



BHARATIYA VIDYA BHAVAN

Sardar Patel College Of Engineering

ANDHERI, BOMBAY - 400 058



अमृतं तु विद्या

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CONTENTS



ENGLISH SECTION

	Page
Cover Design— <i>Arun V. Prabhudesai, B.E. (c)</i>	
Editorial	1
Principal's Report	3
Message from Chief Guest on Annual Day	6
General Secretary's Report	7
 <i>TECHNICAL.</i>	
Electric Rockets— <i>Balakrishnan R.</i>	9
Fast Breeder Reactors— <i>Nagpal Ashok and Muthurao Daljit Singh</i>	12
The Tenth Planet— <i>Rahul S. Melita</i>	16
Hints and Kinks— <i>Manik H. Naik</i>	18
What's Personality— <i>Duljeet Singh Mathurao</i>	19
Small Scale Entrepreneurship— <i>P. J. Shah</i>	20
City Beautiful— <i>Bhagwan K. Gurnani</i>	22
Costing of Flats—Interest Calculation— <i>Prof. L. L. Bhirud</i>	23
Television— <i>A. Vijaykumar</i>	27
Numerical Control of Machine Tool— <i>P. K. Viswanathan</i>	31
Wit-Bits— <i>Nagpal Ashok</i>	34
Treatment of Town Refuse— <i>D. D. Desai</i>	35
 <i>ENGLISH SECTION</i>	
Mother— <i>Vanco Iqbal</i>	38
The Three Students— <i>N. V. Kokade</i>	40
A Professional Way to Matrimony— <i>Raju B. Advani</i>	45
Race (Poem)— <i>Hemchandra S. Agashe</i>	47
Cricket (Poem)— <i>Hemchandra S. Agashe</i>	47
Wanted— <i>Manik H. Naik</i>	48
Beware of Cheat— <i>Manik H. Naik</i>	48
The Fateful Day of 26th January— <i>Panjabi M. A.</i>	49
Engineering Crossword— <i>Navroz Havewala</i>	50
My Tryst with an Estate Agent— <i>Navroz Havewala</i>	52

—मराठी विभाग—

हार्डट डच्टी	— अरण विश्वनाथ प्रभुदेसाई	54
एक भिकारी (कविता)	— शंखे आर. वी.	55
सनोगत (कविता)	— शंखे आर. वी.	55
सरदार पटेल यांच्या अहमदाबाद येथे 1930		
साली नगराध्यक्ष असताना केलेली काही		
महत्वाची कायें	— कालेंकर डी. टी.	56
स्वप्नप्रवास (कविता)	— गावस भास्कर भीमसेन	57
आल्या श्रावणसरी	— प्रदीप डी. प्रधान	58
'वेस्ट' वरा (कविता)	— ठाकुर एच. आर	59
कविता	— अजय त्रि. लऊढ	59
मनीषा	— धैर्यधर गोपाळ मांजरेकर	59

★

—गुजराती विभाग—

... .. અને આવતી કાલ	— વિજય સંઘવી	60
'કાન્તિકાલીની ખુમારી'	— ભરત ર. કોઠારી	61
ખોવાઈ ગયેલી સજની	— વિજય સંઘવી	61
છાત્રના દાખા (કવિતા)	— પ્રદીપ ગોસલ્લીયા	61
"મારી 'એ'" (કવિતા)	— મહેશ ડી. રાઠોડ	61
ખાસ (કવિતા)	— પ્રદીપ ગોસલ્લીયા	61
'આ' (કવિતા)	— ભરત ર. કોઠારી	61

★

—हिन्दी विभाग—

मिलो शादी करना सीखो (कविता)	— पंजाबी एम. ए.	63
क्या यही स्वराज्य मिला (कविता)	— पहरीआ विमल	64
मेरा नाम अँजीनियर ! (कविता)	— प्रदीप गोयनिश	64
गजल (कविता)	— बानू इकबाल	65

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REPORTS AND COLLEGE NEWS

Indian Games	66
Cine Club	66
Indoor Games	67
Wall Paper	68
Mountaineering	68
Bachelor of Engineering Examination Results	69
Advertisements	72



SARDAR VALLABHBHAI PATEL

(30.10.1875 to 15.12.1950)

...a friend and colleague and comrade on whom one could invariably rely as a tower of strength when revived wavering hearts ...

—Jawaharlal Nehru



Kulapati DR. K. M. MUNSHI
"CULTURE PERSISTS THROUGH TIME"



SHRI DIKRAMSEY M. KHATAV
Gen. President



SHRI SHANTLAL H. SHAH
Executive Vice President

Editorial

We are happy to place the tenth volume of the college magazine in your hands. A college magazine can be considered to reflect the creative talents of the students of an institution. It also embodies the academic and the extra-curricular activities in the institution.

Challenge and Opportunity

The difficult employment position regarding the engineering graduates throws a challenge to many fresh graduates. It also offers an opportunity to the society and entrepreneurs to explore hitherto unexplored areas. Attempts are being made to do a thorough job analysis in engineering industry and remold engineering education to suit the needs of the modern industry. The next decade will witness progress towards rationalisation and specialisation in many centres of education. In the centres of higher learning, the imperatives of knowledge being a unified entity, will have to be recognised and multidisciplinary approach be adopted, where needed.

Institutions with limited resources can be benefited tremendously, by studying the needs of the society around them. They could offer courses with immediate relevance and utility. They can also plan courses useful to up-grade the potential of those who are already working in industries, specialised courses and refresher courses to supplement university education could be thought of. "All those who wish to learn should be offered facilities to learn" could be a meaningful policy of those dedicated to the cause of education.

Our Honorary Director

We are extremely fortunate to have Dr. P. K. Kelkar as adviser to our institution. Dr. Kelkar was Director I.I.T. Kanpur and later Director I.I.T. Bombay. The Government of India awarded Padma Bhushan to him in recognition of his services to the Technical Education in India.

Those who have worked or came in contact with him know of his golden touch. His presence itself is inspiring. He took a part of his education in U.K. and was head of two institutions one sponsored by U.S.A. and other by U.S.S.R. We have in him a person who, with his first-hand knowledge of technical advancement and wisdom, will guide our institution to higher pinacles of glory. Let us hope we prove ourselves worthy of his wisdom and affection.

Towards Academic Progress

Prof. M.M. Ranade, Professor and Head of our Mathematics department was awarded Ph.D. degree in Mathematics by the University of Bombay. Our hearty congratulations to him. We also congratulate Prof. P.V. Parmeshwaran, Assistant Professor in Civil Engineering who has been sponsored by the University of Bombay for the U.N.E.S.C.O. sponsored post-graduate course on Hydrological Methods for Developing Water Resources Management. Prof. Parmeshwaran has proceeded to Budapest to undergo the course.

