88.00 90.00 92.00 94.00 96.00 98.00 100.00

કેક

કારણને પ્રસારેલખા પ્રદેશકરણ વધારાના

(ब) औद्योगिक कारखाने :-

(१) रासायनिक कारखाने :- उदा. पेट्रोलियम शुद्धीकरणाचे, खतांचे, सिमेंटचे, काच निर्मितीचे कारखाने, कागदाच्या गिरण्या इत्यादि.

निर्माण होणारी दूषितके :- HI_2S , मल्फर ऑक्साइड्स, आर्सेनिक फ्लुमम, धुळ वगैरे.

(२) धातुत्रिपयक प्रकल्प :- अन्युत्पत्तिप्रयमचे कारखाने, स्टीलनिर्मिती प्रकल्प इत्यादि.

दूषितके :- धातूच्या (Pb, Zn, Hg) चाका, फ्लुओराईड्स, पॉटॅश्लूनेट्स.

(३) निरुपयोगी पदार्थांतून उपयुक्त पदार्थ मिळविण्यासाठी चांदाविकेने कारखाने (waste recovery) :- उदा. स्क्रॅप मेटल वॉर्ड्स, रेडिंग प्लॅट्स वगैरे.

दूषितके :- धूर, काजळी, वायुरूप सेंद्रिय पदार्थ इत्यादि.

(क) शेतकी क्रिया-शेतभाजणे, किटकनाशक द्रव्यांचे फवारे मारणे इत्यादि क्रियाही ह्या दूषितीकरणामात समाविष्ट आहेत.

दूषितके :- धूर, काजळी, मल्फर ऑक्साइड्स, सेंद्रिय बाष्पा, पॉटॅश्लूनेट्स इत्यादि.

(ड) अणुशक्ति प्रकल्प :- उदा. अणुचाचण्या, इंधन-निर्मिती इत्यादि क्रियांनील प्रक्रियांमुळे फ्लुओराइड्स, यूरेनियम व बेरियम (Be) चे कण, Ar-४१, I-१३१ इत्यादि किरणोत्सर्जक पदार्थ, Sr-९०, Cs-१३७ C-१४ इत्यादि घटक दूषितके निर्माण होत असतात.

(इ) लोकवस्तीची वाढ :- शंभर वर्षांपूर्वी जगाची लोकसंख्या (साधारणपणे १८५० सालापर्यंत) १००० कोटी होती, १९०० साली ती २००० कोटी झाली. २००० सालापर्यंत हेच प्रमाण ३००० कोटीवर जाईल. आताच्या परिस्थितीत पूर्वी फक्त ६००० ते ८००० कोटी माणसांनाच पोसण्यास समर्थ आहे असे पॉल एडविच ह्या इकॉनॉमिस्टचे म्हणणे आहे. त्यातूनच मात्र रहाण्याचा, खाण्याचा प्रश्न भेटमावू लागेल. (तक्ता क्र. २ व चित्र क्र. १ पहा).

पाण्याचे दूषितकरण :- "The oceans are in danger of dying. The pollution is general"

हे २३ वर्षांत २,४८०,००० कि. मि. समुद्रप्रवाह केलेल्या, समुद्रतळाचा शोध घेणाऱ्या फ्रेंच माणूस अक्विम यंत्रम् कॉरिंटोसो यंत्रे मत्त आहे. गेल्या २० वर्षांत समुद्रातील जीवन ४० टक्के कमी झाल्याचा त्याचा अनुभव बोध घेण्यासारखा आहे.

कारखाने, जेव्हा ह्यांच्या द्वाग प्रतिवर्षी ५००० टन मर्क्युरीची समुद्रात भर पडत असल्याचे कळते. सेंद्रिय मर्क्युरी मयुगे good dressing साठी वा क्लोरिन व Na_2CO_3 च्या निर्मितीत गहाळपक पदार्थ म्हणून वापरली जातात. Hg युक्त माणसांमध्ये Neurological disorders निर्माण झाल्याचे व त्यामुळे जपानमधील मिनीमाटा समुद्रकिन्याच्याजवळील ४१ माणसे मरण पावली होती.

नंतरून वेदरिंग ग्रोमंडद्वारा वर्षांना १५,०००० टन लेड समुद्रात टाकले जाते. गेल्या ४५ वर्षांत मानवाने उमर गोवार्थाने लेडचे प्रमाण ०.०१ वा ०.०२ वरून ०.०३ Mg/कि. वर वाढविले आहे.

D.D.R. (सेंद्रिय रसायन) हे देखिल समुद्रात आढळून येते. समुद्रातील इतर काही जातींमध्ये डायनिड्रन, एट्रिन, हेप्टाक्लोर एपाक्साइड आणि बेझिन हेक्साक्लोराइड्स इत्यादी हेड्रोकार्बन्स आढळून आले आहेत. त्यामुळे जलचर पक्षी व मासे ह्यांची संख्या कमी होत असल्याचे आढळून आले आहे.

पॉलिक्लोरोबेन्जेन्स वायुकिनाइड्स (P.C.B.) हे हॅलोजनयुक्त पदार्थ म्हणजे सह-धाची दुर्घिम दूषितके होत. समुद्रात ते फार मोठ्या प्रमाणात पसरले आहेत. अमेरिका (U.S.A.), रशिया (U.S.S.R.), चिन इत्यादि देशांनी केलेल्या अणु-चाचण्याद्वारा जे किरणोत्सर्जक पदार्थ निर्माण झाले ते सर्व समुद्रात आड्ड येतील. Sr-९०, Cs-१३७ इत्यादी पदार्थ ह्या राखण्या-द्वारा समुद्रात सोडले गेले आहेत. समुद्राच्या वायुमंडलातील C-१४ चे प्रमाणही त्यामुळेच वाढल्याचे कळते.

तेलवाहू बोटीद्वारा समुद्रावर फार मोठ्या प्रमाणात तेल पसरविले जाते. अशात-हेचे समुद्र आक्सीजन-पुरेमा साठी न झाल्याने मागाती अणुकारकच दगड काही वेळा detergents च्या साहाय्याने बोटींना

च. मि. समुद्रप्रताप केलेल्या,
नेच माणूस जॅक्सन यवम्
वेन्चा २० वर्षात समुद्रातील
त्याचा अन्तर्भव बोध

१९९९ प्रतिलिपी ५००० टन
असल्याने कळते. मॅट्रिक्स
माडी वा क्लोरिन
महाप्रक पदार्थ म्हणून
मृगामुळे Neurological
व त्यामुळे जपानमधील
१९ माणसे मरण

१५,००००
८५ वर्षात मानवाने
०.०१ वा ०.०२ वरून
आहे

हे देखिल समुद्राने
जानीमध्ये डायनिडिन,
बेझिन हेक्सा-
आदरून आले आहेत.
काची संख्या कमी होत

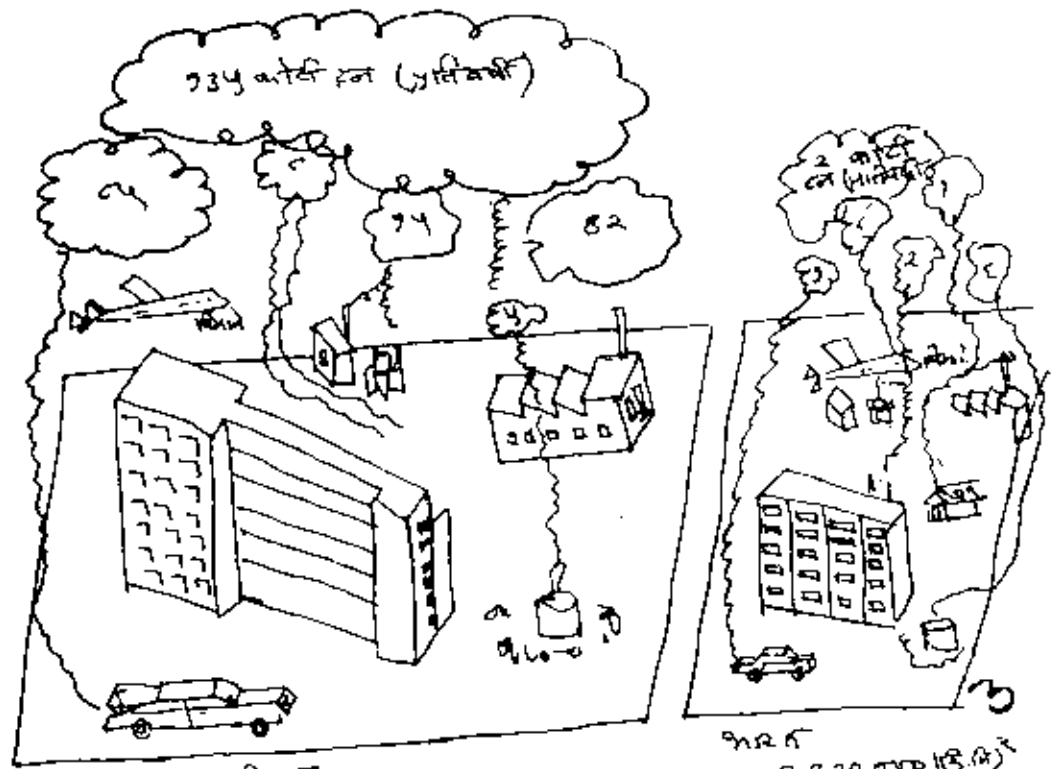
निनाइसम् (P.C.B.) हे
मत्वाची कृत्रिम द्रव्ये
गमाणाने पसरले आहेत.
(U.S.S.R.), जिथे
चक्याद्वारा जे किरणो-
नर्व समुद्राने आढळून
पदार्थ ह्या जाचण्या-
समुद्राला वरून
ह्यामुळे वाढल्याने

कार मोठ्या प्रमाणात
समुद्रांमधील
अप्रायकारक ठरता
मृद्व्याने बोटीना

तक्ता क्र. २

जगातील काही मोठ्या शहरांचे क्षेत्रफळ आणि लोकसंख्येची घनता (Population density)

शहराचे नाव	क्षेत्रफळ (कि. मी.) ^१	लोकसंख्येची घनता (कि. मी.) ^२
अहमदाबाद	२८५	४,२००
बंगलोर	६८	११,५००
पूर्वे बर्लिन	४०५	२,६००
पश्चिम बर्लिन	४८५	८,५००
मुंबई	६६	३५,६००
कलकत्ता	९०	३५,६००
शिकागो	५८०	६,१००
चुंगकिंग	३००	१३,६००
दिल्ली	१,५००	१,६००
हँबुर्ग	७५०	२,४००
लंडन	३००	११,२००
नॉस ऑगलम्	१,१२०	२,२००
मद्रास	१३०	१३,३००
सांक्रो	३४०	१४,६००
न्यूयॉर्क	७३६	१०,७००
ओसाका	२,६२०	१,५००
पॅरिस	१०५	२६,६००
टोकियो	२,१६०	२,५००



अमेरिका
होकार्ड ९,५००,००० (मि.मि.)
(अमेरिकेतील वायू (१९/१९८०) २

चित्र क. १

भारत
होकार्ड - ९,३२०,००० (मि.मि.)
(भारतातील वायू १९३३/१९८०) २

लावली जाते. त्यामुळे समुद्रपक्षीच नव्हे तर समुद्रातील वनस्पती व आर्गॅनिक लाटफ ह्यांनादेखील धोका पोहोचतो. अशा तऱ्हेने प्रतिवर्षी १ कोटी टन तेल समुद्राच्या पृष्ठभागावर पसरत आहे व ८०% ते हे प्रमाण वाढत आहे.

अमेरिकेतील भूगर्भशास्त्रविषयक पहाणीवरून असे दिसून आले आहे की जमिनीत गरम पाण्याच्या अन्वाजवळ विजिष्ट बॅक्टीरिया असतात. व त्या H_2S चे H_2SO_4 मध्ये रूपांतर करतात. प्रतिदिनी १०० मि^३ क्षेत्रफळामार्गे १ किलो H_2SO_4 निर्माण होत असल्याचे आढळून आले आहे. पावसाचे पाणी, नद्या ह्याद्वारे हे H_2SO_4 समुद्राला मिळते. काही विजिष्ट प्रमाणाबाहेर H_2SO_4 असलेले पाणी माशांच्या नाणाय कारणीभूत ठरते व त्यामुळे धातूची व काँक्रीटची कामेदेखिल कमकुवत होतात.

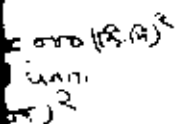
अमेरिकेतील शास्त्रज्ञांना कूजलेली पानेदेखिल पिण्याच्या पाण्याच्या साठ्याच्या दूषितीकरणास कारणीभूत

होत असल्याचे आढळून आले आहे. पाने जेव्हा कूजतात तेव्हा त्यांचे विघटन होते व ह्या प्रक्रियेत ऑक्सिजन शोषला जातो, त्यामुळे ते पाणी पिण्यास अयोग्य ठरते. पाण्याच्या दूषितीकरणाचे चार मुख्य प्रकार आहेत :

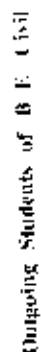
- (१) भौतिक दूषितीकरण (Physical Pollution).
- (२) रासायनिक दूषितीकरण (Chemical Pollution).
- (३) शरीरशास्त्रविषयक दूषितीकरण (Physiological Pollution).
- (४) जीवशास्त्रविषयक दूषितीकरण (Biological Pollution).

भौतिक दूषितीकरण - हे रंग गडदपणा, तपमान तरंगणारे पदार्थ ह्यामुळे होते.

रंगामुळे होणारे दूषितीकरण :- कूजलेला झाडाचा पाला, रंगीत द्रव्ये, कापड कारखाने-मेढ्रिय डायस्टफ



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 ग्ना गद्वक्षण, तपमान
 ग्ना - कूजलेना झाडा
 ग्ना - सेंद्रिय डायस्टफ





Outgoing Students of W. L. (Mecha)

कागद
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ह्याम

कागदाचे कारखाने— निम्नितयुक्त निरूपयोगी ठळे-कातडी कमाविण्याचे कारखाने—रॅनिनयुक्त द्रव्ये इत्यादि कारखाने ह्याम कारणीभूत होतात.

गडूळपणा :—त्रिमिनीची पावसाने होणारी धूप हे ह्याचे एक कारण होय. कागद व चिनी भातीची भांडी वनविणारे कारखाने विशिष्ट तऱ्हेची Sizing Material मानी म्हणून वापरतात व तंवर नीच माती नदीत सोडली जाते. मैला तसेच सांडपाणीही ह्याम कारणीभूत होते.

तरंगणारे पदार्थ :—उदा. सांडपाणी व कारखान्यांनील निरूपयोगी द्रव्यांमधील व विरघळणारे पदार्थ (खनिज व सेंद्रिय पदार्थ). ह्यांचा परिणाम कमी प्रमाणात सूर्य-प्रकाश पाण्याच्या आतील भागात पोहोचण्यात होतो.

फेस :—ह्याम मावण व डिटरिजन्ट कारणीभूत होतात.

रासायनिक दूषितीकरण :—सेंद्रिय अथवा खनिज-पदार्थ ह्याम कारणीभूत होतात. मैला व घाणपाणी ह्यामध्ये प्रॉटिन्स, फॅट्स, कार्बोहाइड्रेट्स आणि इतर सेंद्रिय खनिज पदार्थ जास्त प्रमाणात असतात. प्रॉटिन्स कुजून पाण्याला दुर्गंधी येते. वरील पदार्थांचे प्रमाण काही सूक्ष्म जंतूंचांमुळे कमी केले जाते परंतु या प्रक्रियेत O_2 शोषला जाऊन पाण्यातील त्याची पलट्टी कमी होई.

कोकोआनस तथा बायूनिगिनीसामून निक्षेप होणारे डांबर ह्यामध्ये फिनालभारचे विपारी पदार्थ असतात. त्यांच्या पाण्यावर पसरण्याने regeneration ची क्रिया मंदावते.

शरीरशास्त्रविषयक दूषितीकरण :—ह्याचे दोन प्रकार संभवतात—

(१) चव :—आर, लोह, मॅगनीज, क्लोरिन, H_2S , फिनॉल आणि अनर्बचूरटेड हैड्रोकार्बन्स ह्यामुळे पाण्याला विशिष्ट चव येऊन ते पिण्यास अयोग्य ठरते.

(२) वास :— NH_3 , फिनॉल, क्लोरिन, मल्काइड्स, सायनाइड्स, तेल इत्यादि कारणास्तव पाण्याला वास येतो.

जीवशास्त्रविषयक दूषितीकरण :—सांडपाणी, मैला ह्यामध्ये असलेल्या सेंद्रिय पदार्थांमुळे S. typhi, S.

Paratyphi, shigella dysenteriae, vibro cholerae सारख्या बॅक्टेरिया जोमाने वाढतात.

तपमानाचे दूषितीकरण :—ह्या दूषितीकरणाचा प्रथम परिणाम म्हणजे हवेतील CO_2 आणि धूलीकणांचे प्रमाण वाढते. पहिल्यामुळे पृथ्वीचे तपमान वाढते तर दुसऱ्यामुळे ते कमी होते. आकडेवारीवरून असे कळते की १८८० ते १९८० च्या दरम्यान पृथ्वीचे तपमान ०.४° से. चे ते वाढते तर गेल्या २५ वर्षांत ते ०.२° से. चे ते (सरासरी तपमानपेक्षा) कमी झाले.

निरतिराळी दूषितके पृथ्वीचे सरासरी तपमान कमी होण्यास वा वाढण्यास कमी कारणीभूत ठरतात ते पाहू :—

(१) कर्बोद्विप्राणीय वायू :—पृथ्वीचे परावर्तित केले-लेल सूर्यशक्ति CO_2 शोषून घेते. ह्यालाच Green house effect असे म्हणतात.

(२) धूलीकण :—२ ते ४ टक्के सूर्यशक्ति (पृथ्वीकडे येणारी) शोषून ते पृथ्वीचे तपमान ०.४° से. चे ते कमी करू शकतात. धूलीकणांमुळे कमी उंचीवर ह्या, धुकें निर्माण होते. हे उपादेसीय पृथ्वीकडे येणारी सूर्यशक्ति शोषून घेतात. व त्यामुळे पृथ्वीचे तपमान कमी होऊ शकते. १ टक्क्यांनी जरी अशा ह्यांचा वाढ झाली तरी ०.८° से. चे ते तपमान कमी होते.

(३) ज्वलन :—फॉसिल फ्युअलच्या ज्वलनामुळे वातावरणाचे तपमान वाढू शकते. शक्तिनिर्मितीचे प्रमाण प्रतिवर्षी ३% वाढत असल्याने आणखी ९० वर्षांतच पृथ्वीचे तपमान १° से. चे ते वाढेल (Lamont Cole-अमेरिका ह्यांच्या पाहणीवरून).

(४) औद्योगिक प्रक्रयांमध्ये पाण्याचा वापर तपमान कमी करण्याकरिता करतात व हे गरम झालेले पाणी नदी, नाले यात सोडतात. त्याने तपमान त्यामुळे वाढते. ३५ से. चे तपमानापेक्षा जास्त तपमान झाल्यास फारच थोडे जिवाणू जगू शकतील.

(५) Albedo :—(पृथ्वीची सूर्यशक्तिच्या परावर्तनाची क्षमता) यात १% वाढ झाल्यास तपमान १° से. चे ते कमी होईल. हाट वस्तीचे प्रदेश व वाळवंट ह्यांची अशा तऱ्हेची क्षमता जगद व शेती प्रदेशापेक्षा

जास्त असते आणि म्हणूनच लोकवस्ती वाढल्यास अन्वेषित वाढ होते.

(६) जेट विमानांद्वारा बाहेर टाकलेली पाण्याची वाफदेखिल तपमानात फरक पडण्यास कारणीभूत होते. त्या वाफेचे डम निर्माण होऊन ते सूर्यप्रकाश परावर्तित करताना. त्यामुळे ओझोनच्या थरावरही अनिष्ट परिणाम होतो.

वनस्पतींचे दूषितीकरण :- हवा नमेच पाणी ह्यांच्या दूषितीकरणावरून वनस्पतींचे दूषितीकरण अवलंबून आहे. SO_2 वगैरेवरून निरनिराळी किटकनाशके आणि औद्योगिक निरुपयोगी द्रव्ये ह्यांच्या वाडीनुसार इतर अपायकारक पदार्थांचे प्रमाण वाढते आहे.

अंक्रूर, शेण्याच्या वेळेस, कडी उमलण्याच्या वेळेस तसेच मोहोर येण्याच्या वेळेला आर्द्रता असल्यास SO_2 मुळे फारच नुकसान होते. फल्युअराइडची हैड्रोजन फल्युअराइड जास्ती हानीकारक होय. वनस्पती ह्या फल्युअराइडचा मोठा साठा तयार करून ठेवतात. २ ते ३ PPM इतक्या प्रमाणात ते असल्यासदेखिल लिफ.निकोमिस, क्लोरोमिस सारखे रंग उद्भवतात व पुनरुत्पादनांत घट होते. कर्बग्रहण क्रिया मंदावते व पेशींमध्ये बदल घडून येतात. गोभेची आठे इथिनीनमुळे फार लवकर नाश पडताना. वनस्पतींच्या हार्मोनची क्षमता इथिनीनमुळे कमी होऊन त्यांची वाढ खुंटते.

ओझोनमुळे टोबॅकोसामध्ये वनस्पतींच्या पेशी नाश पावतात. त्यामुळे Bleaching आणि Necrosis उद्भवते. ह्यासाठी ०.०६ ppm O_3 सहा तास असला तरी पुरेसा होतो. आर्द्रतेचे प्रमाण वाढल्यास हा धोका वाढतो.

PAN साख्खे फोटोटाँक्सिकंट देखिल ०.०५ PPM इतक्यास प्रमाणान देखिल ८ तासात वनस्पतींचा नाश करतात.

डी. डी. टी. सारखी किटकनाशके फार मोठ्या प्रमाणावर वनस्पतींच्या नाशाला कारणीभूत ठरतात. इंडियन कौन्सिल ऑफ अग्रिकल्चरच्या पहाणीनुसार गव्हामध्ये १२ ते १५ PPM, तांदूळात ९ ते १६ PPM DDT असल्याचे आढळून आले आहे.

वनस्पती विशिष्ट हवासानावरच अवलंबून असल्याने विशेषकरून पुनरुत्पादनाच्या काळात पाऊस वा तपमान ह्यात बदल झाल्यास वनस्पतींचे प्रमाण एकतर खूप वाढते वा कमी होते. यामुळे इकोसिस्टीमचे समतोलच बिघडते.

अना दूषितीकरण होऊ नये म्हणून कोणते उपाय केले पाहिजेत ते पाहू या :-

उपाय :-

(१) देशाच्या विशिष्ट भागातच कारखाने काढावेत. (खासगीनारख्या ठिकाणी कारखाने काढू नयेत.) कोणत्याही एका भागात कारखाने केंद्रित करू नयेत. लोकवस्ती ह्या कारखान्यांच्या आजूबाजूचा जो धोकादायक भाग असतो त्यापासून दूर ठेवावी.

(२) काही विशिष्ट प्रमाणानच निम्नयोगी पदार्थ व द्रव्ये बाहेर टाकण्याचे बंधन कारखान्यांवर घालावे. हा नियम न पाळल्यास बंद करावा. ह्यासाठी करान सवलत दिल्यास कारखानेदार नियमाचे पालन करण्यास प्रवृत्त होऊ शकतील.

(३) धूके, धूळ नाहीगी करण्यासाठी, गुम्टवाकरण, छनो, म्छिद्विद्युत ह्यावर आधारित उपकरणे वापरली जात आहेतच. सहाय्यक पदार्थांच्या (उदा. ceramic) साह्याने अस्मीकरण करून घातक नैट्रोजन संयुगे व CO ह्यांच्या निमितीस आळा घालता येईल.