We hope that in future many more of our colleagues will bring fame to our institution and will receive encouragement in their advanced academic pursuits such as Research publications, participation in seminars and summer schools, Quality Improvement Programme etc.

Principal's Report

(for the year 1974-75)

Mr. & Mrs. Patel, Dr. P. K. Kelkar, Friends, Ladies & Gentlemen,

I am very happy to welcome to-day Sir J. V. Patel, President of New Standard Engineering and Smt. Patel to be with us for our College Day function. I am really grateful to them for agreeing to spare their valuable time. Mr. Patel requires no introduction. In Bombay, he is known as the pioneer of the Indian Engineering Industry but among educationists he is better known for his combination of engineering knowledge with engineering education. He has taken always very keen interest in advancement of technical education. He has been a member on Experts Committee of nearly every university in India and his contribution to technical education is truly great. I am really very happy that we have been able to persuade him to come for our function.

To-day I propose to submit a very short report about the achievements of this institution. Results of the University examinations held in 1974 are highly impressive in spite of the psychological tension introduced due to the inordinate delay in the conduct of the examination because of the railway strike. The results of this institution is as follows:

In B.E. (M) 78 students appeared. 21 students passed in First Class with Distinction, 48 with First Class and only two in Second Class. Percentage being 91 per cent. In B.E. (E) 85 students appeared. 13 came in First Class, 38 in Second Class, 1 in Pass Class. Percentage being 61 per cent. In B.E. (C) 48 appeared. 1 student passed in First Class with Distinction, 2 students in First Class, 22 in Second Class. Percentage being 96 per cent. In T.E. (M) 77 appeared. 22 passed in First Class

and 40 in Second Class. Percentage being 81.5 per cent. In T.E. (E) 67 appeared. 11 passed in First Class and 36 in Second Class. Percentage being 76.12 per cent. In T.E. (C) 51 appeared. 9 came in First Class, 29 in Second Class. Percentage being 82.35 per cent. In S.E. (M) 76 appeared. 17 came in First Class, 44 in Second Class. Percentage being 80 per cent. In S.E. (E) 76 students appeared. 2 came in First Class, 38 in Second Class. Percentage being 56.5 per cent. In S.E. (C) 51 students appeared. 22 passed in Second Class. Percentage of passing being 63 per cent. In F.E., 202 students appeared. 8 came in First Class, 85 in Second Class. Passing percentage being 51 per cent.

You would be happy to know that Shri Parikh Bharatkumar K. stood First in First Class distinction in the University of Bombay in B.E. (M) examination. He was awarded Merwanji Framji Pandey Scholarship for securing the highest number of marks on the aggregate among the successful candidates in B.E. (M) examination held in May 1974. Mr. Parikh was also awarded G. R. Tongaonkar Prize for securing the highest number of marks in the B.E. (M) examination. He is also awarded Jodha Lalwani Memorial Prize for securing the highest number of marks in the subject of Machine Design II. Besides these University awards, Mr. Parikh Bharatkumar is awarded Kulapati's Gold Medal for standing First with the first attempt in B.E. (M) by Bharatiya Vidya Bhavan.

Shri Pravinkumar Gala has stood First Class first among the students passing at the first attempt at the B.E. (C) examination of the University of Bombay.

Mr. Gala has been awarded by the University Pina. S. B. Junnarkar Gold Medal for securing highest number of marks in the subject of Theory of Structures III and Structural Design and Drawing II. He is also recipient of Jamshedji Dorabji Naegamwala Prize for securing the highest number of marks in the subject of Structural Design and Drawing II. Mr. Gala has also been awarded Dr. Theodore Cooks Memorial Prize for securing the highest number of marks on the aggregate in the B.E. (C) examination held in May 1974. Mr. Gala is awarded Kulapati's Gold Medal for securing the highest number of marks in B.E. (C) examination, by Bharatiya Vidya Bhavan.

Shri Hareesh Vadital Dani has been awarded the G. D. Daftari Gold Medal and Prize for securing the highest number of marks in the subject of Water Resources Engineering I and II taken together at the B.E. (C) examination by Bombay University.

The Rao Bahadur Rajadhyaksha Scholarship has been awarded to Shri Mukesh K. Sanghani of this college for standing First in T.E. (C) examination in the University. He is also awarded Kulapati's Gold Medal for standing First in T.E. (C) examination, by Bharatiya Vidya Bhavan.

Shri Parekh Suhrud P. has been awarded Kulapati's Gold Medal for securing First Class and the highest number of marks in B.E. (E) examination held in May 1974.

Kulapati's Silver Medal has been awarded to Shri Agboatwala Yusuf A. for securing the second rank at the first attempt in the college in B.E. (C) examination held in May 1974.

Kulapati's Silver Medals have been awarded to Shri Rao Mohan S. and Shri Dighe Shomir S. for securing equal number of

marks in First Class Distinction and standing Second at the first attempt in the college at the B.E. (M) examination held in May 1974.

Kulapati's Silver Medal has been awarded to Shri Sathe Madhusudan R. for securing First Class in B.E. (E) at the first attempt and standing Second in the college in the examination held in May 1974.

Shri Pruthvish Narayandas Killawala Prizes are awarded as follows:

Shri Mody Pankaj of F.E. Class for securing highest number of marks in the first attempt amongst the students of this college joining S.E. (E) class in 1974-75 (Rs. 100).

Miss Mahant Leena R. of S.E. (E) Class for securing highest number of marks in the first attempt amongst the students of this college and joining T.E. (E) class in 1974-75 (Rs. 100).

Shri Shah Parimal J. of T.E. (E) Class for securing highest number of marks in the first attempt amongst the students of this college and joining B.E. (E) class in 1974-75 (Rs. 100).

Shri Parekh Suhrud P. of B.E. (F) Class for securing highest number of marks in the first attempt amongst the students of this college in the University Examination held in April 1974 (Rs. 100).

Shripadrao Dubhashi Prize has been awarded to Shri Dalvi Pradip P. of T.E. (C) for securing highest number of marks in Building Design and Drawing in T.E. (C) examination held in May 1974 (Rs. 75).

Shri Yogesh Asher Scholarships have been awarded to Shri Khwaja M. Y. and Shri Sawant R. B.

MERIT PRIZES—1974-75, for standing First and Second at the first attempt:

Sri Maru Prakash B.	F.E.	I
- Thanawala Darpan	B.E. (E)	II
- Shirke Devendra P.	S.E. (C)	I
- Jain Rameshkumar S.S.E.	(C)	II
- Advani Raju B.	S.E. (M)	I
- Badami Raghuvver S.S.E.	(M)	II
- Mody Pankaj H.	S.E. (E)	I
- Devnani Ashok P.	S.E. (E)	II
- Shah Vijaykumar S.	T.E. (M)	II
- Arolkar Chandrabas M.T.E.	(C)	I
- Parab Prakash S.	T.E. (M)	II
Miss Mahant Leena R.	T.E. (E)	I
Sri Jaisinghani Amar	T.E. (E)	II
Sri Sanghani Mukesh K.	B.E. (C)	I
- Chokshi Umesh K.	B.E. (C)	II
- Shah Jitendrakumar N.	B.E. (M)	I
- Sadekar Gajanan K.	B.E. (M)	II
- Shah Parimal J.	B.E. (E)	I
- Zaveri Sudiq A.	B.E. (E)	II

A number of staff members have obtained the Master's qualification in engineering ~~and~~ this year. I am particularly happy to mention that Prof. M. M. Ranade, the Head of Mathematics Department has been

awarded the Ph.D. degree in Mathematics by the University of Bombay. It may be mentioned here that these staff members had not taken study leave for prosecuting higher studies. The UNESCO has selected Prof. P. V. Parmeswaran, Assistant Prof. in Civil Engineering for training at Budapest, Hungary in Hydrological Methods for Water Resources Management. He is the only candidate selected from the University of Bombay.

From this year, we have been fortunate in having the services of Dr. P. K. Kelkar, formerly the Director of I. I. T., Kanpur and Powai, on honorary basis to advise us in academic and administrative matters. His advice and guidance will be of immense help to this college.

I must thank the staff and students for the active co-operation extended to me without which the all round success could not have been achieved. I must also thank Shri Shantilal Shah, the Executive Vice-Chairman who has been taking a special interest in this institution in spite of being extremely busy. I am also thankful to members of the Governing Council whose guidance is available to me in all matters. I must not forget to mention my gratitude once again to our Dr. Kelkar for the help extended to me.

★ ★ ★

Advice From Mr. J. V. Patel to Students and Young Engineers on the Twelfth Annual Day:

We have received the following message from our Chief Guest which could be of immense help to our students. This message contains the noteworthy features of the speech delivered on the Annual Day.

Dear Prof. Dighe,

I thank you for your letter of 22nd April asking me to give a message as the Chief Guest on the Annual Day function for 1974-75. I am very happy to comply.

Sardar Patel was a great man who did immense good to our nation during his few years as Deputy Prime Minister. If he was alive our nation's progress would have been tremendous and India would have become one of the four great nations of the world instead of the present three. We indeed have talent, capacity to hard work, foresight and culture. We must make good use of the virtues that we have and due to this reason Sardar Patel's name given to this college is really proper.

I was one of the members of the Committee appointed by the University to go into the establishment of Sardar Patel College of Engineering by Bharatiya Vidya Bhavan Trust and I am happy to note that

the college has grown up to its present status to bring out engineering graduates in large numbers. I have also noticed that the calibre of professors and students was of a high degree which can match that of any good college in India.

My advice to the student graduates is to form a habit of hard and intelligent working without wasting any time. They should also form a goal which they should try to attain in life. Only by hard work one can grow out of the present state. We must also form a habit of saving for the future. If an organisation or a person spends 5 per cent more than the earnings one cannot avoid bankruptcy, but if one saves 5 per cent, he can grow from strength to strength and enjoy better life and help others by such an example.

Thanking you again,

Yours sincerely,
(J. V. PATEL)

★ ★ ★

s and
Day:

General Secretary's Report

I thank the students of our College for electing me with an overwhelming majority of 75%. This rare show of confidence was gratifying and I have always strived to live up to the high expectations behind this confidence. This report will indicate how far I have succeeded.

This year the rules for elections to the Gymkhana Committee were changed very radically.

1. Students who had not cleared all subjects in the previous year were barred from Class Representative elections.
2. All Secretaries were elected by C.R.s as before, previously, when they were appointed by the General Secretary.
3. The number of Secretaries was reduced to ten important portfolios, thus providing a compact team and an effective opposition within the Gymkhana Committee to the eleven student office-bearers.

I am thankful to Shri Shantilal Shah for his useful suggestions bringing the above changes.

This year the Cine Club started its activities first, and was a hit. For his sincere and successful work Mr. Naval Saigal was awarded the best secretary prize this year.

Our College won the Lions Club Cricket Shield this year. In Inter-College Cricket, we became Zone-Champions and went up to quarterfinals, where we were defeated by Raza College.

Our College became the Bombay Suburban Table Tennis champions for the second year in succession. Mr. M.E. Khairaj won the singles title for the third running year. We participated in an all-India Inter-Collegiate Festival of Competitions "Mood Indigo '55" sponsored by Bombay I.I.T.

Our team (Messrs. V. R. Malankar, Navroz Havewala, P. I. Rangnekar and Kishore Vasudev) won the first prize in College competition. Mr. Rangnekar also won the second prize in Poster Design.

Cultural activities began this year with the Evening Melody in September in which our student artistes entertained the students. The College Day was held on 22nd January. We had the honour of having among us as Chief Guest Mr. Jethabhai Patel, President, New Standard Engineering Co. Mr. Patel, in addition to being a leading technocrat, is also connected with Engineering Education. He played an important role in the founding of our College as a member of the Committee appointed by the University to examine the desirability to start this College. We are thankful to Mr. Patel and Mrs. Chunchalben Patel for gracing the occasion, giving us valuable advice and guidance and for distributing the prizes.

As College Day celebrations we also had a Film Show, a Musical Evening, and a Gujarati Folk Dance presented by the lady students of Elphinstone College. The Art Exhibition was an entirely new feature introduced for the first time for the College Day. I am thankful to the Elphinstonian girls dance troupe for the magnificent dance.

On the student welfare side, two new schemes have been started this year. The Ex-Students' Association, which was a long-standing demand, was inaugurated on 15th April when B.E. students were given the send-off party.

The details of the Book Bank Scheme, under which needy students will get books for use throughout the term, are being worked out. Efforts are also under way to secure more scholarships for our students through the office of Charity Commissioner, Government of Maharashtra.

The help given to poor students under the Poor Boys Fund Scheme this year will be seven times more than previously, under a new U.G.C. Scheme.

This report would be incomplete without a word of thanks to the secretaries and volunteers, without whose help this year could not have been the type of success for

the Gymkhana Committee as it has been. I am also thankful to the staff members and specially Prof. V. S. Chandrasekhar for guidance and help provided throughout the year and particularly during the College Day celebrations.

NAVROZ HAVEWALA
General Secretary.

★ ★ ★

On the door of a hostel student: "Do not disturb. Genius at work."

★ ★ ★

I offered to help an old man cross the road. He accepted, and took my arm.

He was impatient to cross, so I warned him that the lights were yet to change.

His face changed colour immediately. "Oh well," he said. "I can cross by myself on the green light."

★ ★ ★

A statistician can prove almost anything by quoting figures.

According to statistics a man with legs in a 100° oven and head in -5° refrigerator is, on the average, quite comfortable.