(४) निरुपयोगी पदार्थांमधील दूषितके नष्ट करावीत किंवा ते पुनः पुनः वापरावेत. म्हणजे त्यातील अनिष्ट पदार्थ नष्ट केले जातील.

(५) मोटारी, रेल्वे इत्यादि ठिकाणी होणारे ज्वलन पूर्णपणे होऊ द्यावे. इलेक्ट्रिक बॅटरीवर मोटारने चालविल्या गेल्यास दूषितीकरण कमी होईल. अपानचे प्रदूषणविहरीत मोटार निर्माण केल्याचे जाहीर केलेच आहे.

(६) हवा व तिचा दर्जा ह्यांचे कोष्टक ठरविणे तेथे पाहिजे व त्यामंथधी गणकरणाच्या साह्याने सर्व ठिकाणे माहिती पुरविली गेली पाहिजे. धोक्याची पातळी ओळखली की भोंगा वाजवून तशी सूचना दिली गेली म्हणजे दूषितकांचे प्रमाण कमी करण्यासाठी प्रयत्न केले जातील.

(३) जंगलतोड नावडतोड धांवडावी व विविध टिकाणी पुनः वृक्षारोपण करावे.

(८) डि. डि. टी. डेन्ड्रोन वगैरे किटकनाशकांचा वापर पूर्णपणे थांबविता येता पाहिजे. त्याऐवजी कमी काळ टिकणारी रासायनिक द्रव्ये त्रितनमध्ये वापरली जात असल्याचे डॉ. वे. भेलवी ह्यांनी सांगितले आहे.

किटक नश्यादींच्या अंगातील नैसर्गिक प्रवृत्तीचा आधार घेऊन, त्याच्या साहाय्यानेच किटकांचा निरास करायला असे एक नवीन तंत्र शास्त्रज्ञांनी अलिकडेच अवलंबिल्यामुळे मुरवान केली आहे.

दुसरे कॅम्पुसोमॅट प्रकाशिकणांच्या साहाय्याने अमेरिकेतील एन्टोमॉलॉजिस्टने किटकांचा प्रश्न सोडविता आहे.

(९) दूषितीकरणाचे आर्थिक तसेच शारीरिक ताटे काय होताना ह्यावर संशोधन करण्यासाठी सरकारने सर्वतोपरी महत्त्व केले पाहिजे. Ecology च्या अभ्यासामात्र उत्तेजन दिले पाहिजे.

(१०) शक्य असल्यास छोटे उद्योगधंदे करणाऱ्यांनी आपल्याला लागणारी कार्यशक्ति पवनचक्क्यांच्या साहाय्याने अथवा लहान रिअॅक्टर वापरून निर्माण करावी म्हणजे ज्वलनशुद्धी निर्माण होणाऱ्या दूषितकांचे प्रमाण कमी होईल.

(११) अमेरिकेतील नॅशनल अगोशिएशन ऑफ मॅन्युफॅक्चरर्सने निरनिराळ्या कारखान्यातील किती पाणी परत वापरता येईल ह्याची टक्केवारी काढली आहे उदा.

कारखाने	टक्केवारी
पेट्रोलियम	९८%
कागद	५२%
रसायने आणि औषधे	३५%, इत्यादी.
ह्या पाण्याच्या वापराने पाण्याचे होंकारे दूषितीकरण कमी करता येईल.	
(१२) सेंट्रल हेल्थ इंजिनिअरींग रिसर्च इन्स्टिट्यूट	

(CHERI) नागपूर ह्या संस्थेने मांडपाण्यावर सग्यटोनिना आणि मेन्था ह्या तैल वनस्पतींची चांगली वाढ होते असे शोधून काढले आहे. ह्यामुळे मांडपाण्याचा प्रश्न सुटेल. कारण हे तैल औषधे व इतर कामासाठी वापरले जाऊ शकते.

(१३) अँटिव्हेरेड प्लॅजप्रोसेस किंवा ट्रिक्लिनिक फिल्टर्स वायालॉजिकल प्रक्रिया, काही विविध जीवजंतू ह्या रावांच्या गाढ्याने गाढ्यापाण्यासून पिण्याजोगे पाणी निर्माण करता येईल. ह्यासाठी अंदाजे खर्च दर गॅलन पाण्यामागे २ ते ६ रुपये इतकाच येईल. नेम्बूर, ट्रॉम्बे इत्यादी टिकाणी अमदेचे कारखाने अशा तऱ्हेचे प्रकल्प हाती घेऊन अमुन वर्षांना १ रुपया याप्रमाणे मांडपाणी पुरविल्याचे पुढील महानगरपालिकेने कल्प केले आहे.

आणि शेवटी Paul R. Ehrlich आणि John P. Holdren ह्या दोन तंत्रज्ञांच्या लोकवस्ती-वाढीवर व वातावरणावर होणाऱ्या परिणामांचा अभ्यास करणाऱ्या अमेरिकन शास्त्रज्ञांच्या निष्कर्षानुसार अगण लोकवस्तीची वाढ, अमर्याद मंपनीची आढ (३०० अश्वशक्तिच्या मोटारी वगैरे), केवळ वाढीसाठी म्हणून केलेली उद्योगधंद्यांची वाढ, (वस्तूचा पुरेपूर वापर करण्याआधीच त्या टाकणे), उत्पादकांचे निरुपयोगी पदार्थाने संपादन, हाट ध्येयंसाठी तंत्रशास्त्राचा वाढता वापर, इकोलाॅजीच्या बाबतीतील अज्ञान (खते आणि कीटकनाशकांचा वाढता वापर) ह्यांना वेळोवेळी लक्ष घातला पाहिजे. ह्यासाठी मानवाच्या नैसर्गिक वातावरणाचा आणि त्यागधीन त्याच्या स्थानाचा अभ्यास आवश्यक आहे. असे न ज्ञाने तर शूद्ध हवा व पाणी ह्यांचाही वापरमान देऊ शकल्याबद्दल गुडनी पिडी आपल्याला दोष दिव्याखेरीज रहाणार नाही.

संदर्भ :- Scientific American	Sept. 1970
	May 1971
Science Today	Oct. 1970
Reader's Digest	July 1970
Science Reporter	Nov. 1969
	May 1968



बांगला देश

व

भारताची राजकीय नीती

वक्ता : श्री. विजय नाडकर्णी (श्री.ओ. मिडिल)

(कै. पंडीतराव वक्तृत्व स्पर्धेमधील प्रथम पारितोषिकाला प्राप्त ठरलेले भाषण.)

(दि. १८ डिसेंबर १९७१)

संस्थानतीय अध्यक्षमहाशय व बंधुभारतीनी,

'बांगला देश व भारताची राजकीय नीति' ह्या विषयावर माझे विचार व्यक्त करण्यासाठी मी आपल्यासमोर उभा आहे. स्पष्ट जवाबामुखीचा उद्देश आला आणि 'विषाची परीक्षा पाहू नको' असे जग सांगत असता देखिल एखाद्या अहमूच्या वेड्याने त्या जवानामुखीच्या शिखरावर चढण्याचा प्रयत्न करत जवानामुखी निघवू लागला आणि त्याचि त्यांना अस्मान दाखविणे गेले तर दोष कोणाचा? जवानामुखीचा, जगाचा की त्या वेड्या निराचा? जनरल यादवाखानेच्या अत्याचाराने अस्त झालेल्या बंगाली जननेने जलूनी मला झुगाभर दिली तर त्यात दोष कोणाचा? बंगाली जननेचा, भारताचा की यादवाखानेचा? मला वाटते की बांगला देशच्या वावरीत भारताने राजकीय धोरण समजावून घेण्यासाठी जननेच्या लढ्याचे स्वरूप समजावून घेणे आवश्यक ठरेल. बंगाली जननेच्या लढ्याची संभावना पाकिस्तानी राज्यकर्त्यांनी "राष्ट्रापासून फटून निघण्याला प्रयत्न" ह्या शब्दांत केली तरीही "राजकीय गळजेपीतून गुप्त होण्याचा प्रयत्न" हे त्याचे खरे स्वरूप होते. २४ वर्षे दडलेल्या देशाचा आत्मा स्वातंत्र्यासाठी झुजत होता, कारण आर्थिक, सांसांजिक व राजकीय गळजेपीचा त्याला वीट आला होता. २४ वर्षे गोपण झाल्यामुळे चिपछामार्गी वतनेनी जनता जिवावर उदार होऊन स्वातंत्र्यासाठी लढत होती. आणि त्याचच संश्रुत इस्लामी बांधव रागादवाच्या महाय्याने लडा चिरडून टाकत होते. म्हणजे एकाच राष्ट्राला दोन भाग एकमेकांविरुद्ध उभे ठाकले होते..... एक अस्याध

करीत होला दुसरा त्याविरुद्ध लढत होता. परंतु राजकीय दृष्टिकोनातून प्रथम पाकिस्तानचा होला आणि म्हणून पाकिस्तानी लष्करी मत्ताधिष्ठांनी हा प्रतिपेचा प्रयत्न धरतिका बंगाली जननेच्या प्रतिनिधींनी तडजोड करून मांभज्याने मोडवाचा अशा भारताची संयतो उभे विवेकी भूमिका होती. भारताची ह्या प्रणामध्ये लष्करी पद्धतीची इच्छा नसली तरीही वस्तुस्थितीपासून घट्ट अलिप्त राहू शकत नव्हता.

समस्येत भारताचे असे नसले तरीही भारत अजिब राहू शकत नव्हता. ह्याच दोन कारणे होती. वस्तुतः भारताच्या बाह्यमध्ये विभावेनेला एक तुकडा लष्करी हक्कांमदीं आणि लोकगाही राजवटीसाठी एकाकरीत लढत होला. त्या तुकड्यासाठी लढणाऱ्या बांधव असे प्रयत्ने नव्हती, अण्वस्त्रे नव्हती, आधुनिक प्रशिक्षण नव्हते परंतु अंतःकरणांमध्ये देशप्रेमाचा अंगार होत आणि डोळ्यात त्यांच्यावर झालेल्या अत्याचारांचे प्रतिबिंब होते. एका बाजूला १२ वर्षांच्या पोरोंपासून ७० वर्षांच्या म्हानाऱ्यांपर्यंत सर्व स्त्रीपुरुष एकदिलाने तडहानावर शीर घेऊन लढत होते..... गोनार बागल्यासाठी लढत होते, आणि दुसऱ्या बाजूला शस्त्रसज्ज लष्कर कतली करीत होते, आधावाहणींची अबू लुटत होते, घरादारावरून नांगर फिरवित होते. म्हणूनच माणुमरीच्या भावनेने प्रेरित होऊन तडमळणाऱ्या भारतीय जननेची आणि पर्यायाने भारत सरकारची गहानुभूति बांगलाच्या जननेच्या पाठीशी होती ह्यात काहीही नवल नव्हते. परंतु त्याचबरोबर भारताच्या सीमांमधून आमरा शांतिन देशाचे लक्षावधी निर्वासित हो मरफार संधारीत संभरीत गमम्या होती. आर्थिक दृष्ट्या मागमनेल्या भारतामध्ये निर्वासित सोडून

राज्य नीती

येना, परंतु राजकीय
लेखा आणि म्हणूनच
हे प्रतिष्ठेचा प्रश्न
नेहमी महजोड करून
लेखाची मर्यादी आणि
हे प्रश्नामध्ये गुंतून
वस्तुस्थितीपासून भारत
म्होती भारत अनिष्ट
करणे होती. वस्तुतः
एक तुकडा त्यास
वस्तुतादी एकाकीपणे
वस्तुतादी बांधवाकडे
आधुनिक प्रशिक्षणही
वस्तुतादी अंगार होता
वस्तुतादी अत्याचारांचे
वस्तुतादी धोरणापासून
वस्तुतादी एकदिवाने
होते. मोतार
वस्तुतादी वाजुला शस्त्रसज्ज
वस्तुतादी अंधू मुटून
वस्तुतादी म्हणूनच
वस्तुतादी नळमळणाऱ्या
वस्तुतादी भारत सरकारची
वस्तुतादी होती ह्यांत
वस्तुतादी भारताच्या
वस्तुतादी निर्वाचित
वस्तुतादी लोहून

दृष्ट्याचा याह्याखानाचा कावा म्हणजे भारतावरील
आक्रमणच होते. निर्वाहिनाचा लोहा धावविणे
भौगोलिक दृष्ट्या जिनके अशक्य होणे निवकेच मानवतेच्या
दृष्टीकोनातून ते अयोग्य होणे. निर्वाहिनाचा आभरा
देण्यामागे "माझी तुटपुंजी शिंदोरी आपण देशांनी मिळून
ब्राऊन" हा मानवतावादी दृष्टिकोण होता हे निश्चितच.
म्हणून "निर्वाहिनाची भोगळ भगव्या निर्माण करून
भारतच पाकिस्तानच्या अंतर्गत कागभारात उबडपट्टी
करून आहे व पाकिस्तानी जनतेत फूट पाडून आहे"
असा हांगी आरोप करण्यात आला तरीही भारताने
त्याची फारशी दखल घेतली नाही.

वस्तुतः पाकिस्तान दृष्ट्याचे किवा नष्ट व्हावे अशी
भारताची कधीही इच्छा नव्हती. ४८ साली पाकिस्तानच्या
काश्मिरवरील आक्रमणापासून ६५ व्या युद्धापर्यंतचा
इतिहास पाहिला तर प्रत्येक वेळी कुत्रापण पाकिस्तानने
काढून आक्रमण केले तरीही भारताने मर्यादी धोरण
सोडले नव्हते. युती असमयभेद निर्णय अत्याचारांनी
अग्रुनदेशित भारताने ने प्रमाणभूत मानले. त्यासाठी
सरकारने जनतेचा विरोध असूनही नाशकदमागचे करारही
केले. ह्या धोरणातून भारताने दीर्घकाल शिरत नव्हत.
विरत होती ती पाकिस्तानशी मित्रत्वाच्या भावनेने
रहाण्याची वेडी आज! नंगाल शानातून जातो हे
पाहताच याह्याखानाने भारताला युद्धांत ओढण्याचे प्रयत्न
ह्याच कल्पनेने सुरू केले की 'युनोमध्ये हा प्रश्न नेऊन
वेगळत देवता येईल.' भारताच्या सीमांवर कुत्रापणी
काढत असतानाच 'मुश्निब्राहिनी म्हणजे भारतीय सैन्यच'
अशी आरंभी जनमानसी शंकाची व अमोघका आणि
चीनकडे 'भारताला आवय' असा कांवावा केला. इंग्रामो
याह्याखानाचे तीन उद्देश होते. एकतर भारतभूत सैन्यबळ
बापरावधाम लावून आक्रमक उगवावयाचे आणि
युनोमध्ये कोडीत पकडावयाचे. भारताने बांगला देशात
बाईगदीने मान्यता दिली तर 'भारतच पट्ट्याड्या आहे.'
अशी ओरड करून अशाची महात्तुमनि मिळवावयाची
आणि बांगलादेश हातातून गेलाच तर 'त्यः जपनेन
पराभव केला नाही-नहले भारतीय सैन्यच' असे सांगून
मोठळे व्हावयाचे.

भारत सरकारने ह्यावेळी अशक्तिस्वी दृग्दृष्टी,

'चर्चिनीची रणनीती आणि कौटिल्याची राजनीती' ह्या
वेष्टांची ओढवण करून देते. भव्य भारतातील विभिन्न
पक्षांकडून 'बांगला देशला मान्यता द्या' ही मागणी गेले
कित्येक महिने होत होती. नफतेपणाचे आणि गळमुळीत
कुतिशून्य धोरणाचे आरोप पंतप्रधानावर केले जात होते.
परंतु "मान्यता योग्य वेळी देण्यात येईल. कोणताही
निर्णय घाईने घेतला जाणार नाही." हे इंदिराजीनी
प्रत्येक वेळी भागितले होते. ह्याचा कारणे देखिल सबळ
होती. बांगला देश ही एक वस्तुस्थिती होती आणि
ती स्पष्ट करण्यासाठी मान्यतामागण्या राजकीय औपचा-
रिक विवदाची त्यावेळी आवश्यकता नव्हती, दुसरे
म्हणजे भारतासमोरचा निर्वाहिनाचा प्रश्न निव्वळ
मान्यतेने सुटणारा नव्हता; त्यासाठी निर्वाहित पल्ल
जाण्यास आवश्यक परिस्थिती निर्माण होणे आवश्यक
होणे आणि पाकिस्तानी अत्याचार बाबेपर्यंत ने शक्यही
नव्हते. किवहुता अकाची दिवल्या मान्यतेमुळे "भारत
ह्या समन्येत अकारण हस्तक्षेप करून आगंत नेल
आतन आहे" ह्या पाकिस्तानच्या आरोपास कधीही
पुष्टी मिळाली अमनी. ह्या सर्व पात्रवभूमांवर
'भारत रजिवा मैत्रीकार' नशांत घ्यावा लागेल. जेव्हा
हा कारण करण्यात आला तेव्हा लोक बाग्याकडे संशयाने
पाहून होते. 'भारत साम्यवादकडे वळत आहे', 'भारत
रजिवाच्या कळणाने जिरत आहे' अशा प्रकारचे अनेक
आरोप विभिन्न पक्षांच्या मुढाऱ्यांकडून करण्यात आले.
परंतु राजकारणाच्या बाजारात वस्तुनिष्ठ नव्य आणि
आवहारिक नव्य या दोन वेगळ्या गोष्टी अस्मान हे
ध्यानात घेऊन आधीआधीच्या काळाने महत्त करणारा
एखादा वलशाली मित्र अभावा ह्या धोरणानेच हा कारण
करण्यात आला. अमेरिकेची प्रत्येक युद्धातील पाकधार्जिणी
भूमिका ध्यानात घेऊन चीन व अमेरिका ह्यांना काढणह
वेऊन आपले राजकीय वर्चस्व आशियामध्ये निर्माण करू
इच्छिणाऱ्या रशियाम पंतप्रधानांनी कराराने बांधून
घेतले. ह्या कारणाने 'भारत रजिवाकडे झुकता की
रजिवा भारताकडे झुकता' हा विवाध मुद्दा क्षणभर
वाजुला देवला तरी भारताना आत्मविश्वास करण्यामुळे
वाढला आहे आणि रजिवाचा राजकीय क्षेत्राने दवदवा
निर्माण झाला आहे. सुरक्षा समितीमध्ये गीत वेळा
वापरण्यात आलेल्या व्होटाने भारताने हेच दाखवून

दिले आहे की अलिप्ततेचे धोरण स्विकारताना देखिल एखाद्या जवळच्या मित्राची आवश्यकता असते.

पाकिस्तानच्या वृंगपती वाडत असतानाच इंदिराजींचा परदेश दौरा घडून आला आणि तो अविगमनीय ठरला. भूतकाळात भारतीय राज्यकर्ते परदेशात मदतीच्या दावनेसाठी किंवा अन्नच्या मागणीसाठी जात. इंदिराजी परदेशात 'शांततेच्या अखेरच्या प्रयत्नासाठी' गेल्या होत्या. भारताने वेढोवेढी जगाचे लक्ष बांगला देशाच्या समस्येकडे वेधले होते. आणि 'झालून त्वरीत राजकीय तडजोड करावी' असा घोषा लावला होता. परंतु जगाने शब्दार्पणकडे काहीच केले नाही. ह्या कलानाट्याचे मागे लक्षप्रतिष्ठित देशांच्या परराष्ट्र टाकून 'भारत हे फार काळ महान करणार नाही' हा निश्चिंत व्यक्त करण्यासाठी त्या परदेशी गेल्या होत्या. अमेरिके-सारख्या वड्यांना ही समस्या माहित नव्हती असे नव्हे आणि ती समस्याचसाठी इंदिराजी गेल्या होत्या हे सुद्धीच नव्हे. परंतु 'आन्नापूर्य पाकिस्तानला पाठीशी घालून तुम्ही फूस दिलीत. यानुळे त्याने कुशभत काढली तर ने सहन केले जाणार नाही आणि त्याचे तुमचे वडपण वा नुडवड भारन सहन करणार नाही' हा स्पष्ट समज अमेरिकेला देण्यासाठी त्या गेल्या होत्या त्यामुळेच पाकिस्तानने आक्रमण करताना दोग्दी गरहद्दीवर भारतीय सैन्य घुसवून बांगला देशाला स्वातंत्र्य मिळवून देण्याचे पुण्यकृत्य आणि पाकिस्तानचे कबरडे मोडण्याचे वीरकृत्य भारतास ताठ मानने करावे आणि कारण आंतरराष्ट्रीय

व्यवहारात भारताची गरजू बळकट झाली होती. 'अन्याची निर्णय घालत तर युत्तोलोही बुडकावून लावू' ही खंबीर भूमिका भारतीय राज्यकर्त्यांनी घेतली होती. 'मातवे आरमारच काय परंतु प्रत्यक्ष परमेश्वर देखिल आम्हास न्यायाच्या मार्गावामून विबलित करू शकणार नाही' हा दुर्लभ विश्वास सरकारला वाटत होता आणि म्हणूनच लक्ष-लक्ष परकीय फौजांचे दमन भारताने दोन आठ-वड्यात केले आणि योग्य वेळी एकतर्फी मुडबंदी करून देखिल स्पष्ट केले की भारतास शांतता हवी आहे.

बांगलादेश स्वतंत्र झाल्याच्या आतंदासने सर्व भारन फुलून निघाला अस्मानाच काही चिंतातुर जीव 'बांगला देश देखिल उद्या आमच्यावर आक्रमण करणारच नाही कशावरून ?' अशी अंका व्यक्त करतील. त्यांना थोड-क्यात सांगतो, "अरे वेड्यांनो, ज्या देशाने स्वातंत्र्यासाठी रक्त मांडलेले असते त्या देशाला स्वातंत्र्याची किंमत काढते. ज्या देशातील प्रत्येक भारतीन कर्ता माणभाच्या शरीराची देणालाही राख घालेली असते तो देश दुसऱ्याचे स्वातंत्र्य काहीही दटपू इच्छिणार नाही." ज्या भारतीय जवानांनी आणि मुक्तिवाहिनीच्या थोड्यांनी अलिदान केले त्यांच्या राखेवूनच किनिक्म पक्षाप्रमाणे एक शांतता-प्रेमी राष्ट्र घटोदले जाईल आणि भारत आणि बांगला देश शांतताभय सहजीवनाचे मागे स्विकारतील हे निस्संशय !

जयहिंद !

‘रितें पत्र’

अखेर.....
तुला पत्र तरी लिहायचं म्हणून
भोठा कागद घेतला होता.
खूप खूप लिहायचं म्हणून
तशीच तयारी केली होती.
पण शब्दांची अवकृपा
हाणून टाकतेय माझा बेत.
आणि माझ्या मागल्या 'कवितेचा' आशय
संज्ञात घेऊन देखिल नाही संकेत.

अशोक सोहोनी

बी. अस्मी. बी. ई. (गिरिह्व.)

आजच्या पत्रातल्या 'रित्या ओळी'
सांगतील सारे मनोगत.
नाहीच उमंगला मजकूर तर
जाळून टाक हा कागद.
जळत्या ज्वाळंतून देखिल
उभी दिसेल माझी हसरी घूरत
मृगध हृदयव्यथा प्रेमीत
कळेल सारे तुला मग.
'दिलवाने दिलका दई जान लेते हैं !'

होनी. 'अन्याची
'न लावू' ही खंबीर
'होनी. 'सातवे
'देखिल आम्हास
'क शक्यार नाही'
'जोता आणि म्हणूनच
'मानाने दोन आठ-
'कर्मी युद्धवंदी करून
'मना हवी आहे.