★ ★ ★

Switzerland, figures show, had the highest percentage of increase of unemployment in one year. In 1970, Switzerland had 34 jobless, and in one year the figure increased by an "alarming" 50% to 51%!

★ ★ ★

When it comes to spreading gossip, the female of the species is much faster than the mail.

NAVROZ HAVEWALA

it has been. I
members and
drashekhar for
throughout the
be College Day

HAVEWALA
Secretary.



Chief Guest

Shri J. V. Patel

'For Success, make Perseverance
your Friend, Experience
your wise Counsellor'

ANNUAL DAY



Now, it is your turn Sir, to receive a gift—a token of gratitude



Best Secretary Award to Mr. Saigal

11



Audience



An Award for Principal for—Skipper Teachers' XI

()



Thank you all for the kind Co-operation



'Rangoli'—A. V. Prabhudesai

ART EXHIBITION

A
Thing of Beauty is a
Joy For Ever

11
00

Wake up please.
The show is over



Our Students in English Drama

Electric Rockets

by: Balakrishnan R., B. E. (Electrical)

It can be a never to be forgotten event for those who witness the nerve wracking lift off of a rocket, like the Saturn which launched men to the moon. It is often referred to as a controlled catastrophe, as each of the five Saturn F-1 motors produces a thrust of 1,550,000 lb. for a period of two minutes. The chemical rocket motors have such a voracious appetite that 91 per cent of the launch vehicle weight is accounted for by propellents alone. They are used for placing the payload on the desired trajectory with no further application of propulsive power.

Electric propulsion systems provide considerable propellant economy and long periods of operation. As with any other motor, electric rockets derive thrust from the expansion of high velocity matter from the engine; only the thrust is usually in the order of a pound. Hence unlike chemical rockets, electric rockets cannot be launched directly from the earth. But in the near vacuum of space under infinitesimally small gravitational forces, a cluster of electric engines can accelerate a heavy spacecraft to very high velocities; and the small weight of the rocket provides for heavy payloads.

Types of Systems

Electric propulsion systems can be divided into three main classes—electrothermal, electromagnetic (or plasma) and electrostatic (or ion and colloidal thrusters). Electrothermal jets produce thrust when the propellant is heated and expands through the nozzle; the plasma jet accelerates ionized gas through a magnetic field; the ion and colloidal jets operate by the influence of an electrostatic field with ions and charged colloidal particles respectively.

Figures 1 and 2 illustrate two forms of electrothermal jets, the resisto jet and the arc jet respectively. In the resisto jet (Fig. 1) the heating element takes the form of concentric tubes which carry electric current, the propellant flowing between the tubes, or has a coiled wire heater. Among the wide range of low molecular weight propellents that can be used are hydrogen, helium, lithium, methane and ethane. The choice of the angles for the nozzle (from a 17-25° half angle range) of the rocket is critical in the rocket's performance. A recent version uses hydrazine as propellant which spontaneously decomposes if heated to 500°F and hence once started the reaction is self-sustaining and produces Specific Impulse of approximately 280 seconds. In the arc jet (Fig. 2) the working fluid is heated by a normal discharge between an anode and a cathode. Temperature in the thrust chamber and nozzle walls range from 500°K to 3000°K. Thus in an electrothermal jet, the heating of the propellant to high temperatures and ejection through a convergent-divergent-nozzle produces the required thrust.

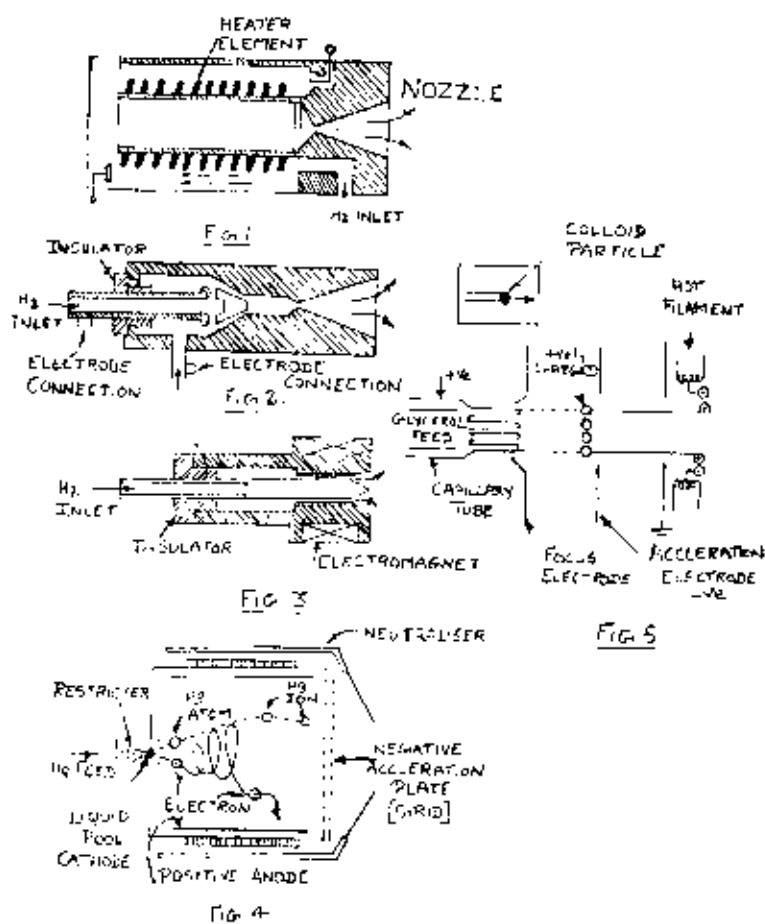
The second type of electric propulsion is the plasma jet which utilises a a.c. or d.c. accelerator or a pulsed plasma accelerator, the d.c. accelerator being the most developed. Among the several alternative systems the magneto-plasma-dynamics (MPD) arc jets are the most promising. A MPD arc jet illustrated in Fig. 3 uses Plasma accelerated by an electromagnetic field, the plasma source being an arc. Besides this thrust is derived also from electrothermal expansion of the plasma in an arc jet, the specific impulse being in the order of 600 to 5000 seconds. This form of propulsion

has not been as much developed as the other two forms of electric propulsion.

The next is the ion engine. A number of flight tests of this engine in space have already been undertaken and is reputed to give a very good performance. The ion-thruster is frequently a Mercury electron bombardment thruster, and unlike a plasma system which accelerates both positive and negative ions, the ion engine accelerates only positive ions by means of an electrostatic field. The principle of the motor is shown in Fig. 4 which depends on bombardment from cathode to produce ions of the working medium, namely, Mercury. One method uses electron bombardment from a thermionic cathode to produce ioni-

sation. The path of the electron is deliberately lengthened as shown, by the application of a weak magnetic field. Often Mercury pool cathodes are preferred. Positive Mercury ions produced by ionisation are accelerated towards a negative plate (a grid) and thrust (in the range of millipounds) is produced as the ions pass through the grid. They are then neutralised and stopped from reaching the negatively charged spacecraft.