अनेकदा सर्व भारत
'चिन्तन नीत्र "बांगला
'क करणारच नाही
'करीन. त्यांना थोड-
'इमाने स्वातंत्र्यासाठी
'त्वातऱ्याची किमत
'क कर्ता माणसाच्या
'कने तो देश दुसऱ्यांचे
'क." ज्या भारतीय
'द्वारांनी बलिदान
'कमाणे एक शांतता-
'कण आणि बांगला
'क स्विकारलीत हे

अशोक सोहोनी

डॉ. ई. (मिथिल)

आजच्या विद्यार्थ्यांची अस्वस्थता ही त्याची सामाजिक व नैतिक मूल्ये खालावल्याची दर्शक आहेत का?

डॉ. डी. कामत, टी. ई. (मिथिल)

आजचा विद्यार्थी हा देशाचा भावी आधारस्तंभ,
देशाचा भावी जिवंतकार, देशाचे भविष्य साकार
करणारा इत्यादि, इत्यादि असे विद्यार्थ्यांवद्दल वर्तिल
भडकी बोलवाता अथवा वायात वेळा ऐकतो. पण
ह्यापुढे असे काही ऐकू येईल अने वाटत नाही. कारण
हल्ली जवळजवळ राजीव गांधीनंतरातून त्याच्याचिन्ती
काहीना काही बरेवाईट येऊच असे. आज काय कनिज
बंद पाउने, शिक्षकांना माहंण केनी. उद्या काय
कॅलेजच्या इमारतींना आग भाली. परवा काय, तर
बसेस जाळल्या. थोडक्यात मागायचे म्हणजे कुठेना कुठे
ह्या विद्यार्थ्यांची दगल ह्या ना त्या कारणाने घालून अने.

ह्या सर्व प्रकाराचा आधंग जर नीट विचार केला,
तर अण्णाला असे आडवून घेतल की आजचा विद्यार्थी
हा पूर्वीच्या विद्यार्थ्यांपेक्षा फार अविचारी आणि अस्वस्थ
बनत चालला आहे. एखाद्या क्षुब्धक गोष्टीसाठी ते
होतघाईवर येतात. मोठमोठ करणे, आठपोळ करणे,
दगल भाजवणे, त्यांना समझना करून त्याच मित्रांपेक्षा-
पेक्षा अधिक घमन पडते. या गोष्टीवरून आणि एकच
अनुमान काढू शकतो व ते म्हणजे आजच्या विद्यार्थ्यांनी
नैतिक व सामाजिक मूल्ये पार रसातळाला गेली आहेत.

प्रत्येक गोष्टीना काहीना काही तरी कारण हे
असतेच. विद्यार्थ्यांची सामाजिक व नैतिक मूल्ये खाला-
वण्यासाठी बरीच कारणे आहेत. त्यापैकी काही कारणाना
विद्यार्थी स्वतःच जबाबदार आहेत, तर काहीना समाज,
त्यांची कुटुंबीक व आर्थिक परिस्थिती, तो जेथे शिक्षण
घेतो त्या शैक्षणिक संस्थांचा संस्कारभाट, त्यांनीच
शिक्षकवर्ग व त्यांचे ज्ञानगारी अजिनेबाजी, गटबाजी
जबाबदार आहे. बरे मांडीनेल्या गोष्टींचा त्यांच्यावर
इतुहळू कसा परिणाम होत जातो हे आता आपण पाहू.

लहानपणी बहुतेक मुले देवापुढे बसून हात जोडून
'छोटे कवी बोलू नये, चोरी करू कल नये...' म्हण-

तात, त्या बालक्यांना तो तशी वागतान देखिल. पण
हीच मुले असजणी मोठी होऊ लागतान तमवता त्यांचा
इतशजी सर्वेथ येऊ लागतो. इतुहळू ते समाजाचा घटक
बनत जातान. समाजांत चारनीभावसंभार वागताना
त्यांना या ना त्या कारणाने खोटे हे बोलानेच लागते.
जणूनबुजून किंवा स्वभावानाच किन्हेक लोक खोटे
बोलतात. 'खोटे बोलणे पाप आहे' असे म्हणतात. पण
तो जमाना आज गेला आहे. 'खोटे बोलणे पाप आहे'
असे मानून जर का एखाद्याने मासख खरेच बोनायत्ता
निरनय केला तर त्याला मुवामुध्री राहणे फार मुष्कीलीच
होऊन जाईल. किन्हेक वेळा खरे बोलल्याने अननत्व
प्रसंग अदिवण्याची शक्यता असते. समजा, एखाद्याचा
खून होताना एखाद्याने पाहिले तर तो पोलीसाना मी
खून होताना पाहिला व झुती माणसांना मी ओळखू
शकतो असे मांयायनर धडन नाही. आपण त्या भावनेच
नाही असे तो भासवतो. जर का त्याने संय कवन केले
तर त्याच्या जीविताना थोका निर्माण होईल याची
त्यांना खात्री असते. अशावेळी बोलण शहाणा खरे
बोलेल ?

समाजांत राहणाऱ्या प्रत्येकाने आपापल्या परीने
सामाजिक जबाबदारी उचलली पाहिजे. पण होतं काय
की बहुतेक लोक 'आपल्याना काय करायचं त्याच'
म्हणून मोकळे होतात. साध्यासाध्या गोष्टीकडेही कातर-
डोळा करतात. केळी खात्यावर नावे रस्त्यावर न
टाकता टोपनीत टाकणे, पाव खावून त्याच्या भिन्नकाऱ्या
भित्तीवर अगर वाटेन नेथे टाकणे, पेटनी सिगारेट तशीच
न विजवता टाकणे, केर टोपनीत न टाकता टोपली
बाहेर टाकणे, वगैरे भारल्या गोष्टीकडे कातरडोळा
करणान येता. त्यामुळे लहान मुलांनाही त्या भवई
कायक्या लागतान, व समाजिक जबाबदारीची भावना
त्यांच्यातून नाष्ट होते.

विद्यार्थी ज्या कुटुंबातून येतो त्या कुटुंबांची आर्थिक परिस्थिती व त्याची कुटुंबातील जबाबदारी ह्या गोष्टी विद्यार्थ्यांना मोठ्या प्रमाणात अस्वस्थ बनविण्यास कारणीभूत होतात. ममजा एखाद्या कुटुंबात ५-६ भावंडे व आईवडील एवढा परिवार आहे. वडिल साधे क्लर्क किंवा भाधे कर्मचारी आहेत. अशा स्थितीत त्यांना आपल्या मुलांच्या शिक्षणासाठी योग्य वाहताना फारच कश्टात आते. आजच्या महंगाईच्या काळात मुलांचा करंडानेना, खाणेपिणे आपआपणी व शिक्षणाचा होणावा वाढता खर्च करताकरता कुटुंबांतकांच्या नाकीतून येताना भावंडांपैकी जर का एखादा कॉलेज-शिक्षण घेत असला तर त्यांनी फारच कुत्रंबांना हात कारण कॉलेजमधल्या शहर मुलांमध्ये त्यांना करंडे नसतात, त्यांच्यामागची त्यांना चैन करता येत नाही. भावंडांत तो वडिल असेल तर त्यांना घराबंदी करताने पहावे लागते त्यामुळे अभ्यासासाठी त्यांना यात्रा त्तिका वेळ देता येत नाही. ह्या सर्व गोष्टींनी परिक्षेन ताणस होण्यास कारणीभूत होतात. मग अभ्यासातले त्यांचे लक्ष उडते. कॉलेज सोडून देऊन मित्रांन ती नाकरी करण्याची पाळी येते.

तर गांगितलेली कोटुंबिक बाब ही त्यांच्या आर्थिक पातळीवर अवलंबून असते. व ही आर्थिक पातळी तो ज्या समाजान राहतो त्याच्याशी निगडित असते. आर्थिक पातळी ही राजकीय दृष्ट्या कमीअधिक होऊ शकते.

अनापयंत आधुन विद्यार्थ्यांच्या अस्वस्थतेला त्यांची कोटुंबिक व नासाजिक स्थिती कशी कारणीभूत होते ते पाहिले. विद्यार्थ्यांत अस्वस्थता निर्माण करणाऱ्या दुसऱ्या गोष्टी म्हणजे विद्यार्थी ज्या कॉलेजमध्ये शिक्षण असतात त्याचा शिक्षकवर्ग, बालकवर्ग, विद्यार्थ्यांच्या शर शिक्षकांनी केलेला अन्याय ह्या होत. हल्ली महंगाईमुळे शिक्षण प्रसाराच्या नावाखाली शाळाकॉलेजांची मर्यादा भंगभर वाढत आहे. शाळा किंवा कॉलेज काढण्यासाठी केवळ इच्छा, पैसा ह्यांचीच आवश्यकता असते असे नाही. तर ह्या गोष्टी शतकशे इतर गोष्टीही महत्त्वाच्या असतात. त्यातील अत्यंत महत्त्वाची व अत्यावश्यक गोष्ट म्हणजे अनुभवी व तज्ञ प्राध्यापक वर्ग, भरपूर पुस्तके व

अध्यानाची सोय असणारे ग्रंथालय. कित्येक ठिकाणी तर चांगल्या-चांगल्या विषयांना प्राध्यापकच नसतात. उति-हाम, तत्त्वज्ञानासारख्या कठीण विषयांना अनुभवी तज्ञ मोठाच परंतु साधा प्राध्यापकही मिळणे फार कठीण जाते. जे काही प्राध्यापक असतात, त्यांना आपापल्या विषयांचे धोस ते व हवे निरंक ज्ञानही नसते. मग असे प्राध्यापक विद्यार्थ्यांना काय शिकवणार? व त्यांच्या अभ्यासाच्या अडचणी कशा सोडविणार? त्यामुळे विद्यार्थ्यांना सोपे विषय देखिल कठीण वाटू लागतात. कित्येक प्राध्यापकांना तर वर्गात उगीस येणे म्हणजे भूषण वाटते. 'I was very busy' असे चक मोगून ते मोकळे होतात.

एक हानते टाळी कशी वाजत नाही. ही गोष्ट शिक्षणाच्या वास्तवीकतेत खरी आहे. ज्ञान देणे आणि ज्ञान घेणे ह्या गोष्टी नेहमीच नाध्या होतील जेव्हा प्राध्यापक व विद्यार्थी ह्यांच्यातील संबंध अधिक घनिष्ट होतील. प्राध्यापक व विद्यार्थी मित्रत्वाच्या नात्याने वागतील. या गोष्टीचा आज फारच अभाव आढळून येतो. प्राध्यापक स्वतःला विद्यार्थ्यांपेक्षा थोडे मानतो, विद्यार्थ्यात तो फारसा मिसळत नाही. त्याच्यापासून तो सदा दूर राहण्याचा प्रयत्न करतो. असे प्राध्यापक स्वतःला भेटल्यास ओळखही देण्यास तयार नसतात. जे विद्यार्थी अशा प्राध्यापकांची 'Private Tuition' लावतात ते मात्र त्यांचे लाडके शिष्य बनतात. अशा विद्यार्थ्यांना मग फक्तच पेपर धाडून दिले जातात. एवढेच नव्हे तर आपल्या विद्यार्थ्यांना जामन माव मिळून त्यांचे नंबर वर कसा येईल ह्याची बरपासून चांगलीच काळजी घेतली जाते. ह्या गोष्टीमुळे माहजीकच दुपार व मेहंतकी विद्यार्थ्यांना त्या उताऱ्या व मुलापेक्षा कमी मार्क मिळतात. असे प्राध्यापक विद्यार्थ्यांच्या अमंतांपासून कारण बनतात.

विद्यार्थ्यांची वाढती संख्या ह्या एक प्रश्नच होऊ नसला आहे. शाळेत प्रत्येक वर्गात ४०-५० विद्यार्थी असतात. परंतु कॉलेजच्या लेक्चर रूम मध्ये १५०-२०० विद्यार्थी खचून भग्लेले असतात. ह्यापैकी बहुतेक तर वर्गात काय चालले आहे याचा शोध घेता नसले भागल्या वाकावर बसलेल्यांना फक्त प्राध्यापक ओठांनी उचडसान व त्यांचे हान्यारे यापलीकडे काही

अस्य कित्येक ठिकाणी तर
निराश्रित नमनात. इति-
विद्यया अन्तर्भावी तज
ही मित्रां फार करीण
निराश्रित, त्यांना आपापल्या
मनही नमने, मग असे
निराश्रित? व त्यांच्या
निराश्रित? त्यानुद्ध
करीण वाटू लागतात.
हे करीण येणे म्हणजे
'busy' असे चक्क
नाही. ही गोष्ट
जान देणे आणि
निराश्रित जेव्हा प्राध्यापक
निराश्रित होतो.
निराश्रित बराचच.
हेतू येतो. प्राध्यापक
निराश्रित, विद्यार्थ्यांत तो
निराश्रित तो सदा दूर
प्राध्यापक स्थानात
निराश्रित. जे विद्यार्थी
'Tuition' वाचनात ने
निराश्रित अशा विद्यार्थ्यांना
निराश्रित. एवढेच नव्हे
निराश्रित मिळून त्यांचा
निराश्रित बराचच काळजी
निराश्रित दृष्टीवर व मेहनती
निराश्रित मार्क मिळतात.
निराश्रित कारण बरतात.
निराश्रित एक प्रश्नच होऊन
निराश्रित १०-१५ विद्यार्थी
निराश्रित मध्ये १५०-२००
निराश्रित श्यांपैकी बहुतेकांना
निराश्रित थापतात नमनो.
निराश्रित प्राध्यापकांच्या
निराश्रित यापलीकडे काही

शिक्षण नाही. फक्त चाचण. निविदेने प्राध्यापकांचे संचालन अधर लावून बांधिल्याकरीता विद्यार्थी काहीही इच्छित घेऊन बसलेले नसताना, अर्जाद्वारे स्थिती असून देखिल विद्यार्थ्यांचा भरणा वाचवून असतो. कारण त्यामुळे कॉलेजला फायदाच होणार असतो. बऱ्याच वेळा विद्यार्थ्यांना जर्नली दाखवून आकर्षित केले जाते.

जगज्जो विशाध्याची संस्था बांदून जाते नमनशी गैरमोडही बांदून जाते. या गैरमोडकडे गोंईस्कारच्या वातावराला करण्यात येतो. विशाध्यांत व प्राध्यापकांना योग्यपारी पुरस्कारे लायबरीत नसतात. लायबरीची आज्ञा अन्वय करण्यायोग्य नसणे, कनिष्ठच्या वर्षांमधील मध्ये सांगली व अंधपूर उत्तकणे नसणे, प्लेबोर्ड नसणे, अभ्यासक्रम जास्त व वेळ अपूर्ण असून देखिल प्राध्यापकांचे वर्तनवर गैरहजेरा नसणे, अशा कितीतरी प्रकारे कनिष्ठचे संचालक व प्राध्यापक विशाध्याचे अन्वय करीत असतात. ह्या अन्वयातून ज्ञान विचारधाराभावी व अध्यापका मागण्या मान्यकरून धरण्याभावी पण विशाध्यांनी कनिष्ठच्या प्राध्यापकांच्या विरुद्ध व कनिष्ठच्या गैरकारभाराविरुद्ध बरे प्रकारचे लगाने, अडथळे विशाध्याी सहसा विचार करण्याच्या मनःस्थितीत नसतात. त्यांना मित्र नो साथी सोपा मारे ते स्वीकारतात. ह्यातूनच अध्यापकांचे जन्म होतो. मग कनिष्ठच्या सामान्याची मोडगोड व जाळपेराळ केली जाते, शिक्षकांवर हल उगारले जातात, कनिष्ठमध्ये गंध पुकारला जाऊन ते वेगवेगळे बंद पाडले जाते. काही विशाध्याी तर उपोषणातही बसतात. ह्या प्रकारे कनिष्ठपुरुषांचे सर्वोदित व राहता रम्यावर आणला जातो. लोकांवर इश्टपेक्ष, बसेस अडवून त्या पेट-विस्था जाणवत. ह्यातूनही काय को विशाध्यांचा अभ्यास बुडतो, परिक्षा नुकताच बघे वाया जातात. सर्वप्रकारे विशाध्यांचेच नुकसान होते, व विशाध्या तालकांना ह्याच्यामुळे काय करावे हेच कळत नाही. ह्याची ताजी उदाहरणे घायची लागी वर बनारस हिंदू विद्यापीठ, बंगळूर विद्यापीठ, फार काय तर मुंबईतल्या इंग्लिशरी कनिष्ठच्या संपाती देवा येतील. सध्याच वर्षांची गोष्ट घ्याता अंग्रेजीच्या एका कनिष्ठमध्ये केमाप्टीचे प्राध्यापक देव महिने तब्बत म्हणून विशाध्यांनी निवडले जेव्हा असता त्यांच्यावर पोलीसकरीची लाठीहत्ती करण्यात

आता, अथॉन पोनीमांना, प्रिन्सिपान्तमाहेबांता तस
आदेश मिळाला होना हे वेगळे सांगण्याची गरज नाही.

एवढे असूनही कनिजे मित्रांचे काय धांवत नाहीत. कनिजे काढण्यामध्ये मंचावरकाचे तीनचार हेतू असतात. पहिला म्हणजे शुद्ध मिश्रणप्रयोगाचा, काहीजण सामाजिक प्रतिष्ठा म्हणून कनिजे काढतात, तर काहीजण केवळ आर्थिक फायदा कमवावयाच्या उद्देशाने ती काढतात. आताच्या बहुतेक कनिजना व्यापारी किंवा औद्योगिक क्षेत्राची फट्टा अभ्यास दिवून घेते. मेडीकलशास्त्राच्या कनिजमध्ये प्रवेश मिळविण्यासाठी हताश स्थितीची दक्षिणा पुढे करायी लागते त्यामुळे अधिक दृष्ट्या गरीब विद्यार्थ्यांना अशा ठिकाणी प्रवेश मिळणे शक्यच नसते श्रीमंताची उताड, भंड धर्तीनी पोते केवळ वर्तमानत्वा खिना जड अभ्यासाने प्रवेश मिळवू शकतात. कनिजे विशादेवोची मंदिरे म्हणून मांडून व्यापाराच्या वजिअंशेदा वनन चालली आहेत.

विशार्थ्यानां मनाकणां दुग्गा एक प्रश्न भूषणं
 गद्यवाजी हा होय अमुक एका कविजमध्ये अमुक एका
 जार्नीच्या, अर्माच्या मुलांना प्रवेश दिना जातो. इतरांना
 काहीतरी मंत्रव मागून प्रवेश नाकारण्यांत येतो.
 मुंबईतल्या बऱ्याच कविजमध्ये हा प्रकार आढळून येतो.
 आपल्या मर्जीने, जर्नीने व वर्णिल्याचे प्राध्यापक
 नेमण्याची प्रथा दिसून येते. यामुळे कविजचे वातावरण
 दूषित होऊन मुलांच्या मनाचे व अभ्यासावर त्याचा
 परिणाम होतो. अशा ठिकाणी विशार्थ्यांना जार्नीय
 भावना नसेल तर ती निर्माण करण्याचा प्रयत्न प्राध्यापक
 करेकतात. जार्नीय चळवळीची बीजे येथेच रोवली
 जातात.

विद्यार्थी व प्राध्यापक ह्यांच्यातील संबंधाचा दुवा तोंडपारी एक महत्त्वाची गोष्ट म्हणजे शिक्षकाच्या चारंवार होणाऱ्या बद्दल्या. प्रत्येक वर्षी नवीन प्राध्यापक येतात. त्यामुळे विद्यार्थ्यांना त्यांच्याबद्दल व प्राध्यापकांना विद्यार्थ्यांबद्दल काहींच आस्था नासत नाही. त्यामुळे त्यांच्यात एकमेकांविषयी आदर हाण्योची शक्यता फार कमी असते. यंत्रेवर बद्दलणाऱ्या प्राध्यापका-मुळे विद्यार्थ्यांना आपण त्यांचे विद्यार्थी आहोत व ते आपले प्राध्यापक आहेत ह्याची जाणीवच होत नाही.

अणावेळी जर विद्यार्थ्यांनी प्राध्यापकांची दिगल टक्करी केली तर त्यांत त्यांना दोष देण्यात काय अर्थ आहे ?

मुंबईमार्ख्या गहरान भिनेमाधियादरांची मंथ्या फार वाडत चालली आहे. रोज नवे देशीविदेशी, बरेवाईट भिनेमा दाखविने जाणान. विद्यार्थी अजा गोंष्टीकडे चटकन आकर्षिता जातो. भिनेमांत पाहिजेने नायक-नायिकेचे चाले, त्यांनी पांखात घेतले फाडे त्यांची मन रुक्कन केली जाते. विद्यार्थीही त्या नायकाप्रमाणे वागू लागतात. अभ्यासपेक्षा भिनेमाचीच गाणी व त्यांनी 'डांब्यास' त्यात लवकर पार होताना. ह्यागायी ने कानिचका अभ्यासाचा वेळ व पैसा असाय खर्च करताना.

ह्याही विद्यार्थीवर्गात पाजवल्याने अभ्यासकरण करण्याची फार मोठी आट उगळली आहे. रोजीवेळी कवडे परीक्षण करत विद्यार्थी-विद्यार्थीनी उगाचच डकडून निकडे मित्रवतना आणत पाहता. केसांचीही फेजत फार थोकाळत आणली आहे. मुले मुलीप्रमाणे पांज वेग

देवनात तर मुली आणले केस गुलाप्रमाणे लाडून टाकतात. गुलीही जॅरीनेट घालायला लागल्या आहेत. त्यामुळे हुकत पहारागळा हा मुलगा की मुलगी हे समजणे फार कठीण होऊन बसले आहे. माथी मिगारेट, पान तर मोडान गण अकुरांतामारख्या मादक पदार्थांच्या भेवताची त्यात चटक लागली आहे. फोर्डमारख्या एकाद्या टिकाणच्या 'First Grade' हॉटेलमध्ये बसून ते आपला वेळ खर्च करताना. 'दम मारी दम मारी जाणू गम'—म्हणत मिगारेटची पाकीटेच्या पाकीटे सोपवली जाणान. मंद प्रकाशाच्या व धुंद वातावरणाच्या हॉटेलमध्ये फेजत ननेलीचा भाव पहारावात त्यांचे मन असरी रमून जाते. काजवेळ कशाचच त्यांचा भाव रहात नाही.

एवढे नवे केसांवर मन त्याच्या जवळ अभ्यासासाठी वेळ कुठून येणार ? घराच्या गोष्टीकडे लक्ष देणे तर त्यांना 'ह्या गोष्टीमुळे शकतच नसते. त्यांना आपल्या कर्तव्याची जाणीव थोडीदेखील नसते. असरी आपला काही



संबंधच नाही. कधीतरी कण त्यांना मुलीच व लडणाऱ्या केले पाहिजे व म्हणजे केवळ भविष्याविषय अगदी कमी विबाहू येत व कु

विद्यार्थी त्यांना जे प्रस समाजगामून होते. आज त्याच्यापेक्षा क लोक मोठमोठ



ने बागवान. समाजाचे आपल्यावर
हे व ने आपण फेडले पाहिजे असे
नाही. देशासाठी प्राणपशने लढलेल्या
पणही, नैतिकतासाठी आपण काही
छात्र त्यांना नाही. 'मानवी जीवन'
अमेक त्यांना वाटते. देशाच्या
व त्याच्या सुरक्षिततेची चिंता
ने आढळत येते. कुठे ने भगवतिह,
हे चिंतने, खचलेक नमून !

ने शिकवल्या जाणाऱ्या गोष्टीपेक्षा
दिले, ते त्यांना दवरण्यामुल. व
अनुभवाने लवकर आकलन
न हो काय पाहिल आहे ? तर
के, व वैयक्तिक पातळी असागर
हृदयाच्या जागेवर जमने आहेत.