Thrust from an electrostatic engine can be increased by the use of large particles, hence colloidal particles have been tried out as propellant— that is groups of molecules possessing an electric charge. As the particle size increases, so also the accelerating



the electron is de-
scribed, by the app-
etetic field. Ofte
are preferre
duced by ionis
is a negative pla
the range of mill
the ions pas
are then neutralis
ching the nega

atic engine can
large particles
been tried out
of molecules
As the par-
the accelerating

Fig. 5 shows a typical colloid
in which the working fluid is Glyce-
It is used to produce the colloidal par-
which are then accelerated as shown.

Many alternative systems of electric
propulsion have been worked out, each
with its own advantages and disadvantages.
One of the most interesting applications of interest, is in the raising
of a spacecraft, which has been put in-
to a low orbit by a conventional che-
mical rocket, to a higher one. The elec-
tric engine could burn for many days, weeks
or months, gradually moving the spacecraft
along a spiral path, increasing its
altitude. Another application is in the al-
timeter, station-keeping and position keeping of
satellites. Some communication satellites
are in a synchronous 24-hour equatorial orbit,
and must maintain both their altitude and
position above a point on earth. The gra-
vitational forces of the sun and the moon
and the asymmetric distribution of mass
about the earth's axis tend to move the
satellite towards lower points and settle

there. Though at present small mono-pro-
pellent rockets are being used to counter-
effect this tendency and keep the satellite
on station, for station keeping over longer
periods, electric engines would be more
suitable. Probably the original reason for
the development of electric thrusters was
for deep space probe in interplanetary
space where steady acceleration under small
thrust is essential, the flights lasting for
months or years.

Fundamental to all electric propulsion
systems is the power requirement. A very
powerful, light, compact generation system
is essential. A British engine of 0.066 lb.
of thrust requires 550 watts of power. So-
lar cell arrays covering 80 sq. ft. would be
required to provide this power in earth or-
bit. Nuclear sources also represent an
attractive solution for long life time and
high power levels, as for deep space probes.
But with the present development in these
fields, electrical engines will undoubtedly
be high up on the list of propulsion systems
for the future.

★ ★ ★

Two hippies after having a good lunch in a
restaurant walked out without paying the
bill. When questioned by the manager they
showed their backs on which was printed
"Stick no bills" and walked out.

BHAGWAN K. GURNANI
S. E. (Mech)

FAST BREEDER REACTORS

—Solution To Our Energy Crises.

Nagpal Ashok & Mathraroo Daljit Singh, T.E. (Mech)

"NO power is as costly as no-power". The often quoted adage that Dr. Homi Bhabha preached over a decade ago, has come true as evident from the experience of the past few months. There is today a greater awareness of the need to properly plan for adequate power for the future. In the years to come, nuclear power will be called upon to play an increasing largely role. The vital question is: how much and what type of reactor will meet the need?

All the commercial nuclear power stations operating in the world, at present, have thermal reactors. Like any conventional power station, these nuclear power stations consist of a heat source, steam boiler and turbo generator. In a nuclear station, the heat source is the nuclear reactor. The energy is produced by the fissioning of uranium atom caused by neutrons. Since neutrons are themselves produced in the fission process, a neutron chain reaction sustains a continuous series of uranium fission. The term 'criticality' means that optimum conditions have been established for fission to be maintained at steady rate. These conditions depend on actual distribution of fuel material, heat removing fluid, moderator etc.

Thermal reactors have one inherent drawback, they can "burn" only a very limited fraction (2 to 3%) of the total uranium available in nature. This is due to small percentage of U^{235} , in natural uranium and relatively small amount of plutonium that is produced in thermal reactors.

If the bulky moderator is eliminated and conditions are so arranged that a fission chain reaction is established by means of

fast neutrons alone; one gets a "fast reactor". The main advantage of this type reactor is the great improvement in neutron economy. Wasteful absorption of neutrons in fissile, structural, control and other materials is minimised. Thus 1 kg. of plutonium produces 50 per cent more energy in a fast reactor before being "used up" than in a thermal reactor. Fast reactors have the unique property that they can breed or produce more nuclear fuel than they consume, while continuously generating power at full capacity.

Concept of Fast Reactors

The fissile fuel inventory in a fast reactor is larger than in thermal reactors, but the physical size of the core is much smaller because of the absence of a moderator. While the principle of the fast reactor has been known from the very beginning of the atomic age (in an atom bomb the neutron chain reaction is maintained by fast neutrons), it is the small size of the core with resultant high power densities that has postponed technological exploitation of the potentialities of the fast reactor. The power density in the core of a typical large fast breeder power reactor would be 400 KW/litre, which is several times that in thermal reactors. Conventional coolants such as water are just not efficient enough to take away the enormous quantities of energy released in the small fast reactor core. Besides, the coolant has to be such that it will not slow down the high speed neutrons, nor absorb them in a wasteful manner. Only liquid sodium is found to fulfil the requirements of a practical and effective coolant for fast reactors. It has indeed proved to be very efficient and eco-

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Crises.

E. (Mech)

a "fast reactor" of this type of element in neutron absorption of neutrons and other 1 kg. of plutonium more energy "used up". Fast reactors that they can use fuel then easily generat-

a fast reactor, but much smaller moderator. reactor has beginning of the neutron by fast the core ties that of the. The ical large could be times that coolants enough ities of reactor be such a speed wasteful and to cal and It has and eco-

Sodium has very good moderating properties and low boiling point and does not require high pressures thus making the reactor vessel design less

In fast nuclear reactors there are several isotopes available. These are ^{238}U and ^{235}U . Of these only ^{235}U is found in nature. The other two, ^{238}U and ^{239}Pu , are man-made isotopes. In fact, plutonium is an altogether man-made element. Thorium is another material, plentifully available in nature. On absorption of a neutron, ^{232}Th becomes ^{233}U which is also a good material for nuclear power generation. These two reactions are important as they provide a means of converting the otherwise useless but plentiful supply of ^{238}U and ^{232}Th in nature into fissionable nuclear fuel.

The ^{235}U - ^{239}Pu cycle has particular importance for us since India has vast reserves (250,000 tons) of Thorium but only small supplies of uranium (30,000 tons). If we are to plan a long term nuclear programme for the late eighties and early nineties, the potentialities of the ^{232}Th - ^{233}U cycle has to be fully considered.

The operation of nuclear reactor, whether of the thermal or fast neutron type requires that we assemble a "critical mass" of fissionable material. The principle of the reactor itself does not require that fissionable material such as ^{235}U or ^{239}Pu be present in the reactor. But if we were to fuel the reactor with a mixture of fissile and fertile isotopes, in the course of reactor operation some of the fertile isotopes would be converted into fissile nuclei due to neutron capture. The ^{238}U yielding ^{239}Pu and ^{232}Th being ultimately converted into

The incentive for using a mixture of fissile and fertile isotopes is two-fold: (a) Firstly, the life of the fuel in the reactor is increased. This is a short term objective. As the fissile isotope gets "burnt", fresh fissile material is generated within the reactor itself, compensating to some extent the loss of the original fissile material. (b) Secondly, the long term objective is that the fertile isotopes ^{238}U and ^{232}Th get converted into ^{239}Pu and ^{233}U which can then be used to fuel new nuclear stations to generate more power.

If one were to look at the overall consumption pattern and flow of fuel in a breeder reactor system, whose breeding ratio is greater than unity, it would appear as if the fast reactor actually "burns" the abundantly available fertile isotope, while the fissile inventory constituting the basic critical mass of the reactor only acts as a kind of 'catalyst' and that too a special type of 'catalyst' that produces more of itself for use in other reactors! Herein lies the promise of fast breeder reactors.

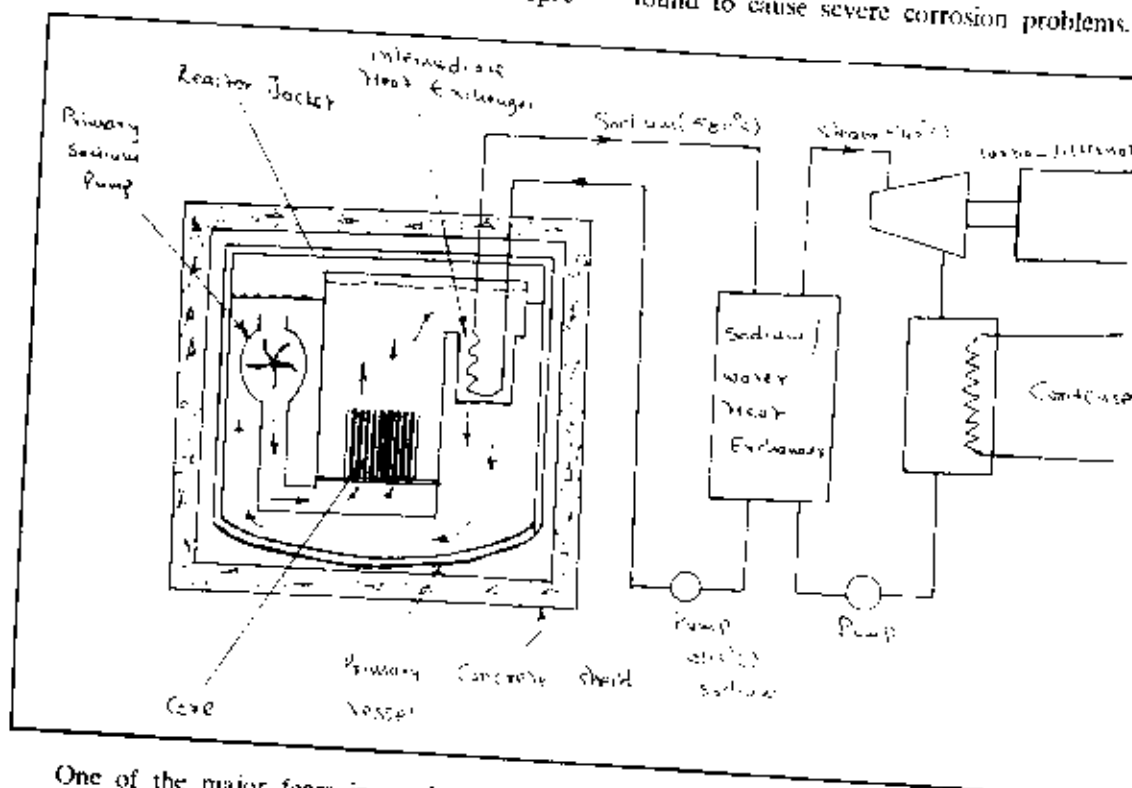
The Engineering Considerations

The technological challenge is to keep the breeding gain high enough to obtain short fuel doubling times. In other words the time required for one breeder reactor to produce sufficient extra fuel for starting a second breeder reactor should be low. With current concepts, doubling times achievable appear to be in the range of 15 to 25 years.

What are the engineering problems that have to be faced in designing and operating fast reactors that would, both generate power as well as breed new fissile material? It was mentioned earlier that sodium is almost unanimous choice for extracting the heat produced in the core. But sodium has never been used on any significant scale by industry before the advent of fast reactors. Sodium is a metal and is solid

at room temperature. Sodium is intensely radio-active while passing through the reactor core. Usually the hot sodium is circulated through the core in one or more primary circuits. The primary sodium passes the heat on to secondary sodium circuit in a heat-exchanger. The secondary sodium then transfers the heat to a final water circuit which raises steam for driving a turbine. Fig. 1 is a schematic repre-

sentation of a fast breeder power reactor. Sodium has great affinity for oxygen and water. There would be several tonnes of sodium in the reactor vessel and associated piping and all this has to be kept chemically very pure, specially oxygen free. Even very small quantities of dissolved oxygen of the order of a few parts per million, are found to cause severe corrosion problems.



One of the major fears in nuclear reactor operation is the possibility that coolant flow through any fuel sub-assembly, or section of the core would decrease or stop, altogether, for some reason. If this happens the fuel elements will over-heat and, in the worst case, melt. In a fast breeder reactor sodium flows between fuel pins through gaps less than a millimeter in size. Therefore it is necessary to ensure that small extraneous objects do not enter the circuit and block coolant flow in any region of the core. A sophisticated instrument has to be devised to sense if the sodium has

started boiling in local pockets of the core or if the fuel pins are getting over-heated.

The design of the secondary heat-exchanger where sodium flows on one side and water on the other is a particularly intricate job, considering the violent nature of the sodium-water reaction.

Apart from the above more or less conventional problems, the fast reactor designer has to face an altogether new problem peculiar to nuclear technology. This is the 'damaging' effect of fast neutrons on the structural materials and fuel elements.

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may be 4×10^{15} n/cm²/sec.
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This severe knocking com-
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components. Similarly, a pro-
at the forefront of fast breeder deve-
is the swelling of stainless steel
subjected to intense fast neutron
How much power can one extract
a given core before the reactor needs
The answer to some of these
will directly affect the economics
generated by fast reactors.