दादागिरीच्या व पिताच्या जागेवर ने उत्तरेवर बवेग्व
गळवनात. माणसाच्या, खूनागारच्या गोष्टी करन त्या
महजामहती पचवनात. ह्या मये गोष्टी विद्यार्थ्यांचे
अभ्यासातने पक्ष उद्धविण्यात कारणीभूत होतात.
शिक्षणात काही राम नाही असा त्यांचा समज होतो. ह्या
प्रकार नभाच काही काळ अजून चालू राहिला तर
विद्यार्थ्यांचा 'विद्यार्थी' हो गज्जा जावणे पोत्य होणार नाही.
केवळ 'गंड' म्हणून त्यांना संबोधवे लागेल. पण ही
स्थिती कधी न येवी हीच परमेश्वराजकळ प्रार्थना.

'देशाचा भावी आशास्त्रज्ञ' अजून कसा पोकाळ व
कमकुचन आहे हे आपणपर्यंत आपण पाहीचे. पण नेमे
होणारा केवळ नेच मर्यादी जबाबदार नाहीत. तर आजची
शैक्षणिक, सामाजिक व राजकीय परिस्थिती वनाच
अगो कारणीभूत आहे. हे मये केळीत थांबले पाहिजे,
थांबवले गेले पाहिजे.

हसणे-एक आनंद

विजय र. नाडकर्णी

बी. आ. (गिझिन)

स्वतःच्या आयुष्यामंजरी कोणीही रडवेल्या नाशने बोलनास तेकरे ना की मला भंतात येते. जेशी, आयुष्य म्हणजे दोन घडोता हाव. धरे त्या घडोतामुद्रा गुबड्याच्या उगवावसावे नसलेल्या-दुःखाच्या काळया गालावर सूखाच्या जरीबुद्ध्यानी शोभून दिवसा-या ! मग त्या क्षणभंगुर आयुष्यात रडना का ? हसा, खेळा, मजा मागा. वेदघातो तुमच्या हास्याने गुथून देखिल तुम्हाला नेताना लाज नवेल. बघता काय ? 'खडळा की...हसा मोठ्यांचा.

मंदळी मला माहित आहे....तुम्ही हसकार नाही. अशो हसण्यात देखिल विरंगाई करणारे तुम्ही. माला तुमच्या हृदयातच चांगे नाही. अशो हंसू ओठावर नव्हे, हृदयात असावे लागते. पण आडानेच नाही तर पोहोचाने कोटून येणार ? मला माहित आहे तुम्ही असे रडतानाच को ने तुमच्या आयुष्यात एतका बेदिरंगपणा आहे की ईनदिन कामाच्या व्यावागुळे तुम्हाला माधे हसना मुद्रा येऊ नये ? 'मकाळी उडावे, शौच-गुणमात्रेतादि विधी आटवावे, जग स्तनभंध्या करतो न कर्मना नोच जेवावे, १-१५ की कास्ट एकदावी, लावकळत प्रवास करावा...आणि तो देखिल बुद्धुगन, आफीनात जावे, पाच ताम मन लावून काश्कुनी करावी व परत यावे, धामदलेल्या वेड्याने येतायेतांच मुलावर कावावे, जेवावे व ओपी जावे.' ही तुमची आयुष्याची व्याख्या. थार, तुम्हाला हसण्याना वाचव नाही यांत !

अशो तुम्ही गाडी एकडण्यासाठी स्टेशनवर येता. येताना कोणावाली तुम्हाला धक्का लागतो. आत सागा....यात चिडण्यासारखे काय आहे ? पण नाही... तुम्ही भडकणाराच. अगदी लाकवूंद होणार. डोळे बटा-रून स्वतःशीच पुटपुटणार, "हंगामखोर, मनसं ताहीत मात्थोना." तुम्ही ज्याच्यावर विडवान ना त्याने त्यानी मूळीच करणता नाही आणि म्हणूनच तुम्ही जागत नागाशन. खरे सांगा. धक्का मागण्यात विडम्व-मारखे काय आहे काय हो...तुम्हाला कधीच नाजे का धक्का मागण्यामा वाटत ? हो....स्मजली. वाटने मारायामा पण डेअरिंग होत नाही तर ! मग निवड चिड तरी नका.

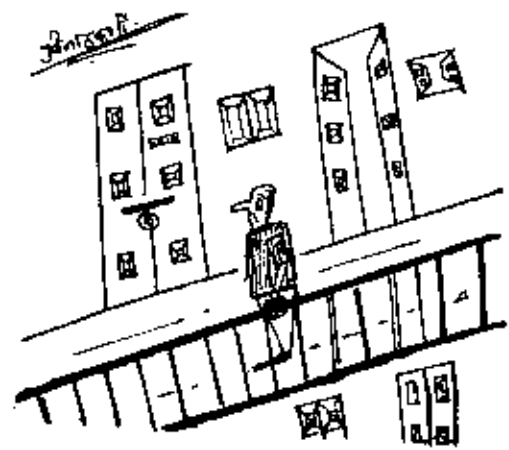
साईतही नेच. तुम्ही जड लागलान की उतर कर तुम्हाला डकलतान. प्रिजातल्या पार्कीटावर हात डेऊन दुनाच्या हाताने पिण्बी भांभाळणारा तुम्हाला कांच कमरत करावी लागते पण लोकांना काय त्यांच ने आपले डकलतायन् तुम्हाला. आणि एकाने तर चवच तुमच्या पायावर पाय दिला. शांते ! बघता तुमच्या पाया. तुम्ही पुढावर चार मृत करत. काष्पा टळ पाय देण्याचा नमनो तो तुमच्या जिन्तदियनेचा अन्नने शिवटी विरोधी पक्ष गुधांवर येऊ लागतो आणि म्हणजे 'मला टिंगे. बवंदेष्ट की चनाला हे !' आता तुमचा राग जिरून जातो. तुम्ही केविलवाणे होत आणि गुपीत बोनण्याचा निपळट प्रयत्न करता. म्हणजे

हम मर्क वात करता
मेली दिक्कत." तुम्ही स्वतःच्या
उच्चरणा आहेत. दोस्त, मी एक
तुमच्या पायावर कोणी पाय ठेवला
पाय त्याच्या पायावर ठेवा. आणि
दोस्त, मारी वाळणा व रागावता-
वृत्त ठरेल.

तुम्हाला आधीमातच पहावयाचे
वंग. स्वतःला कोण समजतो कोण ?
पाच मिनिटे उशिर होत नाही ?
आध्यामास, तुम्ही दररोज पाच-दस
वाट इ. प. वाट हु ने ?" तुम्हाला
दुसरी बरोबर १०॥ वाजता आधीमात
मग काही अचानगी भयंकर अमनात.
मज फुटत नाही. तुम्ही पाच मिनिटे
मग करगळी वर कसत त्याला समाजा-
मग छे. ऐकतच नाही वेटा. म्हणता,
मज दे. फिगर काय वर कसत. हे
हाय काय ? मिक मी मिक."
करगळी काय ? तुम्हाला वाटते,
कर ? अरे माथा करगळीचा अर्थ
तुम्ही एखादी चिड्या नमना परंतु
झालेली फाजिती केविल्याची

होचला होता नाचून पांडू शिपाई पहातो आहे हे तुम्हाला
समजते. तुम्ही स्वतःच वनागता.... वनागता....
वनागता. मना तरी वाटते की तुमचा माहेर फारच
विनोदी आहे तुम्ही थोडे खेळकर व्हा. बी. ए. स्पोर्ट.
हसन हसन मंगल त्याला खरे कारण. वधा, तो मुद्रा
म्हणत, "माता तु मज जाऊन हाय हो." आणि वर
मिगरेट देखिल अफिर करत.

घरी आल्यावर तुम्हाला आढळते की बायको
नावाचा प्राणी घराला वृत्तु ओकून भ्रमंतिमाडी येता



बसून घरी यावे तो शारास कुलूप !



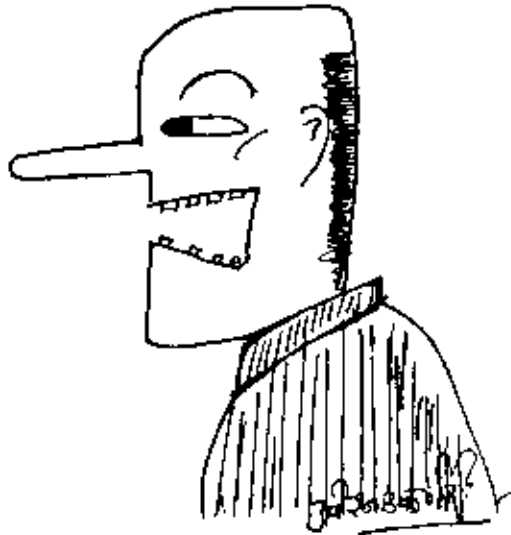
करगळीची लूण समज नये ?

आहे. "कमान आहे ! अरे कांही रीतिमान एकडे
आम्ही मरंस्नोवर काम कसत मध्याकाली वरत यायचे
आणि पाहावयाचे काय-कुलूप ! कांठे जाणार कांठे ?
अना येऊ दे मग दाखविता मासा ईशा." नी येने
आणि आगीत नेल आनते. म्हणते, "अप्या तुम्ही नेमके
नवकर आलातच ना ? जाताना मागायला काय झालं
होतं बाई ? आज बरोबरच मी. दणपुजेकडे पाटी होती.
काही म्हणत तुमचा धांदलण्या कायमच !" "ध्या.
कमान आहे. अरे कोण बायको आहेस की कोण ?" तुम्ही
फुटाण्यासारखे फुटत असता. ती देखिल स्तंभित होते.
आणि जेव्हा घरात अबोल्याची आणीबाणी पत्कारली
जाने. थार, पण तुमच्या लक्षात नाही की कुसुपाची
दुर्मिक्केट नाही तुमच्या वंगित आहे. विमगलान ना ?
आणि म्हणूनच निडमान. अहो एवढी सुंदर बायको

आहे... काय फक्कड कांदापोहे करणे ! पण तुम्हीच अरसक, माग्वे घेतलावेले. कधी आपणहेन मागल्याचा गजरा आपल्यान का मिनेयाची निकीट अणवीन ! हास्य कसे ते तुम्हाला माहीनच नाही ! मडळी, म्वा ही गारंगी सारखी अमने. तांग मुगत जुळविच्यान नर संसारसंगित गाणारी. मग जुळवा रा त्या तांग तुमच्या हास्याने !

आयुष्य हे असे आहे यार ! आयुष्यामध्ये रडण्या-सारखे इतके आहे की रडून रडून आयुष्य पुरणार नाही. असे धुळीतून चलताना खडे बोकलान म्हणून गडण्यापेक्षा धुळीतच हिरे सापडतात म्हणून हसणे चांगले नाही काय ? अंधेच्या रात्री चांदणे थिबकावे ना नगेच अमने हास्य ! दुःखामध्येच चमकून जाते आणि वेदनांचेर फुकर धालते. मग आयुष्यातील दुःखाचे, वेदनाचे, खर्याने रडणाणे कां गावे ? हमाचे की क्षणभर !

काय ? पटले ना ? — मग हसा—खळखळून हसा.



पटले ना ?
मग हसा की—खळखळून !

वात्रटिका

टायपिस्ट

एक लेडी टायपिस्ट
करी टाइपरायटरची खटखट
साहेबांची नजर लागली,
प्रमोशन मिळाले पटपट.

फुडारी

एक होता फुडारी
जनमेवेची त्याला आवड भारी
'गरीबी हटाव' करण्यासाठी
त्याने घेतल्या मोटारी.

इंजिनियर

एका तरुण इंजिनियरला
जाड मुलगी सांगून आली
'स्टॅटिकली इन्टीटरमीनेट स्ट्रक्चर' म्हणून
त्याने रिजेक्ट केली.

नाटककार

एक विचारा नाटककार
त्याच्या नाटकांना सर्वत्र नकार
नकार ऐकून कंटाळला
आणि 'निर्माता' झाला.

समज

चौथी देखिल मुलगीच झाली
बिश्वाच्या सी. अण्डपुत्रेना
टपें टपें करीत डॉक्टरना सांगे
"समज या आईबाबांना."

वाढदिवस

नटीच्या वाढदिवसाची पाटी मोठी छान
नटी मात्र दरवर्षी, होते वर्षाने तहान

विजय र. नाडकर
बी. आ. (निर्दिष्ट)

असा भेटलो

बाळकृष्ण गणपत पाटील
बी.टे. (जेनेटिकल)

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मेच्या काकांकडे गेल्याचे समजले.
मोठे अजिब, एवढी फारसा बोलत
मेच्या हातावर दोन राखड्यांचे देतांच
मेच्या हातावर दोन राखड्यांचे देतांच
मेच्या हातावर दोन राखड्यांचे देतांच

परंतु पुढच्या वास्तव ही गो. येत असल्या दिसता.
त्यामध्ये निश्चित काहीच नाही. हेतुमध्ये निश्चित
काहीच नाही तरी हेतु असे. (कारण तेव्हा ही जगतीची
मानसता असते.)

उत्तरावरील कोडे हे नक्की माहित नव्हते. दुसऱ्याला
विचारले तर त्याने थोडा कर्मापणा आटवत होता. म्हणून
मध्येच कुठेतरी आलो. त्यानंतर एथरपोट कालिनी
कुठे आहे हे कुणातरी विचारण्याशिवाय मर्त्यनर
नव्हते. तेव्हा एका गृहभाजकाला चौकशी केली. त्याने
इशूत व्हा ने पक्षर मिनिटावर असल्याचे सांगितले.
त्यावरून मी दोन म्हाण पुढे जनश्रव्याचे माझ्या लक्षात
आले. तेव्हा पुढील मागे जाणे भाग पडले.

कालिनीय शिष्यातूनच विविधगचा नंतर शोधण्या-
मागील काळामेला एक पूर्ण प्रदर्शना घालावी लागली
तेव्हा कुठे हवी असल्याची विविध मिळाली. तळमजल्या-
पासून वरच्या मजलीपर्यंत मजलीकडे तजर फिरवली.
परंतु सर्वथ स्मरणजोतना भासत होती. कोणी
चिपपाखर (अधिक मांगणे न लगे) फिरताना दिसले
माही. मध्येच दोन-तीन अनोळखी व्यक्ति गोंयरीमध्ये
घेऊन माझ्याकडे सध्याने वचून मिळून गेल्या. तेव्हा त
सहज कोणातरी विचारण्याचे ठरविले. शोभाच्या
काकांची मजली नुनत. शोभाने एका तिच्यावरवीर
माझी ओळख करून दिली होती. तिचेच नाव एका
छोट्या मुलाच्या विचाराने त्याने मला त्याच्या घरी
देऊन सोडले.

घरात एक धिगाड मूर्ति वर्तमानपत्र वाचत बसली
होती. मी थोडा पटकळलो. परंतु थोड घटून घरात
शिफारस.

“शोभाचे काका इथेच राहिलेले का?” मी घरात शिरलाच विचारले.

खुर्चीवरील गृहस्थ आपल्या चप्प्याचा काव मढ्याने गुप्त माड्याकडे बघतच राहिले. नंतर त्यांनी ‘हो’ म्हटले.

‘कोण तुम्ही? कोणत आलात? कोण हवंग तुम्हाला?.....’ वगैरे वगैरे त्यांनी प्रश्नांची मखमलीच मुद्द केली. तेव्हाच शोभाची काकी मुद्धा हजर झाली.

“सना तुमच्यानी थोडे बोलायचे आहे” मी नम्रतेने म्हटले.

“काही हरकत नाही. नि:संकोच बोला.” शोभाचे काका म्हणाले.

“माझे नांव मदन वरद्रीकर. मी वरळीहून आलो आहे. दोन दिवस जावे. माझी छोटी बहीण शारदा घरालून वेपता आली आहे. आम्ही वराच नगम काढला. परंतु अजून कुठेच पत्ता लागला नाही. शारदा आणि शोभा पंडितक ह्यस्मृत्यमध्ये एकाच वर्गात शिकतात. तेव्हा चौकशी करण्यासाठी आज मी शोभाच्या घरी गेलो होतो. शोभाच्या आईने शोभा तिच्या काकांकडे गेल्याचे मागितले. एखाद्यावेळेस शारदा शोभावरवीर एकडे आली असेल या कल्पनेने मी शोभाच्या आईकडून तुमचा पत्ता घेतला आणि नावडतोव येथे आलो” मी एक भरभक्कम थाप टावून माफळा आलो. बरीच हकीगत योग्यता माझ्या डोळ्यातून पाणी मुद्धा आले. त्या वेळचा अभिनय पाहून मोड-मोडचा नटथेरांनी मुद्धा तोडून बोटे घातली असली.

शोभा आणि नूतन स्वयंपाकघरात भिनीआडून भारं काही ऐकत होत्या. नंतर शोभाच्या काकांनी शोभाला बोलावले. मी हळूच तिला डोळ्याने खुणावले. ‘नम्रतेनेच को उगारा काही होणा हे.’ शोभा जे काही समजायचे ते समजली. मी तिला शारदाबद्दल विचारले. तेव्हा तिने हसू आवरले आणि शारदाबद्दल काहीही साहित्या नगल्याचे मागितले.

“तुम्ही पोलिस स्टेशनमध्ये चौकशी केलीच का?” तिच्या काकांनी विचारले.

“काय मागणार तुम्हाला, मंचईतील एवढी पोलिस-स्टेशन शिल्लक ठेवले नाही.” मी उत्तरलो.

“हत्ती मुबईत मुली पळविणारी टोळी निघाली आहे. असे वयाच वेळा वर्तमानपत्रात येते. तुम्ही शक्य निराक्या नक्कर तयार काढा. एखाद्या उद्योगिका मन्दा घ्या.” तिच्या काकांनी गुर्जावले.

“आतापर्यंत पंधरा उद्योगिका मन्दा घेतला. चर्चगेट ते बिगार, धोडीवेर धामन कन्याणपर्यंत माझ्या दोन दोन फेऱ्या झाल्या. शिवाय घरच्या माणसांचा क्षय चालूच आहे. अजून कायच चिन्ह दिभन नाही.” मी मागितले.

“तुम्ही वर्तमानपत्रात जाहिरात द्या.” तिच्या काकांचा मन्दा.

“तुम्ही गोरगावला जाऊन चौकशी करा. तिथे धोरगम गळीत रासाचे देऊल आहे; तेथील पुजारी हरम-तेच्या व्यवहारात अचूक पत्ता लागतो अशी खात्री आहे. गेल्याबरो आमच्या शेजारच्या रमातईची मुमती हरवली होती. तेव्हा रमाच्या विविधगमयीन नारायणनवरोवर ‘हादल हिलटॉप’ मध्ये पळून गेल्याचे त्यांनीच मागितले होते. म्हणून तर ती माफली. ताहीतर पोरीने आयुष्याचे वाटोळे केले असले, तरी तुम्ही तिचे जाऊन तयार काढा.” शोभाच्या काकीने मार्ग सुचविला.

एवढ्याच शोभा आणि नूतन चहा-फराळ घेऊन आल्या. चहा करीत झाल्यानंतर मी त्यांचा निरोप घेतला. दोघी कॉलेजाच्या गेटपर्यंत पोचवायला आल्या तेथे थोडा वेळ (प्रायव्हेट) गणपोगोप्टी झाल्या. शोभा ने रविवारी सकाळी घरी येईन असे मागितले. तेव्हा मध्य-काळी दुसऱ्या शोला जायचे आम्ही ठरविले. जमल्याम नूतनला बरोबर आणण्यास मागितले. आणि मी घरक रररा धरला.

“शारदा प्ररी आल्यावर ताबडतोब सला कळव” आता जात शोभाने टोमगा मागला.

★

अपुरे माझे स्वप्न राहीले....'

अशोक सोहोनी, बी. अंमरी. बी. ई. (मिडिल)

चेवम आहे. दुसऱ्याचे जण झाले आहेत.
आमच्या बाजूच्या मनोरंजना अंका
ने वसवले! ही दगडी बेंक अनेक
सन्ने कशी असली गेल्याहोत होऊन
आमच्या परिवर्तनेकडून सुर्वकिरण आले
आकाशात एक पाहत्या दगावा
बेकडे भक्तीय! दुसरे असली नरी
आहे. वा परिमरणान्या व्यक्तीय
होण्याच्या लावत भावल्या पहल्या
किंमिरी आगगाय वसुकिनागेचा
चिह्नतो आहे! ताजमहाल वहा-
नोखीज राही आहे! गरम करडे
चन भाणमे उरवाहने आजुवातुला
ताजमहालची छावाचिने पेनाहेत
आलेली भवली हिरव्यागार गवनावर
चकी आहेत. ताजमहाल मनोरंजना
मना ताजमहालच्या अंका मितागचे
दिमने आहे. गात नाचत कुणी
प्रतिबिंब पहाण्यांत हसून गेला
जग विभक्त एक नवी जोडी
कोकावा कसली नरी मनोरंजने
आणि मुनेवाने मिळून केवी होती

कर कर्पापुर्वीना दिवस! त्यावेळी
आमच्या विद्यार्थ्यांचा गनुह आयल्या-
"जीवन विमलक पहालीमाही"
मनोरंजना स्टॉडिअमचे, हनिमेटवूट
मंडीकालचे पदवपुनर विद्यार्थी
मनातःहेने प्रथम अंगाले भस्म
असली आमाव्य माणसाना गातून
त्यांचे उत्पन्न-मिश्रण-कुटुंबा-
असल्या ताना सोडी आम्ही

करणार होतो. नर मेडीकलचे विद्यार्थी आगेव्यविषयक
पहाणी करणार होणे.

आमच्याकडे येण्यासाठी आम्ही वांछे मेटवना
'जयता' धरावला आलो तेव्हा मना वाटत होत आम्हा
विद्यार्थ्यांत विद्यार्थीनी नगरात. पण आमच्या राखीव
हत्यात पाहती नर पांचनात मुनी! अंबड्या लाववर
येऊन असने काम करावला नवार होणाऱ्या मुनीबडल
कानूक वाटत! गाडी मुदयाची जिद्दी झाली आणि
गाडी मुदली तेव्हा आमच्या वृमधे आगच्यावा येणाऱ्या
नीनच मुनी उरल्या. बाकीच्या तिगेत घ्यावला आच्या
होण्या नर! गाडी मुर्वहून निधावी तेव्हा मुदयानीना
मारीजण विडक्यातून बाहेर पहात होती पण नगर
मुर्वहून दूर सरकायला लागल्यावर मात्र आम्ही अंक-
मेकांच्या ओळखी कसत येण्यात गडली. आम्हा मुनाचा
काही प्रश्नत नव्हता. आमच्या गणा गुजरातीतून
संगल्या. कुणाच्या वाटत असत आम्ही पूर्वीतानूनचे
ओळखीचे आहोत म्हणून! त्यावेळी नेवा आमच्या
जवळ आली. बांडावेळ थांबून तिने विचारले, 'Any
one speaking marathi?'

"आ अशोकभाई छे ने." परेण मेदवान उत्तर
दिव आणि ओळख देविल करत दिले.

"आ अशोकभाई छे ने-मारी गटोरी लखे छे-
अने अशोकभाई, आ छे अमारा इन्स्टिट्यूट आफ मॉडल-
मॉन्सना भिग काछे- आ वेत पण कविताओ लखे छे."

गवर ती म्हणाली, "मला वाटत तुम्ही गुजराती
बोलताय-दुसरे कुणी मराठी बोलणार नाहीत की
काय?"

"छे! छे! आहेत ना - पाचनहा जण आहेत.
पलीकडे असलीय. नावांची वाडी नाहीत ती आताच,"
मी उत्तरलो.

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“वर झालं. जतां बोलायला तरी मिळेल—
मी पाचरलेच होते—आम्हां निर्धन मी एकटीच पडले
की काय?”

अव्हडं बोलून ती पण गेली. ती आकर्षक होती.
निष्काकडे पण पहायला लावील अशी होती. थोड्या
वेळानच ती आपल्या गमाताकडे हजर जाली. आम्ही
सर्वजणांनी दिवा देखिल आगल्यान सांभाळून घेतल.
आणि मग—गप्पा झाल्या— सगळींचे पले खुलून लागले—
खाण झाल— मध्याकाळारच नेवानं आरंभमं करून
टाकलं. आमच्या घरावरची प्राध्यापकमंडळी देखिल
कडप करून गप्पा हाडत होती. भग्नपूर येईपर्यंत
तरी दुसरा काही उराय करणांभारग्या नव्हता.
उरायच्या दोन मुलीपैकी ‘कंठी दासवाला’— दायजेरूमचे
आणि ‘मामी मेगल तामीझलच्या’ पुस्तकांत डांक
खुपयून होत्या. नेवा माज मला आवडली होती.
अगदी वडवडी— आणि माझाभारग्वेच मराठीन खुप
वाचून केलेलो. आमचं मुल वरं जगलं. मध्याकाळी
थंडी वाडून गेली. दिवाभर गाडीतल्या लश्करांना
कटाळून सर्वजण निडाघोव व्हायला लागले. आम्ही
माज वराच वेळ बोलत होतो.

दुसऱ्या दिवशी आम्ही आग्याला पोहोचलो.
“पोस्ट ग्रॅजुअेटम् स्टुडंटम् हांमरेन” मी आननी
रहायची सोय केली होती. तीन मुली आणि एक
प्राध्यापिका— “मिस् अराती” जेव्हा खोलीत अकच
तर आम्ही विशाखी तीन-चार खोल्यांतून असे सरण्यात
होतो. इगरी आमची एक सदा घाबरी गेली. आणि
आम्ही काम काम करायचे शाळा मूचता मिळाल्या.
दोन-दात जण मिळून माहिती निवडायला बाहेर
पडणार होते. मना मोड लश्कराच वगना. नेवानं अपण
माझाबायलेवर किण्णार अगल्यानं आणवून प्राध्यापिक
‘भोळ्यांना’ सांगितले होतं. आमचं थोडं डिपार्टमेंट
आंक स्टॅटिस्टिकसचं प्रमुख होते. त्यानीच मला
सांगितलं, “तुज्यावरवीर असतं तर मराठीन बोलता
येईल म्हणून ती तुज्यावरवीर वेंणार आहे.”

त्या पांच सहा दिवसांत आम्ही ओडीने आगल्यात
किण्णो. माहिती गोळा करता करता— थोडे कजाला
सोपा मला मी जास्तच आवडली. आमचं काम सफल.

अक दिवस श्रमशानाचा, तर अकशे तिथल्या विशाखी-
वरोवर जगां कण्णया कार्यक्रम जाला. अर्जण नगर
‘Gut together’ माठी बोलायणे जालं. अक कार्य-
क्रमाच्या वेळपूर्वी आमच्या प्रांफेसरांना आमच्यानच्या
कुणीदरी कार्यक्रम सादला हवाच अशी गळ बोलण्यात
जाली. प्रो. ‘थोडे सदांच’ थिरकून गेले. कुणी तयारच
होईना. आयल्यावेळी काहीनरी कार्यक्रम करून आपली
‘नग्नपुती’ टाळा असे देखिल त्यांनी सांगितलं. मी
कार्यक्रम पारण्याचं आश्वासन दिलं. कार्यक्रम सर्वांना
समजेल असा हवा होता. प्रथम आगल्यानच्या
विशाखीच कार्यक्रम जाले. अक हिही प्रथम जालं.
कुणी खत्रा म्हणून मूर्तीन लावून दाखवलं. कार्यक्रमांना
माझ्या मेजारी सुनेवाच होनी. मग मला बोलायलात
जालं. माझा सायरीला व्यासंग उपयोगात आणण्याचं
टक्कल. वगोवर माजेल अशी प्रस्तावना करून मी
आदरीला कार्यक्रम पेश केला. तिथल्या रमिकांनी
मनापासून पाठ दिली. कार्यक्रम संपल्यानंतर माझ्या
भोवती त्यांचा गगडा पडला. अनेकांनी माज अभिनंदन
केलं. तिथून मोकळा होऊन मी हॉम्लेलवर पोहोचलो
जेव्हा हॉम्लेलच्या दारातच माजी वाट पहात नेवा
उभी होती.

‘अभिनंदन—कमाल केरीम हं अगदी वाटलं नव्हतं
तुला उई दाखल घेत असेल म्हणून. लोक थुप साने
तुज्यावर.”

वावर मी म्हणाली, “अजवटला ना कार्यक्रम—मग
गल: काहीनरी प्रक्षिप्त हे ना—तुमचं अभिनंदन काय
पुण्यशांनी केलेय!”

तिन मला दक्षिम देण्याचं कवून केलं—मुखईन्
वरून संप्रदानंतर !

शेवटच्या दोन दिवसांत आम्हा मात्यांना आज
पाहण्यासाठी भूषा देवघात जाली होती. माझी अपण
नेवाची मैत्री पाहून इतरजण अपणवून दुर पडत
होते. म्हणजे आमच्यानी थवळे पाहण्यासाठी देखिल
नेवाशिवाय दुसरी कोणती नव्हती. आमच्यात निवडून
आम्ही मागी थवळे पाईली. छायाचित्रे घेऊन
मध्याकाळी नात्रमहीलकडे जाला होतो. फिकत झाल्यवर
ज्या वेळी आम्ही वसना त्यावेळी असल्या दिवशीच

कोवनाना मी निता 'मिस खाना' म्हणून म्हणत.

"हं तुला नाच करत नाही म्हणून तू तुला होत होत्या."

"करत की चुकत होती म्हणून?" मी. "कितीय ना नाच."

"काय वेला अगनाय तर मना तरी असता."

"तुज्या कसयना म्हणजे बरीच तयारी होईना आमच्या घरी ये! कधी तरी येतून."

"मिस्."

"महा! होणान होत देत म्हणाली.

"राण तरी म्हण नेहा!"

"राण म्हणजे—

"स्वप्न राहिले....."

"जेवढ्या दिवशी आम्ही फोटोपुर-अर्था उन्हातून आम्ही भटकलो नाही. दिवाण-ई-शाम, दिवाण-इत, गाव्यांभूत जाणांना माईड'

"काय सुटिंग उतरवाही हे माव," काव्यावर म्हणाला.

"स्वप्न-बहिरी" वा त्या कसानीवरचा

"स्वप्न, 'नेत्रा! तू त्या कसानीवर-सिद्ध ये 'बहिरी' माखडी मी कोडो

"ज्यावर जाऊन उभी राहीली, होला.

"ज्याची नेमनाहीचा राज्य जातनी

"ज्या लाल भिनीला देऊन आम्ही नेत्रा नेत्राक मूकई आठवायला

लागली होती. त्या दिवशी आम्ही परत राजमहानकडे गेलो किती वेळ तरी तिथून पायच हटत नव्हता. किती पाहिल तरी समाधान होत नव्हतं.

"नेत्रा! उधां आण मूकईना जाणार. तू तुझ्या अस्मागांन गुंनशील आणि मी माझ्या. आठवण तरी घेईल का माजी? माझ्या स्वभावाशी मिश्र शक्यारी असून कुणी भेटलीच नव्हती. तू भेटलीच—आणि हे काम करण्यासाठी एकडे आलो त्याचं मार्गक ज्ञान म्हणून वाटलं"

"मला देखिल फार चम वाटतंय जे-तू भेटलाय म्हणून."

"आणखी एक विनाय नेत्रा? तू-तू माझ्याची लग्न करशील का?"

"तुला आवडणार असत तर नक्कीच."

"प्रार्थना?"

"प्रामिस!"

इथेच निरत मला आश्वागत दिले होतं.

"आणि लाल झाव्यावर आण उथेल पायलं हं १९ डिसेंबरला". मी हांकार दिला होता. आम्ही मुंबईला परत आलो.

नेत्राच्या वटिवासी आमच्या निर्णयाना आडकाठी केलीच नाही. जलद त्यांनी नेत्राचं अभिमंदन केले. आम्ही कण उतर कदाकावेक्याहून भवत्याच वेगानं घडून गेली होती. मजूनच आम्ही भेटत होतो—मुंबईत भटकत होतो. कुणाच्या तरी—मला वाटतं मावस भावाच्या लग्नाला म्हणून नेत्रा पुण्याला गेली होती.

आणि एक दिवस नेत्राच्या वटिवासात भेट आला. "I am very sorry to inform you—नेत्राच्या ऑक्सिडेंट अ-बाय. तुम्ही नावडनीच पुण्याला या."

त्यांनी दिलेल्या हॉस्पिटलच्या पत्र्यावर मी जाऊन पोहोचिल्यांत जीवना जीव नव्हता. आयुष्यात असा पहिल्यादाच पालरचा होतो.

मी गेलो नेत्रा डॉक्टर आणि मारीच मंजरी निच्या भोवती उभी होतो. मी नेत्रावर दोनचार जण बाजूला झाली. मी पुढे गेलो. पत्रागोपत्राच वेगाने होत होता.

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A., Steno-

नेत्रा ! नेत्रा ! मी आलोय-अगोक."

नेत्रातं डोळे उपडले. वेहयावर हास्य उमटले-
निव्या गावावर घुळी पाहणारं ! मग तिनं भाडा हात
हानात घेतला आणि म्हणाली -

"तुझ्या माठी नाचून दाखवायचं गहूत गेलं रे .
पण-आता शक्य नाही दिनात-मी तपले तरी तू-तू
नाजमहालची जाणीच ना पण !", आणि नेत्रा पुढे
बोललीच नाही. मी तिथेच बसून होतो. रात्री तिनं
इहोको सोडला.

नेत्राच्या वडिलांना खूप वाईट वाटलं, ते माझ्या-
जवळ बोलेच शकले नाहीत. आणि मी नेत्राला विंगड
शकलो नाही.

नाजमहाल आता धुरकट धुरकट दिभतोय. कुणी
म्हणताना, "नाजमहालच्या छनामधून पावसाचा एक
घेव भुमनाजच्या कबरीवरती दरवर्षी पडतो." खरं
की खंय ते मला माहीन नाही. मी मात्र दर १९ डिसेंबरला
इथं वा दगडी बेंडकीवर येऊन बसतो. इथेच वसून नेत्राचं
म्हटलेलं साणं मला आठवतं. नेत्रा निवून गेली आहे
आणि 'माझे स्वप्न' अपुरे राहिलं आहे.

० ० ० ० संध्या ० ० ० ०

बालकृष्ण गणपत पाटील

बी. ई. (इंटेक्टिव्ह)

ध्यानमग्न तो डोळे मिटुनी
चिरकत असा कुणो एक मुनी
बसला होता रुद्रा घेउनी
सूर्यस्तुती तो करीत होता मंत्रमुग्ध होउनी ॥१॥

सगें आपुल्या प्रिया घेउनी
सभोवार मग नजर फिरवुनी
भालो बावरी ध्यान पाहुनी

स्तुती प्रियाची करू लागलो भावनावश होउनी ॥२॥

मोक्षप्राप्तिस्तव आळवी भास्करा
डुबेल जग हे अंधाच्या सागरा
करू शके न दूर तिमिरा
जगी तुजविन कोणो दुसरा ॥३॥

जरी सूर्य तो डुबे सागरी
असता सूर्य सम शेजारी
भीती न मजला या अंधारी
वेईल संधेला साय जीवनमरी ॥४॥

तमू लागला नेत्र मिटोनी
करी प्रार्थना कर जोडोनी
नमस्कार मुनी करी तयाला
उजेडात आण तवकरी जगाला ॥५॥

संध्या बदली तव प्रियाया
नको उगवू सांग रविता
नको वितळवू सम प्रितीला
संध्या-सूर्याचे मिलन जीवनाचे हवे अखंडिन
वहावयाली ॥६॥

✱

सूर्यस्तुति ?

कर्मयोगाचा घोडा, वेहू देखणा तगडा ।
मोक्ष मनःशान्तीचा गाडा, ओढतो अनंत ।
गाडीवान आत्मा ॥१॥

नाल बुढीला, चाबूक विवेकाचा ।
वेग भावनेचा, रथ नरजन्माचा ।

तुजसि लाभला ॥२॥

श्रीकृष्ण ल. पेंडसे, आर्किटेक्ट.

आधुनिक फिल्मों ! समस्या और समाधान !

श्रीनिवास मिश्र,
बी. ई. (मिचल)

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रकों में, इन चीजों पर उन्हें ब्रह्म नहीं
की भारतीय फिल्मों इस देश के
असमर्थता और तब के मांग पर
फिल्म निर्माण में भारत ने हमारा
है कि भारतीय फिल्मों का स्तर
निरचरीतता तथा असमर्थता।
को ऐसे मार्ग की ओर अग्रसर किया
अधिक अंगप्रदर्शन को महत्व दिया
कोमों को अन्तर्गत के ऐसे चार
ने जा रही है जिसमें सुधीनता
असमर्थ है। आज तबू-कालेजों
के अलावा, देवानन्द, हेमामाजिनी
नया तथा नएक भूक में ऐसे हम
बहुधा ही अपनी इच्छा तथा
ने को ही अपना योग्य, अपना

यथोचित फिल्म निर्माण भी अखिर तो एक व्यापार ही है।
किसने आजकल की बात है कि जो चलता सिर्फ जाति के
गाने श्रवण हुकूमतों को अपने देश में बना सकती है,
अपने ही भाषाई देशवासियों को बनाई हुई नयी अवस्था-
गत फिल्मों का उद्देश्य नहीं कर सकती। निर्माता
और धर्मिक दोनों मजबूर है और इस मजबूरी का
परिणाम है दिन प्रति दिन निर्गता हुआ फिल्मों का
स्तर।

आज का दर्शक बर्ग जो 'सत्यवादी' और 'नॉर्मल' वर्गों
के बजाय 'बुद्धि' में तबों' तथा 'पदों के पीछे' देखता
अपना 'समय' करता है। यह दर्शक जो 'गौरव' आकाश
और 'भुवन' शोम' को नहीं समझता और अगर समझता
भी है तो उसे स्वीकार करता नहीं चाहता, फिल्मों को
सोप देता बहुत आभार है लेकिन योग्य अपने गिरवी में
आकर्षक देखना नहीं चाहते वे कारण नहीं छुड़ सकते कि
उन फिल्मों का जन्मदाता कौन है सिर्फ अपना दोष,
अपनी कमजोरी हमारा पर सत् देता चाहते हैं और ऐसा
बे बड़ी सफलता से कर भी लेते हैं।

हम ऐसी फिल्मों, जिनमें सिर्फ उद्यमकृद, माण्यीत
तथा बड़ी पुराना फिल्मों विकास है, को देखने के लिये
उमड़ पाते हैं। अपने हाथ-पांव तक, टिकट लेने में, तुड़का
गकने हैं और टिकटों के त मिलने पर दो रुपये की टिकट
को चार में पाँच रुपये तक बेकर खरीद सकते हैं लेकिन
एक ऐसी फिल्म, जो हमारा ही हकीकत हमारी ही कमजो-
रियाँ बिना समक भिन्न लगाये प्रस्तुत करती है को देखने
हम नहीं जाते। उनके लिये न तो हमारे पास समय है और

जिन भारतीय फिल्मों के बारे में
सच हो है और हमें यह सोचने पर
इस तरह के फिल्म निर्माण का
एक बड़ा फिल्म अखिर क्यों बतरी
दिन प्रति दिन करनी जा रही
निर्माता नहीं देना है और हमें
है जो प्रदर्जित होता है क्योंकि
समर्थता प्राप्त हो है। निर्माता
है जो आज का दर्शक चाहता है

न ही पैस। अच्छी फिल्में बनती हैं और बेधक बनती हैं लेकिन उन्हें कोई नहीं देखना। समीक्षक उनकी समीक्षा में प्रशंसा के पुल बांध देता है, आलोचक को खामोश हो जाना पड़ता है लेकिन हमारी आंख पर कांचा चढ़ा होता है जो यह देख नहीं सकता और हमारे कानों पर भी तक नहीं लगती। चित्रक लाती निम्नता गृह देखता है तथा रंजित है अपनी नकदीय को और बोधी महशुस है भिन्नता को कि उसने ऐसा फिल्म ही क्यों बनाई। इन मक्की अच्छी आदर्शवादी, उद्देश्यपूर्ण फिल्मों में हम खूब देग के किचने नागरिक सुधर जाते हैं यह सभी जानते हैं।

फिल्मने प्रेम की धार है कि 'फर्ज' और 'गनों का राजा' हाथों हाथ बिक जाते हैं तथा हम उनकी जयजय भी कच्चा देते हैं लेकिन 'बम्बई रंग की बाहों में' 'जहर और मरना' तथा 'दस्तक' नहीं 'चुकी', 'चिन्ता' के दो मो में अधिज 'दुःख' और 'होने' है और सब कोई चित्रक रहम खाकर खरीदता है। इन फिल्मों की यह हानत देखकर स्वाजा अहमद अज्जारा तथा राजेन्द्रासह बेदी पर क्या गुजरती है यह कोई सम्झनेवाला ही नमज सकता है। या तो ये हम जयजय में मंज मोड़ने पर मजबूर हो जाते हैं या फिर ये भी पैस ही बन जाते हैं जैसा आज के १५०० निर्माता हैं जिनके लिये फिल्म निर्माण एक कला एक माधन नहीं, भिन्न माधन या नेत्र का कारखाना है।

आज जय फिल्म निर्माण तकनीक में इनकी प्रगति हुई है तब इन फिल्मों के स्तर में इनकी गिरावट क्यों आ गई है? अमिय चक्रवर्ती, विमल राय और गुम्दत अब नहीं रहे और दूट गई उनके साथ ही अच्छी फिल्मों की वह सुनहरी कड़ी। आज नो प्रमोद चक्रवर्ती 'नया जमाना' बनाते हैं जो वरों पहले बनी हुई एक फिल्म की पुनरावृत्ति मात्र है जिसे १९७१ की तड़क-भड़क और शानोशोकन में पेश किया गया लेकिन इस तड़क-भड़क में फिल्म का वाद उच्च आदर्श कहा गुम हो गया किसी ने नहीं सोचा।

इन बातों का उत्तर नहीं आप दे सकते हैं, नहीं मैं और न ही दूसरा कोई क्योंकि हम सब दंगे हैं परन्तु कोई मानने को तैयार नहीं। गिछने क्यों में गंही गाने में अच्छी फिल्मों की अनाकलना इस बात की गवाह है कि हम 'गिके' मनायजन प्राप्त करने की धुन में अपना स्वाद खो बैठे हैं तथा यह रहे हैं उन अज्ञात मजिज की ओर जिरका अब कभी अच्छा नहीं हो सकता। क्या ऐसा नहीं हो सकता कि इन आदर्शवादी गंदी फिल्मों का बहिष्कार करने के लिये आज का युवा दशक को अपने आप को आगे लावे तथा एक बार दिखा दे कि उसका कार्य अभी गिरा नहीं, ध्येय अभी हीन नहीं हुआ, अच्छा युग परवर्तने की शक्ति का अभी ह्रास नहीं हुआ, वह 'गिके' हाड़ मांस का पुतला नहीं दिव और विश्वास में परिपूर्ण एक मानव है जो अभी जिवा है मरा नहीं। ●

“मैं तुम्हारा हूँ!”

जिन्दगी के हर कदम पर तुमको देखा है,
रातों को हवाओं में तुमको देखा है,
बिन को कितारों में तुमको देखा है।

जब देखता हूँ आइने में, तुम ही नजर आती हो,
हर एक हसीन में बस तुम ही नजर आती हो,
हर दम खयालों में भी तुम ही नजर आती हो।

हर पल, हर चीज में तुम्हारा एहसास होता है,
लुन पर अपने आपको तुम्हारा एहसास होता है,
अपने साथे में भी मुझको तुम्हारा एहसास होता है।

मेरे अंग में, मेरे नस नस में तुम समायी हो,
फिर मैं कैसे कह दूँ कि तुम परायी हो,
लगता है, मन से तो तुम मुझसे ही ब्याही हो।

जयंती एम. परमार
बी. ई. (निवृत्त)



फैशन

लांभडिया हरिश म.
(अनिम का, न्यायिक कला)

बच्चों का कहना है कि पुरानी पीढ़ी कहीं जगह पर अटक कर रह गया है। हुजूमता जा रहा है कि, 'नहीं भी क्या वह भी क्या जमाना था, वह भी ...'। जाने है कि एक समय वह भी अखंडता और तबी पीढ़ी के आने पर अखंडता

को कोई उम पीढ़ी और पुरानी पीढ़ी उम सबसे बड़ा है 'फैशन'। यह वह एक कड़ी मंच है और मंच है। हमारे आसक्त के तबतक देखभाल अर्थों की तरह पश्चिमी कर रहे हैं। भले स्थान में तो अन्धे क्योंकि वे अच्छी तरह से उद्योगकर, कोई काम उठाते हैं।

कन होता है फैशन को ध्यान से स्वरूप को से पूर्णतः 'करी भईतुम जगवचनों' करव मिलेगा 'वह तो आसक्त का संचालनी से जान बढ़ती है, लोग हमें और यही मनुष्य तब तब से तूर हो तमम असम्भों को सीनों पीछे छोड़ फैशन, पैसे में फैशन, अमग में फैशन पने आसक्त हर तरह की नीज में नापद भोजन करना व तन डोपना है। क्योंकि कई लोग (विनायन में) भी फैशन ही गमते हैं।

कल इकी नाथ-साध जा रहे हैं तो तन हो जाता है कि उनमें कानलइका है, क्योंकि दोस्त के काने, बपों की रनों पर का भी फकी नहीं जाना। निदान अजीब भी विज्ञानों वाले

कपड़े, गले तक कटे बूंदराने घाल, निरन्तर बूने, मोट-मोट बड़े-बड़े काने जमने व सह पर निरन्तरक-पीड़नों की पानें। दोनों की एकही तरह की वेजसा होगी है। मापनी मा फकी नहीं।

फैशन के कारण आसक्त के लोग धाना धन अपनी इच्छा व जारैरिक नाथि नष्ट कर रहे हैं। फैशन के कारण आसक्त न जाने कृत्रिम कर हो रहे हैं। मनुष्य अगर केवल अपने खोपे-पिने का ध्यान रखे तो कई तरह के जुने होने में रह जाने जैसे कि अक्ल-आयात (Savage)। आसक्त हमारे देश में सबसे ज्यादा 'गमनामा' हो रही है। देश की आर्थिक स्थिति को धिगाड़कर, कई गलत हमारे आसक्त के मुक्त पृथिवियों के लिए विनाशकारी जगह, काने, भंगार व तरह-तरह की मोदने भासपी को जुड़ने में लगे हुए हैं।

फैशन एक बाहरी दिखावा है-आडम्बर है। लोग तरह-तरह के वर्तमान कांडे पहने निकलने हैं ताकि लोगों को दिखा सकें, चाहे घर की हलत बुरी हो क्यों न हो। अगर ये लोग फैशन छोड़कर अपने खाने-पीने की और ध्यान दें तो जारैरिक शक्ति भी बड़े विभिन्न चीजों के मूल्य भी कम हो जायें। लोग हुड़गाल करते हैं, कारे, बसे, देलगाइयों और दुधैन्द्र जमाने हैं, हुकाने लूटने हैं, हुयाने करते हैं ताकी उनकी तरक्की हो, उनकी तनखाह बड़े।