Advantages of Fast Reactors

Of the numerous engineering
that exist, today the fast breeder
is a 'Physicist's pipe dream'.
It will pass the pilot plant stage and is
in the direction of becoming a
economically competitive rea-

cooled fast reactors possess sev-
other attractive features as well. The
of power generated by them is so in-

sensitive to the cost of uranium or thorium
mixed that it has been estimated that even
very low grade ores can be economically
mixed and used. The efficiency of these
reactors in converting heat energy into elec-
tric power is greater than 40 per cent as
compared to the less than 30 per cent for
thermal reactors. This has a very favour-
able effect on the amount of waste heat
rejected to the environment. All the re-
actors are provided with suitable barriers
in the form of containment structures which
would not permit dangerous radio-active
materials to escape in the highly unlikely
event of a serious accident.

About half a dozen experimental sodium
cooled fast breeders producing power in the
range of 5 MW to 60 MW have been in
operation in the technologically advanced
countries for several years now. U.S.S.R.
has already commissioned a 250 MW
prototype fast breeder, and by the
end of this year 2 more such second gen-
eration prototype units would become op-
erational in U.K. and France. U.S.A.,
Germany and Japan also have ambitious
breeder reactor plans.

★ ★ ★

Medical specialisation has reached such
a stage today that patients have to diagnose
themselves to know which specialist to call.

★ ★ ★

A newly-wed remembered his mother-in-
law's birthday and telegraphed "Happy
Birthday Mother! May you live 100 more!"

Her iciness after that baffled him until
he caught sight of the telegram and saw a
zero had been left off the hundred.

★ ★ ★

All British passport holders are supposed
to be "under the protection of Her Brit-
annic Majesty."

Few of them however, know that the
Queen herself has got to have a passport
with the same wording.

THE TENTH PLANET

RAHUL S. MEHTA
S. E. (ELEC)

UNTIL the invention of telescope, only six planets were known to the astronomers. The outermost planet known was Saturn. When closer and closer studies of these planets were done with the telescope aided eyes, William Herschel, a wellknown astronomer, accidentally discovered a planet with his new, more powerful telescope, in 1781. It was named Herschel after his name, but later on it was named 'Uranus'. For the time being astronomers believed that that was the limit of the Sun's gravitational field to hold any more planets.

Astronomers of the eighteenth and nineteenth centuries, who wanted to study Uranus, mathematically calculated the would be position of Uranus in the sky. But when they pointed their telescope to that part of the sky, the planet, to their surprise, did not show up its face. They wondered, but could not explain the reason. Uranus was strangely not behaving as it should according to Newton's and Kepler's laws. In 1846, Leverrier, a French mathematician, happened to solve the riddle. He explained that there might be another planet outer to Uranus, pulling Uranus towards it and hence causing the trouble. From the extent of shift in the position of Uranus, Leverrier also calculated the possible path of the new planet. In the same year a German astronomer located the new eighth member of the solar system. It was named Neptune. A slight shift which remained unexplained, caused the discovery of the Ninth planet which was named Pluto. (However, only in 1930, the famous Lowell observatory in U.S.A. could confirm its existence.)

When techniques of astronomical measurements had advanced sufficiently so that delicate and accurate determination of positions of various objects in space

could be made, it was found that the planet Mercury was not behaving as it should. As determined earlier, the orbit of Mercury departs farther from a circular form than do the orbit of any of the other planets except Pluto. Mercury moves in its orbit with a higher velocity than does any other planet, reaching a speed of about 35 miles, second when it is at perihelion. The line of apsides of orbit of Mercury was found to be rotating slowly about the Sun. The axis rotated at the rate of 574 seconds of arc per century. This was considered to be the side effects of other nearby bodies. When all the possible causes were accounted for, it was found that 531 seconds of arc per century were explained out of 574 seconds of arc per century. The remaining 43 seconds of arc per century remained unexplained. This puzzled the mathematicians. The astronomers of nineteenth century felt that this unexplained drift ought to be the effect of a planet still undiscovered in the orbit between Mercury and Sun. They were certain of the existence of the planet though they had a name for it when and if it should be discovered. It was to be named VULCAN, the name of a Roman God controlling fire.

When unexplained motions of Uranus revealed the discovery of Neptune, the astronomers became more anxious to find Vulcan. However, nobody could find it. As it is, Mercury itself is difficult to study because of its closeness to the Sun. It is visible only 1.5 to 2 hours before sunrise and after sunset. If Vulcan existed, it would give more trouble because the closeness would shorten the vision time and the glare of the Sun would blur the image and make the detailed study more difficult. Yet it was necessary at least to know its existence to explain the excess drift in orbit of Mercury.

S. MEHTA
S. E. (ELEC)

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a French astronomer was study-
the Sun. While observing the solar
he saw a small tiny spot passing on
He thought it to be the occul-
of Venus. When he consulted his
he found that as neither Venus nor
was at that part, the beam could
be Venus or Mercury. He immediately
the theory of Vulcan. Now
of its existence. When he
his discovery Leverrier, a not-
of that time, went to meet
and verified his statement. Lever-
was also certain of the existence of
Vulcan. They together calculated necessary
of Vulcan.

After this striking discovery all the as-
tronomers started hunting for Vulcan at
various points in the sky, but it never
showed up. Even thereafter, nobody ob-
served its occultations on the solar disc.
In such discussion they arrived at a
conclusion that Vulcan did not exist. The
theory by the French Astronomer might
be that some other vagabond body in
orbit or perhaps an asteroidal body.
Some enthusiasts were hunting for
Vulcan in early mornings and evenings.

Einstein's general theory of relativity
gave convincing reasons for the excess
of the line of apsides. The great dif-
ference between the maximum and mini-
mum velocity at the nearest and farthest
from the Sun would cause such
a difference almost exactly the same amount
found. Hence, the sporadic search of
Vulcan which had been going on as a sort
of a hobby for many astronomers
was abandoned.

However, many astronomers do not dis-
miss the possibility of any more members
of our solar system. Some suggest a theory
that a vagabond planet is a member of the
solar system. It exists beyond Pluto at
about 'one thousand million' kilometers
from the Sun. They called it Planet-X.
Anyhow this assumption is purely hypo-
thetical. Even a strong mathematical sup-
port is also lacking besides any practical
support. Any unexplained thing in the cal-
culations lead scientists to such imagination.

Still the "tenth planet enthusiasts" were
not satisfied. During 20th century a new
search in "Unidentified Flying Objects"
(U.F.O.-so-called flying saucers) started.
To explain its origin, when the possibilities
of Mars and Venus were ruled out, some
scientists suggested that a sister planet of
earth moved in the same orbit but exactly
opposite to earth and hence forever hidden
from us behind the Sun. They named it
"Clarion". Immediately the problem was
taken to task. Further details of orbital
motions of this hypothetical planet Clarion
were calculated with the help of computers
at the U.S. Naval observatory. The
studies revealed that this planet could not
stay hidden! In about thirty years, because
of the perturbations from other planets, it
would peep out beyond the Sun's edge and
hence long before, astronomers would have
known, it was there. Thus the ingenious
notion of this hypothetical Clarion eva-
porated.