मनुष्य का वास्तविक मोदने उम प्रकृति द्वारा दी गयी उसकी जारैरिक शक्ति ही है। उसके शरीर का रग उसी खून की भावी है जो लोगों की सुखी पीड़नों की पानों में बेहतर है। आज तो गार्निश के एक गेर ने परिवर्तन करने की आवश्यकता आ गयी है इस तरह-

'फैशन ने गार्निश निकम्मा कर दिया वनो यह भी आदमी से काम के।'
(क्योंकि इष्क करता भी आसक्त एक फैशन है।)

“अधूरा सपना”

अजयकुमार सि

बी. ए. (स्नातकोत्तर) विश्वविद्यालय

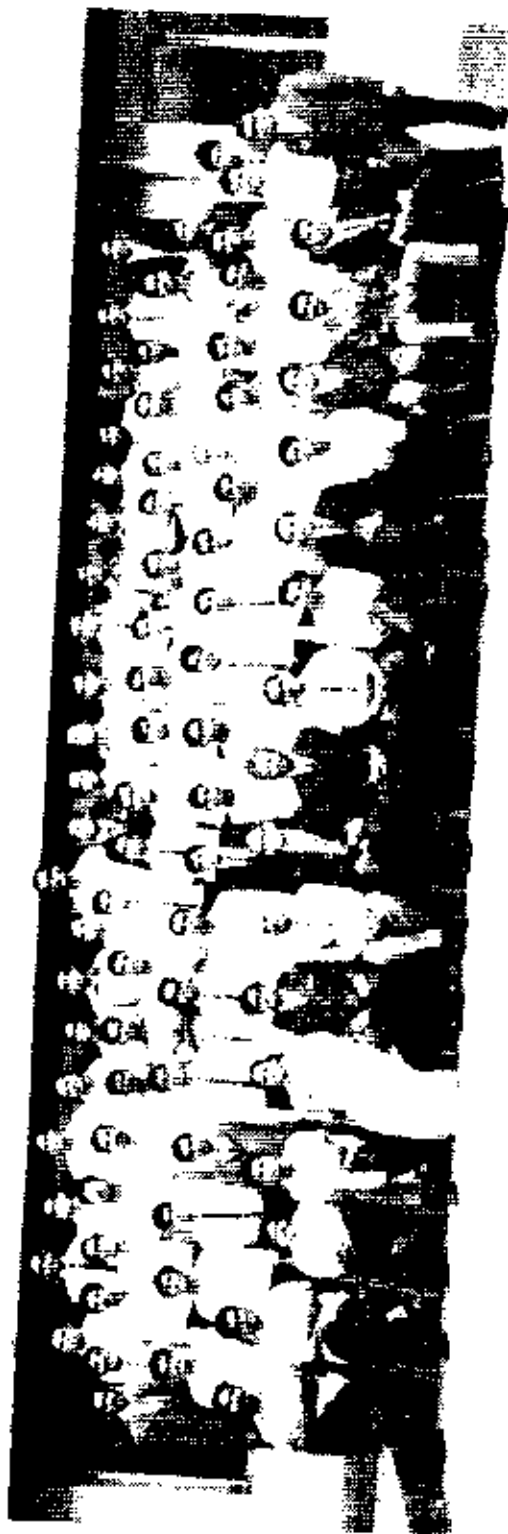
अमर अपने ही खालों में खोया हुआ बोनी यादी की कल्पना कर अपने आभ में ही विगोच हो रहा था। उसके मन में एक ही सबाय बार-बार उठकर एक प्रकार की अग्नि पैदा कर रहा था। सवाल तो सीधा था लेकिन अमर के लिए जिन्दगी और जीन के बीच संघर्ष के बराबर था। उसने मन में एक ही बात घर कर रही थी क्या पुनम अब कभी उसकी जिन्दगी की सहचरी नहीं बन सकेगी? क्या पुनम को वह कभी नहीं या नबोना?

उस दिन मुबई की विकास के द्वारा उसे एक ऐसा समाचार मिला था जो चार वर्षों में गंभीर रूप से उसने अपने के अन्तर्गत पर एक अज्ञान का हो गया था। कुछ क्षण पहले उसने चारों तरफ खुशियों का ही भरीय था लेकिन अब उसकी दुनिया एक अलग तरीके हो रही थी। उसकी आँखों के सामने युद्धमयौन के बाद की समरभूमि का दृश्य घूम गया। ऐसा प्रतीत हुआ जैसे उसके सभी प्रियजन युद्ध में मार दिए गये हों और उसकी प्रेमिका को कोई अवसरनी लिए जा रहा हो तथा वह एक निःसहाय की तरह उसकी तरफ देख रहा हो। उस समय तो वह रो भी न सका। उसका दोस्त भी हैरान थे उसके इस प्रस्ताव पर कि उसे यह मानना ही चुका है कि उसकी प्रेमिका अब कुछ ही दिनों में पगल होने वाली है फिर भी वह मरदन जैसी किए हुए एक दृष्टि निराशा की तरह निश्चल खड़ा था हालाँकि उसके जरीर का एक एक अंग अन्दर ही अन्दर टूट रहा था। वह उन दोस्तों में उस समय कह भी तो नहीं सकता था कि प्रेमियों के दिन गेने हैं अगिरे नहीं।

दिनभर अमर बेवैरी का शिकार रहा। रात्रि में भी वह सो न सका। विस्तर पर पड़े-पड़े वह खूब रोया ताकि उसका दिल बरखान के कुटुराघात की ज्वाला को अपने आँसुओं में टंका कर सके लेकिन वह अपने प्रयत्न में असफल रहा। रात्रि की नीरवता उसे

और भीतरक लग रही थी। उसका अविनायक काय लगा और वह इसमें बचने का उपाय सोचने लगा लेकिन वहाँ भी वह असमर्थ रहा। मध्यरात्रि के करीब अमर अपने खालों की दुनिया में विनयना करने लगा। सोचने लगने लगा क्या पुनम को हमेशा के लिए भुला जाय क्योंकि अब वह पगली होने जा रही है? पगल के भाग्य! पुनम को उसके तन-तन में रखा जाये। किन तरह उसे भूल जाय! वह पुनम को प्रेम करने का तरीका सोचने लगा और सोचने-सोचने रात्रि नींदभर प्रहर व्यतीत हो चुका था लेकिन फिर भी किसी निष्कर्ष पर न पहुँच सका। अब उसे अपने अन्तर्गत पर गुस्सा आने लगा कि वह इस प्यार के अन्तर्गत क्यों पड़ा और यही सब सोचने-सोचने वह सो गया माने ही उसकी आँखों के सामने अमर का चित्र घूम रहा जिसे की जिन्दगी में ऐसे प्यार के लिए कोई स्थान न था।

अमर एक स्वच्छन्द प्रकृति का जनम मुबई में उसने दोस्तों के साथ ही पगल करने थे। वह सोचने लगा कि वह अपने दोस्तों के साथ ही पगल करने का फैसला कर उसका मन बहनाया करता। उसे एक धुन थी कि वह कुछ ऐसा करे ताकि उसका नाम लेकिन यह धुन सिर्फ तभी तक रही जब तक वह एक से बड़ा होता या किसी पत्रिका या अखबार में किने गणगाथा का समानांतर पड़ता। लेकिन यहाँ वह दोस्त या रिश्तेदार के साथ हो जाता उस धुन का गायब हो जाता। बरबाद आये उसे नींद मान हो थी। उन तीन वर्षों तक एक स्थान पर रहने के बाद दुसरे नये घर में रहने के लिए आया था। रोज़ वहाँ के लोग भी उसे इज्जत की दृष्टि में देखते देखते ही देखते उसके सभी दोस्त बंद गये। समय आने में नुजाने लगा और अमर अपने कनिष्ठ की प्रथम की परीक्षा में उत्तीर्ण हो गया। चारों तरफ खुशियाँ थी।



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 वह मोचने लगा राजब की जबानी है
 अदा के द्वारा पता नहीं कितने सुबकों
 बंधनी होगी। आज जीवन में पहली
 खूबसूरत यौवना को देखकर रोमांचित
 उनके देखना रहा और वह खिड़की
 स्पर्शकर विचरकर अमर के दिल को
 । यह क्रम न जाने कितनी देर तक
 अमर के बगल में भास्कर आकर न
 । उसके आने ही वह सुन्दरी तो
 लेकिन अमर की दृष्टि अब भी उसी
 हुई थी। भास्कर उसे देखता रहा
 वहाँ से दृष्टि न हटाई तब भास्कर ने
 में हाथ रखा तो वह चौंक पड़ा।
 उठा जैसे वह कोई चोरी करते हुए
 वह कुछ बोल न सका। तब भास्कर
 "जिन्हीं में खो गये हो?"
 ने लगा कि क्या जवाब दे। उसने
 कि "मे प्राकृतिक दृश्यों का अवलोकन
 वाक्य पर भास्कर ने एक अर्धपूर्ण
 अमर को समझने देर न लगी कि इस
 नव है। वह जानता था कि भास्कर
 है और वह यह जान गया होगा कि
 जाने अमर ने अपना दिल उस सुन्दरी
 है। उसके बाद दोनों ने एक दूसरे
 पूछा और एक दूसरे से विदा लेकर
 गये।
 के लिए सब कुछ था। अमर उसे
 या करता था। अमर अपने दिल की
 को बताये बिना न रहता। भास्कर
 जीवन अपूर्ण था। इतनी निकटता
 की बात अमर भास्कर में न कह
 जाता था कि भास्कर अपने आप ही

सबकुछ समझ गया होगा। भास्कर के साथ अमर की
 दोस्ती भी एक खास परिस्थिति में हुई थी। दोनों एक
 दूसरे को देखे बिना चैन नहीं लेते। दिन में कम से कम
 एक बार या तो कॉलेज में या घर पर जरूर मिलने।
 छुट्टी का दिन तो जैसे सिर्फ उन दोनों के लिए ही बना हो।
 वे दिनभर भाव-भाव रहकर अपने सुख-दुःख की कहानी
 एक दूसरे को सुनाते।

अमर की जिन्दगी ने अब एक दूसरा ही मोड़ लिया।
 उसे कुछ बगने में पहले कुछ पाने की इच्छा होने लगी।
 उसकी इच्छा इतनी प्रबल हो उठी कि उसने अमर को
 उसके कर्तव्य में विनुर करना चाहा किन्तु पूर्ण रूप से
 वह कर्तव्य-विनुर न हो सका। उसका मन हमेशा उस
 सुन्दरी के रूप में खोया रहता। उसे दुनिया की सुध-
 बुध न रहती। एक दिन भास्कर ने उसे सूचित किया
 कि मण्डल के सदस्य गणतन्त्र दिवस के उपलक्ष्य में एक
 कार्यक्रम का आयोजन करना चाहते हैं। अमर का
 मन प्रसन्न हो उठा। वह सारे कामों को छोड़कर अपने
 दोस्तों के साथ इस कार्यक्रम के आयोजन का प्रबन्ध
 करने में लीन हो गया। व्यस्तता के कारण अमर व
 उसके दोस्तों को एक पत्र का भी अवकाश न मिलता।
 व्यस्तता में बीते हुए दिन किस तरह गुजर गये किसी को
 मालूम ही न चला और अन्त में वो दिन भी आ गया
 जिसके लिए अमर पिछले कई दिनों से अत्यंत परिश्रम कर
 रहा था।

सुबह में ही मकान में चहल-पहन थी और सभी
 किसी न किसी कार्य में तल्लीन थे। सभी के चेहरे पर
 एक मधुर मुस्काह खेल रही थी। शाम होने होते रंगमंच
 तैयार हो गया और सभी भाग लेनेवाले अपने-अपने
 कार्यक्रमों का अन्तिम रूप देकर विश्राम करने लगे। आठ
 बजने में अभी तीन घंटे का समय बाकी था। अतः
 अमर भी अपने घर चला गया और जलपान करने के
 बाद थोड़ा विश्राम करने के लिए सोफे पर बैठ रहा।
 बैठने ही उसे एक अपूर्व सुख की अनुभूति हुई क्योंकि कई
 दिनों के बाद आज वह आराम कर रहा था लेकिन
 तुरन्त ही उसे ख्याल आया कि उसे तो अभी सब व्यवस्था
 करनी है और वह तुरन्त ही नीचे उतरकर रंगमंच की
 तरफ बढ़ गया। अपना सब दुःखदर्द वह तुरन्त भूल
 गया। रंगमंच रंग-बिरंगे बच्चों के प्रकाश से जगमगा

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उठा था। चारों तरफ जैसे उजाले का ही अधिपत्य हो और अंधेरा उसमें डरकर कहीं डर भाग गया हो। रंगमंच के सामने गोफे और कुमियों को इस तरह से रखा गया था ताकि सभी आगामी में कार्यक्रम को देख सकें। अमर सबको अपना-अपना कम समझाता जा रहा था। साया इन्तजाम करने के बाद उसने अपनी कलाई पर बंधी घड़ी की तरफ भ्रजर की नो मालि आठ वज्र चुके थे। भिके आधा घंटा शेष रह गया था और बाहर में बुलाये गये अनिधि गणों का आना शुरु हो गया था।

ठीक ती वजे मंगीन की मधुर ध्वनि बजने लगी और पट्टी अपनी जगह में खिसक गया। थोड़ी ही देर में अमर की बलन्द आवाज मरक पर गूंजने लगी और रात्रि का पहला कार्यक्रम पूजानृत्य में आरम्भ हो गया। अमर एवं के पीछे खड़ा था कि इनमें में उभने देखा कि वही रुग्मुन्दरी उसके सामने खड़ी है। अमर आज पहली बार उसे इतने करीब से देख रहा था। उसने नृत्य की वेश-भूषा पहन रखी थी। उसने उसके रूप में चार खोंद लग गये थे। पत्रमुख अमर उसकी सुन्दरता में खों गया। उसकी स्वप्निल दुनिया को दर्शकों की तालियों की गड़गड़ाहट ने तोड़ दिया जो कार्यक्रम देखकर खुश हो रहे थे। अचानक उस लड़की ने पूछा, "क्या आप ही अमर है?" अमर ने स्वीकृति में मिर हिलाकर उसका नाम पूछा।

"पूतम।"

"पूतम!" अचानक अमर के मुंह से निकला और कहा, "किरना सुन्दर नाम है। ठीक आपके रूप के अनुकूल जो एक पूर्णमासी के खोंद की तरह दमक रहा है। मैं आपकी क्या सेवा कर सकता हूँ?"

पूतम ने कहा कि भास्कर ने उसे बुलाया है।

अमर माइक दूसरे के हाथ में देकर पूतम के पीछे-पीछे चलने लगा। उसने चाहा कि पूतम के सामने अपने दिन को खोंल कर रख दे और कहे कि उसमें सिर्फ उसके प्रति प्यार के मित्राव दूसरा कुछ नहीं है लेकिन वह न कह सका। उसने इधर-उधर की बातें करके पूतम का दिन टटोलना चाहा लेकिन इनमें में भास्कर खूद उसी तरफ आता हुआ दिखाई पड़ा। पूतम अमर को छोड़कर चली गई। अमर उसे जाने हुए देखता रहा। भास्कर ने

जब यह दृश्य देखा तो मन ही मन मुस्कराकर रह गया। जब पूतम आँखों से ओझल हो गयी तब भास्कर ने एक मजाक किया और कहा "अरे" वो तो चली गई अब क्या देख रहा है।" भास्कर के इस मजाक ने अमर की तन्ना नोड़ दी और वह लज्जाकर रह गया। भास्कर ने उसे सम्बुधना देने हुए कहा "पहले-पहले ऐसा ही होता है।" अमर भास्कर द्वारा कही गई बात को न समझ सका लेकिन हँसकर चुप हो गया। अमर को भास्कर द्वारा जान हुआ कि पूतम समूहानृत्य में हिस्सा ले रही है। थोड़ी देर तक काम की जाने हुई और फिर दोनों दोस्त अपने-अपने कार्यों को पुरा करने के लिए निर्दिष्ट स्थान पर पहुँच गये। अमर को सभी कार्यक्रम नौरम लगने लगे क्योंकि अब उसके ध्यान भिक समूहनाच की तरफ था। थोड़ी ही देर बाद पन्द्रह मिनट की विश्रांति की घोषणा की गई।

पन्द्रह मिनट का समय अमर के लिए पन्द्रह घंटे के समान लगने लगा। अतः उसके कदम अनाधाम ही मेकअप रूम की तरफ बढ़ने लगे। वही जाकर उसकी आँखें उस भीड़ में पूतम को ढूँढने लगी। मेकअपमें उसी का मेकअप कर रहा था। वह वही खड़ा होकर उस दृश्य को देखने लगा। उसे लगा कि मेकअप की जगह वह खुद बैठा है और पूतम को अपने हाथों में सजा रहा है। अमर का अंग अंग रोमांचित हो उठा। थोड़ी देर में मेकअप खत्म हुआ और वह दूसरे कमरे में चली गयी। अमर ने घड़ी देखी तो दस मिनट व्यतीत हो चुके थे और भिक पाँच मिनट का समय शेष था। वह रंगमंच की तरफ बढ़ चला।

विश्रांति के ठीक पन्द्रह मिनट बाद मंगीन की मधुर नय के साथ परदा उठा और घुघरुओं के मधुर स्वर दर्शकों का मन जीतने लगे। नृत्यांगनाएँ रंगमंच पर मंगीन की नय के साथ धिरकने लगीं। अमर भिक पूतम के हाव-भाव देखने में तल्लीन था और ज्योंही नृत्य समाप्त हुआ अमर के मुँह में "शायाम" निकल पड़ा और वातावरण तालियों की गड़गड़ाहट से गूंज उठा। नृत्य के बाद दो-चार कार्यक्रम और पेश किए गये और अन्त में राष्ट्रीय गीत के साथ ही कार्यक्रम समाप्त हुआ। जरूरी कार्यों को निबटाकर सभी अपने-अपने घर चले गये और अन्त में अमर ने भास्कर से भी धिदा की और

गया। खाट पर पड़े-पड़े वह पूनम की
गा और उसकी अपना जीवन साथी बनाने
चमे लगा। पूनम उसे हर पहलू से उगकी
बनने के योग्य लगी। उसके बात करने
स्वभाव और उसका रूप सभी अमर को
अनुरक्त था जो मिके जर्नीविना का, लेकिन
के जर्नीविना प्रेम के गर्म से कभी रुकावट
परन्तु फिर उसे विचार आया, "क्या
तुम को स्वीकार करोगी?" अगर उसने
तो उसकी जिन्दगी का रूप क्या होगा?
क प्रस्ताव में वह कब सा गया। उसे खुद न

एक दिन भास्कर अमर को लेकर
गया। वहाँ उसका परिचय पूनम के मला-
मई में हुआ। अमर को सभी मिलनसार
उमरें बाद अमर अक्सर पूनम के घर
। जब भी वह वहाँ जाता, अपने जीवन
बने बनाता, कुछ उमरें सुनता और बातें
को स्थान व्यर्थ हो जाता। कभी-कभी
बात करने का सफा पाता लेकिन वह जो
कहना चाहता वह न कह पाता। अपने
पर अमर की दृष्टि बलर उमरें खिड़की पर
को वहाँ पाकर आत्मविश्वास ही उठता।
पूनम वहाँ नहीं दिखाई देती तो वह उदास
वह किसी वहाँने पूनम को दिन में एक
ला।

म को बात..... पर अमर को
..... क्योंकि वह पर
के बारे में सोच रहा था। अचानक
के करारे में प्रवेश किया और कहा कि
मनी रोमन या रहे हैं। पहले तो अमर
लेकिन भास्कर के बहुत आग्रह करने
ने माना ही नहीं। अमर उस दिन निक
मारे को देखना चाहता था। समझ
ही। सभी अपने आप में मग्न थे।
को पताच नही थी और चारों तरफ
मे खुशियाँ ही खुशियाँ थी। सबको
बालों कन्दमा भी अपनी चाँदनी हँसी
पर विषम रहा ही। हर एक फैले
पर पहनी हुई चाँदनी एक मनोरम
रही थी। बल खानी लहरें नर्तकी के
फिर गिरकर फैल जाती।

दुमरे दोनों के साथ धूल-मिलकर
न रहा था। उसे किसी की भी

परवाह नहीं थी क्योंकि उसे उगकी जीवन संगिनी
मिल चुकी थी। भास्कर को यह भी ध्यान न रहा कि
अमर कब उसके पास से चला गया। अगर भीड़ में
ऊँकर एक एकान्त स्थान में बैठ गया और कन्दमा की
गक-गक छटा को सुनता पूनम से करने लगा। आज
कन्दमा कुछ अद्वितीय लग रहा था। मोलहों कलाओं में
परिपूर्ण अपनी ध्वनि चाँदनी द्वारा सम्पूर्ण पृथ्वी को
आलापित कर रहा था। अमर को अपने वक्ता की
बात याद आ गयी जब उसने अपनी माँ से कन्दमा लाने
को कहा था। तब माने उसे समझाया था कि बेटा कन्दमा
तो भगवान हैं। उगकी वाक्ता को कोई नहीं पा सकता।
वह सोचने लगा क्या पूनम भी चाँद के समान है जिसे
कोई नहीं पा सकता? क्या वह अपनी महान है कि
एक मनुष्य का प्यार उसे अपना नहीं बना सकता? क्या
तारी के रस में वह एक देवी है? अमर अपने सारे
सवालों का जवाब भी अपने मन में ही पूछने लगा और
उसके दिल में कहा, "नहीं, वह महान हो सकती है परन्तु
गठिता नहीं। मेरा प्यार पूनम को पकड़ रहेगा।
मेरे प्यार के सामने पूनम की जूझा ही पड़ेगा और वह
मेरी होकर रहेगी।" स्वप्नों के काल्पनिक गमर में
हुने हुए अमर ने देखा कि कन्दमा ने एक अद्वितीय कान्ति
उभारी और उस कान्ति की चमक में अमर को अपने
पास एक पृथ्वी के बँटव का अभ्यास हुआ। अमर उसके
मुखमण्डल की देखकर सोच गया। उसने देखा पूनम
उसके भिन्नहाने बैठी है। अमर भावार्थिक में बह गया।
सत्यों की दुनिया नाकार हो उठी। वह अपने आपसे ही
बाने कहने लगा लेकिन वह समझ रहा था कि वह पास
बैठी पूनम से बाने कर रहा है। अमर ने पूछा, "तुम
यहाँ?" पूनमने अपने होशों पर गहुर मुस्कान बिखरने
हुए कहा, "हाँ, अमर, तुम्हारे प्यार ने मुझे यहाँ आने
पर मजबूर कर दिया।"

"मुझे बहिन या कि तुम एक न एक दिन जरूर
आओगी। आज मेरी लगन पूरी हो गई। आज की
इन शुभ घड़ी में तुम यहाँ आओगी उसकी मुझे कसना
भी नहीं थी।"

"कौन बाने करने हो अमर। मैं तुम्हारी हूँ और
जीवनभर गुहारी रहूँगी। मुझे तुमसे दुनिया की
कोई तकल अलग नहीं कर सकती।" इतना कहने के
बाद पूनम की ऊँगलियाँ अमर के बने बानों में अखँवियाँ
करने लगी। जीवन में पहली बार इस मुझावने न मोटे
संघर्ष को पाकर अमर निद्राके बनीभूत होकर सो गया।

रात्रि का नीमरा प्रहर खनीन हो चुका था। समुद्र
को लहरों के संघर्ष में अमर की निद्रा अचानक टूट गई
और उसने देखा कि वह तो अकेला रेल पर सो रहा था।

करीब-करीब भीड़ ज्यादातर छंट चुकी थी। अमर की काल्पनिक पूनम भी न जाने कब उसकी कल्पना के संसार से दूर जा चुकी थी। उसने उठकर अपने काइों की रेत झाड़ी और भास्कर बंगरह को बुढ़ने चल पड़ा। बहुत कोशिश करने के बाद भी जब वे लोग न मिले तब वह अपने घर की तरफ चल पड़ा।

उस रात के बाद अमर को एक और नया दोस्त मिला विकास। विकास से भी अमर की दोस्ती एक खास वजह से हुई। अमर स्वभाव से इतना शर्मिला था कि अब तक वह पूनम को अपने प्यार के बारे में नहीं बता सका था और यही कारण था कि उसे दोस्तों का सहारा लेना पड़ता था। थोड़े ही दिनों में विकास और अमर एक दूसरे के अच्छे दोस्त बन गये। अमर के दोस्तों की संख्या में बढ़ि हो गई। अब एक से दो दोस्त हो गये। भास्कर और विकास। विकास, अमर और पूनम के बारे में अच्छी तरह ज्ञानता था। अतः उसने जो तौड़ कोशिश की ताकि दो दिनों को मिला सके लेकिन वह भी अपने कार्यक्रम में पूर्णसयोग सफल न हो सका। अमर यही सोचता था कि उसके भाग्य में ही न लिखा हो कि पूनम उसे मिले तो दोस्त बन ही क्या सकते हैं। विकास ने कई बातें पूनम के बारे में अमर को बताई जो वह नहीं जानता था लेकिन अपनी बात को वह भी अमर से छिपता रहा। साथ कोशिश करने पर भी विकास अमर में हमेशा यही कहता कि समय आने पर सब कुछ बता दूंगा। लेकिन उसे क्या मानूस कि प्रेमियों के पास संवकुछ होता है सिर्फ समय का अभाव रहता है।

अमर जब उठा तो काफी दिन निकल चुका था। रात के जागरण के कारण फिर सो गया। दोपहर विकास ने पिक्चर का निमंत्रण देने हुए उसे उठाया। अमर का मन-शरीर कुछ हलका हो चुका था। दोनों सोजन कर निकल पड़े-बातों-बातों के मिलमिल में विकास ने आज वह भी बात बता दी जिसे बहुत दिनों छिपाया था। अमर पर तो जेने वज्रपात हो गया। पर होता तो वही जो पवित्रता को राक्षस होता है। समय के साथ परिस्थितियाँ बदलीं-घाव भी भरने लगे।

अमर को अब पूनम से कोई मिला नहीं है। पूनम एक विवाहिता..... पराए की पत्नी है-किन्तु अमर आज भी पूनम को उसी दिल ने प्यार करता है, जिस दिल से पहले। पूनम भले ही अमर को भूल जाय लेकिन अमर पूनम को कभी नहीं भूलेगा। अमर की जिन्दगी अब पूनम की यादों में बीन जायेगी। अमर का संजोया हुआ सपना अब टूट चुका है। अब अधूरा सपना ही अमर के लिए सब कुछ है।

मेरा नाम Engineer

ए भाई! जरा पढ़ते चलो,
Surveying ही नहीं Hydraulics भी,
Irrigation ही नहीं Transportation भी,
Structures ही नहीं Soil Mechanics भी,
ए भाई.....
तू जहाँ आया है,
वो कोई Arts नहीं, Science नहीं,
Cammerce नहीं, Law नहीं,
Cooking नहीं, Music नहीं, Engineering है।
और प्यारे! Engineering एक पहाड़ है।

और पहाड़ पर चढ़ने के लिए,
बड़े को भी, छोटे को भी,
सच्चे को भी, झूठे को भी,
डुबले को भी, मोटे को भी,
Kinney से Terzaghi तक,
priyani से Rangwala तक,
दिन रात पढ़ना पड़ता है,
ए भाई.....

Failure से डरता है क्यों?
Repeat से डरता है क्यों?
अरे Repeat तू जब तक न पायेगा,
पास किसी Owner के जब तक न जायगा,
Engineering है चीज क्या,
नहीं जान पायेगा
हँसता हुआ आया है,
रोता हुआ चला जायगा।

ए भाई.....
ए भाई जरा पढ़ते चलो,
Surveying ही नहीं Hydraulics भी,
Irrigation ही नहीं Transportation भी,
Structures ही नहीं Soil Mechanics भी,
ए भाई.....

खम्भाडिया एच. एम.
बी. ई. (सिविल)

“હા, વસંત, ...”

સોલંકી ડી. જે.

(ଅଂ. ୧. ଅଧିକାର)

સ્વર્ણ : તમે કહ્યું જાણેલા છેનું નથી. જેમ
કે કનુ પાણી જતાં પાનાપરના વાણે જમે તેવાં
પણ વૃત્તને પાંદડાંએને કથી જા દિગ્ધા અથવા
આસાનીથી પરતનાં કુસવાટા સાથે જ
કે છે, જસ એ જ રીતે હું પણ એ પાતળા એ
પરંચિને અને એ સમયને પાણી નિર્ધે પતાયી
કનાડી નાખાંથ, તેનાયે સંપૂર્ણપણે મુક્ત
મું સર્વ પર્ણ ફેંકી દીધાં પછી વૃક્ષને તમા પછી
? વસંત આવે એકલા જ વાસ એ તમા પર્ણની
ને નથી કળીએ ખાવશે. તરી બહાર
ને એ વૃક્ષને પાનાપરે સ્પર્શ કર્યો હતા, જેમ
નાર્દી શહે એ રોને વિચારવાનાં અવકાશ નથી
જા, જ્યાં વૃત્તએ ત્યાં વસંતનાં વાણે વૃક્ષો,
વિવાજા, ફૂંદા પોતાની મસ્તીમાં ગીતા
એ રોવડો અને તેની સાથે એકાકાર થઈ

જો મોટું વૃત્ત પોનાની પાનાપર, જુની વર્તન
નાના, કિચ્ચો, કુસાદયો રંગપેશાં કોર-
નાવથી નાની શક્તિ, જમી શક્તિ, એકાગ્ર

નહીં, એ રીતે વિચારવું જ નથી. વસોન
તો પાનખરનાં ફૂલને બૂલવું જ પડશે.
તો ક્યોટી છે. ખંદનો મઠિમા પાણ છે.
સાવજન, બોલ તે આપતો પડે છે. અને
તે નથી આપ્યો ? તો પછી શા માટે ક્યો વસોન

એ વસ્તુનું શું કામની જે ફૂલ ખીલતી ન શકે.
એ અનુ શું કામની જે વસ્તુ ન થાતો શકે, પાણી ન આપી
શકે, ફૂલનું ન આપી શકે, વસ્તુનના આગમનને વધારી ન
શકે, તેના ઉન્નમનને, ઉત્થાપનને બાંધી ન શકે, માણી ન શકે?

એને એવા ઈન્સાનની સાથે સંબંધથી, મમતાથી ક્યાં સુધી સંવાગો દેવા સ્વીકાર્ય શકાય ? જે પાત્ર રસ ન પાવાથી શકે તે હેલ ને ક્યાંથી ન જાણી શકે ?

અને એમ વિચાર તંદ્રામાં ઘર ક્યારે આવ્યું એ તેને
જાણર ન પડી.

... હા, આ બેજા શરૂ થયાં મારી દરેક બાબતમાં, અત્યંત પછે શાદ જીવાતી, એમ ખુબી
પણ આવી જતી થયાં છે એમ કહેવા લાગે તે પણ આ
જીવનમાં ? આ કારણે, જ્યાં જુલાઈ આવેત પછે
આમાં કંઈક પ્રત્યેકમાં મુકે લાગે પણ સ્વામીને કહેવું હતું.

સાચું પેરાન પડી ગયું, એ વાન પડી. એ બાગની
અડાર ગઈ. ફૂલ ગયું. તેની સુવાસ પાડી ગઈ. રહી ગઈ
હાર્દયનર દેવો એ કપાડો. માસે બન સુખજ જીવનની
કબર ખોલેને રહી ગઈ છે શું ? ... વાવ આને લમણાં જ
કાપાડી નાખું. માસે વાદોને તાજ કરે. એ દોલતખ ફરી
જાગુન થાય, એ નકેમાં ફરે સરી પડે, એ બેકાર ખૂત-
પણમાં ફરીથી પેરાઈ જઈ, તે પોડાં તેને જ અસમીખન
કરો નાંખું. ... ના, ના, એની વાન પાછા વળતા, લમણાં
નારી. એમ લં કરીશ નારી. લજ્જે તો ધણું કરવાનું ખાસી છે.

એ જિત તારત ખાનડ્યજ કમાડના આગળાને
ખાંધનાં તાર વાગીં, પરંતુ પછી કમાડ જલ સરખો થકો
પાણ દીવાં વિના કોથડી ગળું.

..... શું માફ? ક્યા ધર, માફ સ્વાગત ક્યે છે ?
આટલા વિધેય, વિરાય, વિદેહજા અનુભવ્યાં પછી પણ ?
શું ધરને પામ, પાર દિવાલને પામુ દિવ દેશ છે ? લાગણી
દેશ છે ? સારા સારાનું આન દેશ છે ? કોણ જાણે.....જવા
દેા, જે રસને જરૂં નહીં, તેની આજ શા માટે ? ઈન્સાનને
પણ એવી વૃત્તિ હોત, સતત પોતાપણાંની લાગણી દોત,
એકને જ વર્તણૂક સોંપવાનું હોત, બેવફાઈનું નામ ન
હોત તો ?

..... તે તો આ પ્રસંગ જ પડત નહીં, બાગ ઉગરડત નહીં, પાનખર આવત નહીં, પણ એવો સ્થાપી કમ કુદરતનો છે જ ક્યાં? તેને તો લીલાં પાન જોઈને તેની પર પાનખર આવવાની વૃત્તિ જ સનેજ થાય છે. લીલાં રંગ પછી પ્રોદનાનો પોળો રંગ આવવામાં જ તેને તો વધારે રસ છે.

હર તો કશા જ થરકાટ વિના, લાગણી વિના ખોલી નાખ્યું.

...આ ખેત્રમાર દુર્ગન્ધ શાની આવે છે? આ ભેંકાર અંધારું — કશું જ દેખાતું નથી. શું માફું જીવન પણ આજું જ જવાનું? આ કોર બકોર પણ મામાનિયો જ કરે છે. એમનાથી પ્રકાશ ઝાડત નથી વનો, એટલે...આમ નહીં થાયે, આ દુર્ગન્ધ એમ નહીં જાય, લાવ બારી ખોલી જ નાખ્યું, હાથ, હવે નિર્ધન થઈ. શું બાહરની હવા તાજગી ભરેલી, ઠંડી, મધુર છે. આ સુગંધ તો ફૂલોની જ છે. અરે, હાં, યાદ આવ્યું. આ તો વર્સન જનું થાયે છે. કુદરતની વર્સન.

શું સુગંધ અને દુર્ગન્ધ, વર્સન અને પાનખર, વિરોધ અને મિલન એક સાથે નસંભવી થકે? ના, ના માટે એ પાનખરમાં પલટાયેલી વર્સન નહીં બેઠેએ, એ લાગણી નહીં, એ પ્રેમ નહીં, કશું જ જુનું નહીં. અર્થ જ નવું જોઈએ, પ્રેમ, લાગણી, ભાવના અને સહાનુભૂતિ પણ, શું એ સંભવ થયે?

... કે પછી એ જ ભેંકાર કાળજી કાળી કેટલી? એ જ ઊંચી અને અંધારી દિવાલ? માનવી માનવી જ મરી જાય એવી લાગણી હીનતા, ન ગુસ્સો, ન પ્રેમ, ન અભાવ, ન દયા, કશા જ ભાવ નહીં. ફક્ત પેટ ભરવાનું, ઊંઘવાનું અને દિવસો -- અવજના, ઝિઝગીતો એ એ ઝિઝગી કહી શકતી હોય તો -- પસાર કરવાનાં.

આ છાંયો નીચે પડી ગઈ છે. લાવ, તેને એક બાજુ રાખી દે. નિવેશનો જ લઈ. શું મધુર મુખ હતું તેનું? હતું? અરે, છે!! અરે, અરે, આ તો

અને એના હાથમાંથી છાંય પડી ગઈ.

...હા, આ એજ લોહી છે. પણ લોહી લોહીમાં ફરક છે. હા, નીકે, નને ખુલાયું નહીં. તેં મારે બાગ ખીલ્યો, કપાસી ખીલવી, ઉઘાડી, અને બીજે બાગ બનાવવાની, ખીલવવાની તમન્ના બતાવી. મારી લાગણીને, મારાં

લેવાને કુકારાવાન આપી મને લાગણી હીન બનાવી મૂક્યો. મારી લાગણી ઉઘેળી. મારી ભાવના સ્વીકારી નહીં. તેનાં સ્પંદનો જીવવાની પણ તેં ના પાડી દીધી.

મારાંથી જીવવાનું નહીં. ધીરજ રહી નહીં. ઉપાય શૂન્યો નહીં. હું અંધારો બન્યો. અને મેં એ બાગની સાથે તેના માથાને - તને — નિર્મૂળ કરી દીધો... કાચ, મેં ઉતાવળ ન કરી હોત.

ગુસ્સો, નિરાશા, ઉદ્વેગ માનવીને શારણિકનું ભાન ખૂલાવી દે છે, નર પિશાચ બનાવી દે છે, એમ સાંભળ્યું હતું, અને તેનો અનુભવ પણ લેવો પડ્યો. તિર હે થયું તેને તો ભૂલવું જ રહ્યું. બાલ નીકે, તારી કોઈ પણ શિક્ષા મને મંતર છે. પણ મને મારો નિવેશ આપ. ક્યાં છે એ? મારી એ ફૂંદેલી કૂપળ ક્યાં છે? એને હું કાચ પરમાં સાંભીધ. પાનખર તેને કદી સ્પર્શો ન થકે તેમ. જીવન ઝંઝાવાન હું અહીંજમ સહી લઈય. અને હવે તો તેનાથી દેવાઈ બરો છું ને?

... પણ શું મને નિવેશ મળશે? મળશે તો આ પંદર વર્ષના ગાળા પછી તેને હું જોવાની થકીય? અને મને તે માફ કરી થકશે? જન્માનાનું જર તેના કાનમાં નહીં રેડાવું હોય? મને પિતા તરીકે સ્વીકારવાની જ ના પાડી દેશે તો?

ના, ના, તેની નજર મારાંથી જીવાણે નહીં. મારે અને મજનું જ નથી. મારો સ્પંદનો હાથ તેનાં પર લગાડવાં જ નથી. બલે એ એનું જીવન એની રીતે ખીલવી જાણે. એ કૂપળ ખીલશે, એના આગમાં બહાર આવશે. એની સુગંધ ગોમર પ્રસરશે, અને, અને મારો તેનાં પરનો અધિકાર મેં જ ખોલ્યો છે. અધિકાર ખૂબ અજમાવી લીધો. હવે જતા પણ તમન્ના આડી રહી નથી. કદાચ નિવેશને મળવાથી પરિણામ વિપરીત પાત્ર આવે. પણ નસીબનો, કુદરતનો શો ભરોશો?

બૂનકાળની એ લાત, એ યાદ, અર્થ ભૂલવું જ રહ્યું. બલે એ ભૂં દિલનાં એક અંગેયર ખૂણે પડ્યું રહે, પરંતુ તેનાં આ અવશેષો શું રહેવા દેવા? નહીં, તેને દુઃખ લાગે તો પણ ભસ્મ કરી જ નાખ્યું, ગમે તેવા પ્રિય-જનને પણ તેનો દેહ નિર્જીવ થવા અગ્નિ દાસ આપવો જ

... આપનો, આ ખુશી, આ છબી બધાં મારાં
નજરે જુઓ છે હું ? પરંતુ એને હું

એ આ મારા પ્રાગના - ઉઠડી ચૂકેલાં પ્રાગનાં-
મન આવશેવો ભરમો ખૂન થયાં. વાલ હવે
હવે કશું જ કરવાં હોતું રહ્યું નથી. અવ-
શ્ય આપી દોષો. આ ખૂનવાળ હવે ભેંકાર
નથી. આ જુઓ મને નાસીપાસ કરી થકે

સ પછી વસંત આવે છે કે વસંત પછી
જુઓ .

હવે નવો બાગ ખીલવવો નથી. જમી-
ન દોષ તો નવો બાગ ખોલે જ ક્યાંથી ? એને
એ ઉજડીને તેનું પુનરાવર્તન કરવું નથી.
એ કમ જળવી રાખે.

આ ઘર પણ નિર્જીવ હોવાં છતાં અંધારાને પચાવી
જાણે છે, તેને જીવંત જાણે છે, તે હું તેમ નહીં કરી શકું ?
આમેય તે આટલાં વર્ષો તે અંધારામાં ભેંકાર ખૂનવાળ
સાથે જ વિતાવ્યાં છે ને ? પણ આ અંધારાને નીલેશ સુધી
પહોંચવા નહીં દઉં. એને, એ અંધારાને તે હું જ
પચાવી જાડીશ.

એથી જ એનાં જીવનમાં તે ઉજાસ રહેશે.

મારી તે એ કાળજી કોટડી જ સારી છે. એ પાનખર
ઘોષ છે, અને એ અંધાર જ મને તે હવે પ્રેમ અને
ઘોષ છે.

અને આ અમારી કબર, આ કપાસી અને આ દુહું
પણ ભલે તેમ જ રહ્યાં. એ કદાચ મૂક રહ્યાં પણ બીજાને
ચેતવી દિવાદાંડીની ચરજ સારશે.

... અને ધીરે રહીને ઘરનું કમાટ તેણે પ્રકાર આવીને
બંધ કરી દીધું.



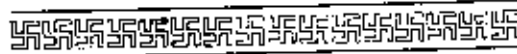
WELL WISHER



આંખે પડોળાં પ્રેમનાં

ખાંભડિયા હુરિશ મ.

શ્રી. ઈ. (ચિવિલ)



આજનું વર્ષ થાન રહેતું મેરૂ. ગામ હોળીનો તહેવાર આવે ત્યારે સાવ જુદું જ બની જતું. પંપજાનાં ઝાડ સુધી ખંજોરે એટલી ઊંચી જવાળાઓ અને એમાં નારિયેળ ઝીંચવા માટે શાવસ કરતા જુવાનિયાઓની સાથે એવી પ્રગંઠા થતી. આ વર્ષે હોળીને જે જ દિવસની વાર હતી છતાં કંઈ નૈયમશીલતા જતાની નથી. એનું કારણ હતું 'રણછોડ'. દર વર્ષે બધાને ઉત્સાહથી ભર્યા કરતા અને સ્પર્ધામાં વિજેતાપદ ભાગવતા, તે રણછોડ જ દેખાતો ન હતો. છેલ્લા કેટલાક દિવસોથી એ કોઠીની નજરમાં પણ આવ્યો ન હતો. તેના સમેતરણ જુવાનિયા પણ ચાર વાર એને ઘેર જઈને પૂછી આવ્યા કે રણછોડ કેમ દેખાતો નથી. તેના મોઢા બાઈએ કહ્યું કે એ કામસર અમદાવાદ ગયો છે. પણ જ્યારે એક મહિના જેવો સમય વીતી ગયો ત્યારે તે રણછોડના મામાથી એ સંદેશનું નાવ. તેમને રણછોડ ઘણા જ પ્રિય હતા. રણછોડની કામજ-શકિત, ચપગતા, ચંચળતાને કારણે રણછોડ પર મામાને ઘણા પ્રેમ હતા. રણછોડની બાના મૃત્યુ પછી મામા મેરૂમાં આવીને જ રહેતા હતા. નાનપણથી જ રણછોડ તેમનાથી એક પણ દિવસ અગ્રણી થયો ન હતો, તેથી મામા તેને હેવા અમદાવાદ ગયા.

ત્રણ દિવસ પછી નિરાશ વદને મામા પાછા ફર્યો. ત્યાં જેટલાં સગાંસહાવાં રહેતાં હતાં એ બધાને ત્યાં રણછોડની તપાસ કરી પણ બધે જ એજ જવાબ મળ્યો, કે રણછોડ એમને ત્યાં આવ્યો જ નથી. મામાએ ગામમાં પણ બધે તપાસ કરી પણ પત્તો લાગ્યો નહિ. ઘેર આવ્યાંને તરતજ એ રણછોડના મોઢા બાઈ થીરુને મળ્યા. થીરુએ કહ્યું : "કંઈજ ખબર નથી. જતી વખતે મને 'હું જાઉં છું' આટલું કહીને એ ગયો છે." થીરુની વનીચુંકે પરથી મામાને દાળમાં કાંઈક કાળું છે એમ લાગ્યું. પાંડુ એ કંઈ જ

બોલ્યા નહિ. એને એ જ દિવસે તેમણે સગે ચલાવે વાવડ મોકલ્યા કે રણછોડના પત્નો નથી. એને આજુબાજુનાં ગામમાંય તપાસ કરી. પણ રણછોડ હાથ નો મળેલ ?

આખરે મામાએ પોલીસને ખબર આપી. અને પોલીસે તપાસ શરૂ કરી. બે ચાર દિવસ નીકળી ગયાં, પણ ક્યાંયથીય આશાજનક સમાચાર આવ્યા નહિ. ગામમાં ખૂબ ખોરે એક વાત ચર્ચાવા માંડીની કે ગામના પોવાળિયા કદના હતા કે ધૂળિયા ટીખા પાછળ ઢોર લઈને જતી વખતે થોડો જ પરાણ બંધ આવે છે. એમાં ય કાંચે સવારે પાંદરે દેવ ને મરજું હેવા આવેલા ગરાસિયા તો એમ વતો કરતા હતા કે પોલીસે કિવસ પહેલાં એવારી રાત્રે ધૂળિયા ટીખા તરફથી થોડો જ દહેનાક બ્રૂમો સાંભળી હતી. ગામ આખામાં આજ વાતો થઈ રહી હતી અને બોલે દિવસે સવારે ભેદ તો ત્યારે જ ખૂબી જ્યારે મડે ગામનાં સોની સોનાની વીંટી સાથે મેરૂ ગામના ચમાર અને શંકર પંડ્યાને પોલીસની સાથે લઈને આવ્યો. ગલબો ચમાર વીંટીના જે બાજ કસાવતા મડે ગામના સોની પાસે ગયો હતા પણ વીંટી પર રણછોડનું નામ લખેલું હતું. આટલું ગામમાં રણછોડ નામના એક કુંબારનો પત્નો નથી એ વાત સોનીને જાણમાં જ હતી. તેણે ગલબાને હુકમમાં ખેસાડી તરત જ પોલીસને જાણ કરી. પોલીસે ફરિયામાં ગલબાને થોડા માર માર્યા, ગલબાએ પંજે પડી જઈને કહ્યું : "સાહેબ, મારો ! જેટલો માર મારેલો હોય તેટલો મારો પણ મારો આમાં કંઈ જ ગુનો નથી. પણ પાપનો કરનારો તે તેના સંજો બાઈ જ મૂલો છે."

થીરુ ગલબાને પોલીસ સાથે આવતાં જઈ ગમ્પરાઈ ગયો. કંઈ ન સૂઝતા એ પાછડે આરંભ્યો નોકો, પણ ગામ-ઝંના કુંબાર ઘરેલોના સૈનિક આગળ ત્યાં સુધી ટકે ? થોડી વારમાં જ એ પકડાઈ ગયો. ગામના મુખી, સરખેય, અને બીજા આગેવાન ગમ્પરાતા જે પાંચ માણસોને બાલા-વવામાં આપ્યાં. થીરુ સમજી ગયો કે હવે તેનું કંઈ જ થાશે નેમ નથી. મનમાં વિચાર્યું : "માર બાઈને ઢોર બની જવું પડશે એના કરતાં કહી દેવા દો અંબી ચાવ. જે થાય તે ખર્ચ. બહુ બહુ તે એ ચાર વર્ષની જેલ થશે શીવું હું ?"

પોલીસ નાથકે એને કહ્યું : "જે કંઈ બન્યું હોય તે સાચે સાચું કહો દેનો જરા ય માર નહિ પડે, માટે કંઈ પણ છુપાવ્યા વગર કહો દે." થીરુ નીચું જોઈ, લીંપણની

હરો બાલ્યો : “ સાહેબ મને કોઈ માફ નહિ
મેં માતામાં માટે ગુના કર્યો છું.

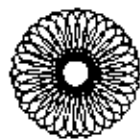
નના પાલક મારો બાઈ એક દિવસ મારી પાસે
હો, તે મારી ઘણી જ આમન્યા રાખતો અને
‘વાણુ’ એવું બોલતો’ મારો પછો આવ એ
વા. તે દિવસે ચૂપચાપ મારી પાસે ઘણી વાર
રહ્યો, પછી થીમથી બોલે કહ્યું : “બાઈ ! મેં
સાંભળ્યું છે એ માડું મન જાણે છે, તમને વડીલ-
કું કહેવાનો હવો ? પણ મારી એક અરજ
ચમતી સાથે ન હોય, ને નેન અહિ આવતી
હો.” એ આગળ કંઈ બોલે ને પહેલાં જ હું
બોલ્યો, મને ઘણા જ ગુસ્સો વડ્યો, ને આગળ
જેન રહ્યો. સાંકે ગરજાને મારી મારી આગળી
ને સમજવી, પેસાના લાભ ગરજાએ કંઈ પણ
વગર એનો બાગ બજવાનો નેવારી બનાવી.
પછળ થેલો બન્યો હવો. ચમતી માટે દુનિયા
જવ થઈ જાય તેની મને પરવા નોતી. મને એમ
રજાડ એની બાબતે આ વાત કરી દેશે. તે
કેડ કોટાની લેમ ખૂંચવા લાગ્યો. તેથી જ તે
દૂર કરવાનો નિર્ણય કર્યો.

મારી સાથે જ્યારે ઘેર પાછો ફર્યો ત્યારે રજાડ
કીમો મારી શવ બેસો હવો. મને જોતાં જ
બાઈ, જમવાનું ક્યારનું ટાકું થાય છે. હું તે
જોશી વગ્યો. ” મેં જાણે તેની વાત સાંભળી
તેમ કહ્યું : “રજાડાડ, મારી સાથે થાય તે જલો.
છાગી ને પાવડે હું પેલી ખીજમાં જ બૂલી
” રજાડાડ તરત બોલી પડ્યો : તમે ખાવા
એ તો હું જ એકલો બંદી આનું છું.”

એકલો આવી અંપારી રાને ક્યાં જશે ? થાય
જરૂર બંદી આવીએ.” હું આગળ થયો ને રજા-
પાછળ. ધૂળિયા રીંબા પર ગલબો ને શંકર

અમારી શવ બેઠીને બેઠા હતા. નિશાન જગ્યાએથી પસાર
થતાં શંકર અને ગલબોએ આવીને રજાડાડને પકડ્યો.
મેં તરત જ બાહુમાં પડેલું ફાનસ સળગાવ્યું. ફાનસના
અજવાળામાં ૫ ફૂટ લાંબો, ૨ ફૂટ ઊંડો ને ૧ ૧/૨ ફૂટ
પહોળો બાઈ બેઠીને રજાડાડ વાત સમજી ગયો એકદમ
અભરથેલો ને ગરજાદિન અવાજે તે કહેવા લાગ્યો.

“ બાઈ ! મને છોડી દે. હું બધું જ સમજી ગયો
છું. આપણા કુટુંબની ખાનગીનિ ને શોભે એવી તમારી
ગાલ બેઈ માસથી રહેવાનું નહિ ને મેં સવારે તમને ઠોક્યા.
પણ જો તમને એ પસંદ ન હોય તો ફરીથી કહી એનું નામ
નહિ થકે. મને છોડી દે, તમે કહેશો તો હું આ ગામ આ
તાલુકો અરેઆ આખો વિસ્તાર છોડીને ચાલ્યો જઈશ. કોઈને
ય કંઈ નહિ કહું. બાઈ હું તમારે પગે પડું છું. હું અહિથી
સીધો જ બગાડ ચાલ્યો જઈશ. કોઈને ય કંઈ નહિ કહું.
બાઈ હું તમારો નાનો બાઈ છું. બાજો મરતી વખતે મારી
બાળવાણી કરીતી એટલું તો યાદ રાખો. બાઈ ! તમને
તમારા નાના દીનીયાના સોગંદ છે જો મારી પર દયા
ન કરો તો.” બાળું આનું એ ઘણું ય બોલી ગયો પણ
અમારા ત્રાણમાંથી કોઈને ય જરૂર પણ દયા ન આવી.
અમે ત્રણે ય એને પકડીને પેલા ખાડામાં સુવાડી દીધા.
હું એને પકડી રહ્યો, અને ગલબો તેમ જ શંકર પાવડાથી
માટી ભંગારવા માંડ્યા. રજાડાડે ઘણા પ્રયત્નો કર્યા, પણ
તેમ તેમ સાટીનો બાર વધતો ગયો તેમ એનો અવાજ
અને ચોંસા સંભળાતી બોલી થઈ. એના મોં આગળ
માટી નાખવા દેવો હું આગળ તથ્યો એવી તેમું કહેનાક
ચીસ પાડે. હું શણ બર થડકી ગયો, પણ તરત મને ચમતી
યાદ આવી. ક્યોય વિચાર કર્યા વગર મેં માટીનો ઢગલો
કરી નાખ્યો. ત્યાર પછી પાંચેક મિનિટ તડકાટ ચાલુ રહ્યો.
અને થોડે થોડે અંતરે અંદરથી અવાજ આવતો રહ્યો.
પણ એ તરત જ બંધ થઈ ગયો. અમે ચારે તરફ માટી,
પથરા એવી રીંદે પાથરી દીધો કે બધું સરખું લાગે.”



ઝેર તેા ખીધાં જાણી જાણી

ખાંભાલિયા હુરિશ મ.
બી. ડી. (સિવિલ)

અવનિ પર અધિકારતા ઓળા ઉતરી ચૂક્યા હતા. ડૉ. અવિનાશ વિચાર મગ્ન સ્થિતિમાં બેસા હતા. ઓપરેશન થિયેટરમાં નડામાર નેપારીઓ ચાલી રહી હતી. ઓજારના ખાલુખાણાટ અને મદદનીશ દાકતરોની ઠોક-ધામથી ધાનાવડખમાં ગંભીરતા છવાઈ ગઈ હતી. ઓપરેશન ટેબલ પર સુદીપના ધોરણ અને સશક્ત દેહ નિખાન અવસ્થામાં પડેલા હતા. જાગૃત્તા મુલાકાતીઓના ઓપરેશન સુદીપની પાતળી નુપા શુન્ય નજરે છત તરફ ફરતા પોતાને તાકો રહી હતી. ગળાશટ અને અવસ્થાના ભાગો એની ઓંખિયામાં તરવરી રહ્યા હતા.

ડૉ. અવિનાશ એક પછી એક સિવારેક રાખવાતો જતા હતા, ખંભિડોલો રાખતા કમવાની જેમ એક પછી એક વિચારો તેના મગજમાં નકરતો ચઢતે ખંભિડાઈ જતા હતા. તેના આંસુએ આંખમાં નુમ્મલ સંધર્ષ જાગે હતા. દેવી અને અસુદી ડૉ. અવિનાશને હેરી વધી હતી, ડૉ. અવિનાશના કળાજની નસો છછેરાથીયે સર્પનો જેમ તેજ બની ગઈ હતી. ઝેરનીપૂર્વક તે રૂમમાં આરા મારી રહ્યા હતા. આ પોંચ્યાં ઓલું આંસુની ટુનિએનાં આટલું જર કદી પણ અનુભવ્યું ન હતું. સિવારેકનો પૂરૂ સંસ્કારથી એક સ્ત્રી આકૃતિ રચાઈ ગઈ, અને ડૉ. અવિનાશ ખૂનકાજતા સંસ્કારોમાં ડિનરી પડ્યા.

અવિનાશના વધુ સમય પ્રથમ એમ. બી. બી.એસ. ના ઈનામી વિતરણ સમારંભનો દરજો મળે જતો. યુનિવર્સિટીમાં પ્રથમ આવવા માટે તેને સુવર્ણચંદ્રકથી નવાજવામાં આવ્યો હતો. નાપીએના રાજગણે વચ્ચે જ્યારે એ સ્ટેજ પરથી નીકે ડિનરી ત્યારે એક સુંદર અને આકર્ષક છોકરીએ સ્મિત વેરનાં કંઠું.

"કૉન્ગ્રેસ્યુએના."

"થોંહું."

"તમારું નામ શું ?" છોકરીએ સ્મિત સમીપ ઉતાર આપ્યો. 'શુધી'.

અને એ બન્ને પછે થોડેક મણે તારા મૈત્રિક રચાઈ ગયું. ત્યાર પછી તે સુધા અવિનાશના એકંદ્રી છવનમાં વસેલની જેમ મહેકી ઊઠી. થીમે થીમે પરિવર્તમાંથી મૈત્રી જન્મી. ધનિષ્ઠ પરિવર્તે તેમની મૈત્રી ધ્રોમમાં પરિણમી. સુધા અવિનાશની એક વર્ષ પછળ અભ્યાસ કરતી હતી, તે પછી જ દેખાવડી અને પોસ્ટાલ રોવાથી કોલેજના અનેક યુવાનો તેને રીજવવા પ્રયત્નો કરતા હતા. પરંતુ તેણે કોઈને થ મથક આપી ન હતી. અવિનાશનો પ્રતિભા તરફ એ આકર્ષાઈ હતો. પ્રથમ તે અભ્યાસના બદલે અવિનાશને ચારેવાર મળવા કરતી, પણ છેવટે બંને એકબીજાને દિવનું દાન દઈ બેઠાં.

અવિનાશ એક ગરીબ વિધવા માતાનો એકનો એક પુત્ર હતા. દાણણ પાણી કરીને માતાએ તેને ખાણવ્યો હતો, માતી એક જ ઈચ્છા હતી કે અવિનાશ ખાણીગણીને ડૉક્ટર થાય, પોતાના પતિનું ડૉક્ટરી સારવારને આભારે અવસાન થવાથી તેને મનમાં જલ એ જ લગત હતી કે અવિનાશ ડૉક્ટર બની તેના જેવા અનેક ગરીબોની સેવા કરે. મરતા પતિને તેણે આ વચન આપ્યું હતું. અવિનાશ પણ આભવામાં નેજાવરી હતા. સફેદસ્થીય ચઢીને તે બાકેતા હતા.

સુખી સંસારમાં સમણાં નિરાળાને અવિનાશ ઠેક પોતાના ખાણકોનાં શું નામ રાખવા ત્યાં સુધીની કલ્પનાએ ખંડોનો ગળો હતા. સુધા ત્રણે એનાં જીવ દોરીમાંની વળની જેમ ગુંવાઈ ગયા હતા. પોતાના પ્રેમ સમજાવેના સમાચાર જાણતો માતાને ખુશ કરવા રતનમાં જવાની ઉતાવળ કરેલા હતા. ત્યારે...

'સર્વે ગુણાઃ ક્રિયનમ આશ્રયન્તે ।' ગણી ગર્ભ શ્રીમંત સુદીપની ઝાકમ ઝેળથી અંજાઈ જતાં સુધાએ એને પોતાના છવનસાથી બનાવો દીધા. પાછળથી અવિનાશને ખબર પડી કે સુધા પારકી થઈ ચૂકી છે.

અરમાનોથી ઝરેલું અવિનાશનું દિવ નૂડે ગયું. માનસિક આઘાતથી તે અર્ધ પાગલ જેવો બની ગયો હતો. એકલા એકલા શુન્ય નજરે તાકી રહેતા આ બનાવ

તેની દેહલા વર્ષની પરીક્ષાઓ ચાલુ હતી. પરંતુ ક્ષતિમાં તે કેવી રીતે પરીક્ષા આપે ?

તે પુણ માતા તેના અંકના એક પુત્રની આ દશા જાણી એક કાગળી, ગોઝારી રાત્રે આઘાતની ઘોડમાં ફેર દોડાડો. આજ સમયે તેના જીવનમાં પ્રેરણાએ તો કે જ્યારે અવિનાશ ચરે તરફથી મુશ્કેલીઓથી ભરેલો. પ્રેરણા અવિનાશની ચારી સંભાળ રાખતી અને કબોટ મળતા પછી પ્રેરણાની સમજાવટથી ક્ષમા આપી. પરંતુ તેનું જીવન શાકે બની ગયું. જ્યારે જીવન જીવતો. ફક્ત માતાની અંતિમ ઈચ્છાને જાણી નમન્નાને લીધે. અને આખરે તે સર્જન થયો. પ્રેરણાએ પોતાના નામ પ્રમાણે ખરેખર ક્ષમા પ્રેરણાનું સિંચન કર્યું. તેથી જ તે અવિનાશ સિદ્ધિ લાંબા કરી શક્યો.

સંત જીનની એક ખુશનુમા સંજ્ઞાએ પ્રેરણાએ અને તેની જીવનસંગથી બનાવવા પ્રસ્તાવ મૂક્યો. અવિનાશે ક્યું કે જેમ એક મ્યાનમાં જે તબયાર શકે તેમ તેના હૃદયમાં કોઈ બીજી સ્ત્રી પ્રવેશ પામી શકે નથી. અને આજે અવિનાશ શહેરના નામાંકિત બની ગયો હતો.

અહીં અવિનાશની વિચાર ધારા અટકી, તેના મનમાં આવીને ક્યું, 'Everything is ready, Sir.'

અને અવિનાશ વાસ્તવિક ભૂમિકા પર આવી પડ્યો. આરંભે બુઝારી આપેલાન વિષેય તરફ પ્રયાણ કર્યું.

સુધાના પરિ સુદિપની જીવન દોરી આજે તેના હતો. તે સિદ્ધિપૂર્વક સુદીપને સ્વયંત પાંચવાડી અને વેરનો અટકો લઈ શકે તેમ હતો. તેણે અટકો નક્કી કરી નાખ્યું હતું. પોતાના જીવન જાળને, પોતાના ફેરનાર અને વળતવાના મૃત્યુ માટે જવાબદાર સુધાનું શ્રીભાગ્ય તેણે ભૂલની નાખ્યું હતું. કેટલાય વર્ષો તેના વેરાગિન નૂતન થયેલો હતો, અને નિશ્ચિત સંતોષનું સિમર વેદી તેણે કામ શરૂ કર્યું. પરંતુ વરત જરૂર દિવાલ પર અંકિત સુખાપિતો પર પડી.

"To forgive is divine."

"Strive to save thy enemy."

તમ બર માટે તે પોતાના નિબંધમાંથી છોડી ગયો.

પરંતુ તે વિચાર તેના ક્ષતિ છે તે પાંચવાં જ તેણે ઘોરી નસ કાપી નાખી.

જ્યારે સુધાએ સુદિપના મૃત્યુના સમાચાર સાંભળ્યા ત્યારે તેના હૃદય ફટ ફટને આખી હોસ્પિટલ બગલી નાખી. ડૉ. અવિનાશ વિજયના કેશમાં હુમલો આનંદોત્સવ ઉજવી રહ્યો હતો. જો કે અવશ્યી તેણે દિલગીરી અને હુમળા બાવેનું મોઢું પહેરી રાખ્યું હતું.

પરંતુ તે રાત્રિએ સડી સડીને તેને સુધાનું આકંઠ અને તેના અધિન ચહેરા વાદ આવી રહ્યો હતો. તે ભૂલવા તેણે અનેક પ્રયત્ન કર્યા પણ તેમાં નિષ્ફળ ગયો. હૃદયના ડોડાણમાંથી અવાજ આવતો હતો કે તેણે આ યોગ્ય કર્યું ન હતું. ડૉ.કર નરીકેતી તેની ફરજ તે ચૂકવો હતો. જે ભાવનામાં અંધ બનીને કરેલું કૃત્ય તેના સ્થાને ખિરાલોલા માણસ માટે શરમજનક અને લીધવનભૂં હતું. અને આટલી ઉચ્ચ કક્ષાએ પહોંચીને તેણે એક સામાન્ય અજ્ઞાન માનવીની જેમ વેરનો અટકો વેરથી લીધો. સુધાએ મુકેલી વિશ્વાસની થાપણ એકાંતી હતી. વિશ્વાસ પર તે સારા સંસાર નભે કો. જુવાનીના તથામાં સુધાએ નાદાત ઉમરે ભૂલ કરી હતી અને પોને? પોને તેો પરિપક્વ વયે ગોઝાડું કૃત્ય કર્યું હતું. આમાં બિનારા સુદિપનો શો વાંકો? તે તેો અવિનાશ અને સુધાનો તક્કરનો શિકર બની ગયો હતો. અંતરાત્માના અજાળને અવગણીને તે આવું કૃત્ય કરી શકેો હતો.

તે જીવવાનો અધિકાર જુમાવી બેઠો હતો. તેને આખી જિંદગી પાપના શોળ લેકા દોષાના રહેનું તેના કથતં મૃત્યુને વાલણું કરવું વધારે યોગ્ય થાયું. પરંતુ આત્મ હત્યા પણ શું એક પાપ નહોતું? એક પાપ પછી બીજું પાપ કરવાની તેની હિમત ન થાયત એટલે જ તેો વધુ વિચાર કર્યા વગર ઉધની જાગો એક પછી એક તેણે ઉદરમાં પથરાવી દીધી અને પોને ફેલા કૃત્યની સજા ભોગવવા અનંત ચાત્રાએ ચાલી નીકળ્યો.

બીજા દિવસે બધા જ આમબાશેમાં સમાચાર ચમકી ઉઠ્યા : "શહેરના જાણીતા અને અનુભવી સર્જને કરેલી આત્મ હત્યા." અને એ દેવના માણસની અંતિમ કિયામાં ભાગ લેવા માટે માનવ મહેરામણ ઉમટી ઊઠ્યો. ફરેન્ના મનમાં ડૉ. અવિનાશનો આત્મ હત્યા એક કોયડો બની ગયો. પરંતુ એ કોયડાનો ઉકેલ તેો ફક્ત એ જણ જણતા હતા. એક સુધા અને બીજા દેશવર

❧

“પાયાનો પથર”

દિલીપ એમ. પારેખ
(બી. ઈ. સિવિલ)

જેઈ મિનારાને, થયા ખુશ બે મિત્રજનો,
જેઈ “પ્રેમભવન” તાજમલાલ, વારી ગયા બે સ્વજનો;
જેઈ કોતરકામ મોદિરાના, મુગ્ધ થયા બે પ્રિયજનો;
જેઈ “વિશાળભવન” પ્રતિનિધિઓનું હાથિક થયા બે
પ્રતિનિધિઓ.

પણ ન ખુશ થયા કોઈ,
જેઈ પાયાના પથરને.

★

“જન”

દિલીપ એમ. પારેખ
(બી. ઈ. સિવિલ)

પૂજે છે આ માનવ, ઊગતા સૂર્યને,
પૂજે છે આ માનવ, આવતી વસ્તીને,
પૂજે છે આ માનવ, ગુફા રક્ષીને,
પૂજે છે આ માનવ, શાન જમાવતે,
પૂજે છે આ માનવ, સુક્રમેને,
પૂજે છે આ માનવ, પુષ્પ ઝંઝારે,
પૂજે છે આ માનવ, સંસ્કૃતિને.

પણ નથી પૂજતો આ માનવ
એક જ દરિદ્રનારાયણને

★

“ગઝલ”

સોહાંકી ડી. જે.
(બી. ઈ. સિવિલ)

નગ્નકત આ જમાનાની હવે તદ આર લાગે છે.
કોકિલું શરીરને એ પણ લવે તો ભાર લાગે છે.
કદિ આ વાત પર ઊઠીને મુમતાઝ એમ જ કહેશે,
મને પણ કબરનો આ ભાર લાગે છે.
દદ દિલનું દુનિયાને બનાવી નથી શકતો
તમારી જેમ આવી સ્વપ્નમાં સનાવી નથી શકતો.
પડી જેટની આદત વિયોગ તેનો નીભાવી નથી શકતો.
બે ચાર દિવાં અમૃતનાં પચાવી નથી શકતો.
નજરમાં તમારી હુ મારી કલ્પનાને ખોળતો હતો.
પ્રિય મારી કલ્પનાને હુ દર્દથી કંકેળતો હતો.
પી પી કલ્પનાને, મસ્ત થઈને કોણતો હતો.
અને પીતો હતો તેથી વધુ તો કોળતો હતો.

★

“તૃપ્તિ”

સોહાંકી ડી. જે., (બી. ઈ. સિવિલ)

રસ્તો સૂમ સામ,
હુ પણ નિર્મત
ચાલ્યો જઈ છું.
...ત્યાં સુધી ચાલીશ,
પછી—
વળીશ કોઈ એક ગલીમાં,
અવાજ ગુંજશે;
હાથ, નેન ઊઠશે,
અને ચહેરાઓ ?
પ્રસરી જશે અવન અવન—
ભાવ દરેકનાં મુખ પર.

પણ,

હુ ચાલ્યો જ જઈ છું.
ધરતી સ્વપ્નમાં ઊઠે ઊઠે,
શું મેળવવા ?
મુગ્ધજ સમ તૃપ્તિ ?
ના...ના,
મોતને આપવા ભેટ જિંદગીની
વીંટળીને અરમાન સંગાથમાં,
ચાલ્યો જ જઈ છું.

★

“તુષણ”

દિલીપ એમ. પારેખ, (બી. ઈ. સિવિલ)

જે અને તું સાગર, તો હું બિંદુ;
જે અને તું સૂર્ય, તો હું કિરણ
જે અને તું નદી, તો હું ધાર;
જે અને તું ફૂલ, તો હું ગાળી;
જે અને તું ગુલશી, તો હું માળા;
જે અને તું આશ્ર, તો હું વિજળી;
જે અને તું સોરભ, તો હું સમીર;
ને જે તું અન્યા છે સર્વ,
તો હું અર્પું છું મુજને.

★

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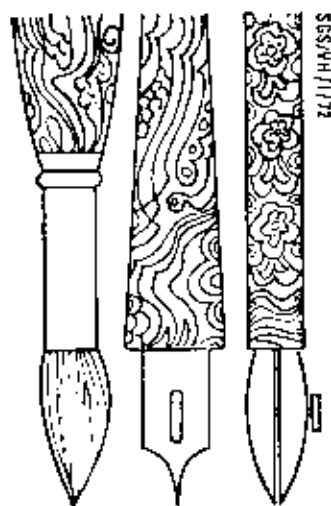
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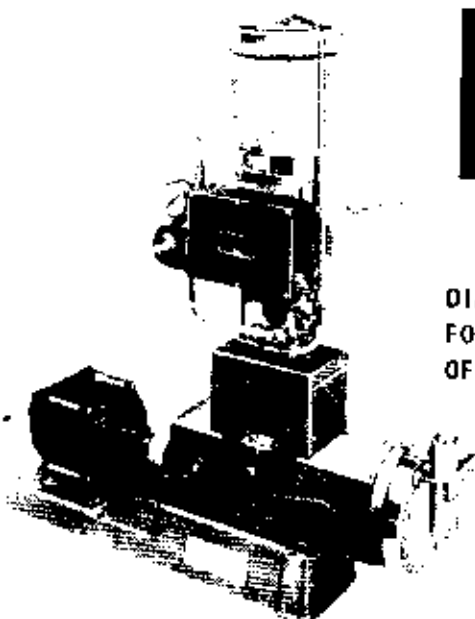
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