Thus ended the search of the tenth planet.
Till now the Sun seems to have planned its
family to nine but in future our new gene-
rations may witness an addition to the
family, either Vulcan or perhaps Clarion or
most probably the Planet-X.

* * *

HINTS AND KINKS

MANIK H. NADIA
F.E. I.

Neon Bulb for Checking Parasitics

ONE characteristic of neon bulbs is that the glow has a different colour at different frequencies. Below a certain frequency the colour is orange to red and above it the colour becomes violet or purple. This characteristic is handy if you want to check for parasitics, particularly very high frequency parasitics. Most of the tubes used in radio frequency amplifiers these days, pentodes and tetrodes, are very likely to have very high frequency parasitics. In fact, unless something is done to suppress parasitics you can almost be certain that such an amplifier will have them. If a neon bulb is held near the plate circuit of an r.f. amplifier and it glows with a violet or purple glow, you know you have a v.h.f. parasitic. Be sure that you are using a neon bulb for such checks. There is another type of glow lamp that is filled with argon gas which has a purplish glow. These bulbs carry the "AR" designation.

Dial Lamps as Indicators

Another good indicator for r.f. power is the common dial lamp. A good example of this is a simple device called a tune-up loop. This consists of a dial lamp connected in series with a loop of wire. When the loop of wire is coupled to the coil of a tuned circuit, and that circuit is resonated, power is coupled to the loop of wire causing current to flow in the loop. The lamp will light, giving a visual indication that the circuit is actually tuning. Depending on the type of dial lamps used this can be an extremely sensitive device.

These are just a few of the uses for dial lamps and neon bulbs. You'll probably discover many more by yourself.

Don't Throw Away those Tubelight Starters

Solid research has recently brought forth the fact that even waste can be converted

into invaluable useful products which utility sometimes even surpasses the quality of products made from fresh raw materials.

Talking about tubelight starters, let us see what is inside that aluminium can. You may easily be able to salvage an old starter from an electrical store by removing the metal can by defastening the small metal flaps on the bakelite disc containing the two terminals. Inside you will find a small bulb-like envelope. Wrap a piece of cloth round it and with a pair of pliers crush the envelope slowly and with care. Be careful not to damage the inside. When the glass envelope has been removed you will find two strips of different metals connected to the terminals. One of the strips will be straight while the other will be U-shaped. The two strips will be separated by a thin gap. In parallel with the bi-metallic strips you will find a condenser usually an aluminium foil or a ceramic one. In starters the trouble is usually due to a defective condenser. Filter the condenser if it is leaky or it is shorted. Clip off the leads to the condenser carefully. Now with a condenser-less starter you can do a number of things.

Connect the starter in series with a lamp and battery. Now you can surprise your friends. Bring a lighted match near the bi-metallic strip of the starter. And behold! there is light. Blow against the strip with your mouth and the lamp goes off. You can use this device to see the time of your wall-clock when you get up at night. The starter can also be used as a heat sensor. This can be used for your soldering iron to prevent overheating. The circuit can be wired by connecting a starter, red glow lamp or relay in series. The soldering iron must be kept near the bi-metallic strips.

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the iron gets overheated it either
a lamp or rings a bell as a warning
a relay which can be used to
off the current. Control of tempera-
be achieved by enclosing the starter
a metal box with an adjustable window
can be used to time the relay or

This device is extremely useful in pro-
longing the life of soldering iron elements.
The second next time you get a tubelight
don't shove it in the bin.

Painting

A hurdle which obstructs the ex-
terior is chassis painting. You obvious-
ly cannot paint a chassis with a brush and
the average man a spray painting set is

beyond reach. But don't be dejected. You
still can get that professional look for your
projects if only you have mosquitoes and
cockroaches in your house and the only
thing you need is a spray-pump used for
spraying flit. Yes, this spray-pump can be
used as a very efficient painter. Get a spray-
pump (a new one will be better because it
will save your time cleaning an old one)
some paint which you prefer to coat your
chassis with and some thinner. Mix about
50 ml of paint to 30 ml of thinner to get
a thin mixture. Fill your pump with it and
spray at a distance of about 6 inches from
the chassis. Spray in even amounts every-
where and avoid forming paint-drops on the
chassis. To get best results you will have
to spray paint your chassis at least three
times.

★ ★ ★

WHAT'S PERSONALITY

PERSONALITY is the outward, or
the surface expression of your inner
self—the inner you."

It represents a medium of communica-
tion. It includes the combination of many
things. The way you walk, the way you
dress, eat, talk, the tone of your voice,
facial expressions, what you say, how you
say it; your habits and ways of doing things,
your mannerisms, the way you express or
control your emotions, your attitudes to-
wards yourself and others, your desires,
your dreams and ambitions, your likes and
dislikes, what you believe and disbelieve,
your ability to love and to be loved, your
capacity to survive misfortune, all these
things and more constitute the total you.

DAJEET SINGH MATHRAROO

T. E. (Mech)

★ ★ ★

SMALL SCALE ENTREPRENEURSHIP

P. J. SHAH
B.E. (Elec)

ENTREPRENEURSHIP is the process of choosing a challenging future and of establishing the enterprise for making that chosen future a reality. An entrepreneur is the agent for building-up people making people more productive. With millions of people unemployed in India, there are unlimited opportunities, all around. After being a successful entrepreneur you would enrich not only yourself, but your country; you can add to the happiness and welfare of your family and also benefit many others, including those whom you employ.

You must have started questioning yourself how to become an entrepreneur? What about finance? and what about experience? In this context I must quote the examples of Tatas and Birlas. They are entrepreneurs. But one need not be as large an entrepreneur as Tatas and Birlas to start with. Depending upon the availability of resources an entrepreneur can start an enterprise. Even large entrepreneurs need an infrastructure or ancillaries of small entrepreneur to support them. It is with this aim that our State and Central Governments are encouraging Small Scale Industries and Ancillary Industries.

According to the present definition by Government of India, an industry is considered to be in small scale sector, if the investment on plant and machinery does not exceed Rs. 7.5 lakhs (Rupees: 10 lakhs in case of ancillary industry).

An individual who wants to establish a small scale industry, as defined above, must know various institutions and organisations set up by the Government to provide assistance to small scale industrial entrepre-

neurs in Maharashtra State. Following institutions provide financial assistance:

1. *M.S.F.C. (Maharashtra State Financial Corporation)*

Advances loans up to Rs. 10 lakhs at concessional interest rates and repayable on easy instalments for the purchase of land, building, plant and machinery.

2. *S.I.C.O.M. (State Industrial and Investment Corporation of Maharashtra)*
Offers capital participation scheme and cash incentives if industry is started in the specified under-developed regions of Maharashtra State.

3. *N.S.I.C. (National Small Industries Corporation)*

Supplies indigenous as well as imported machinery on hire purchase basis.

4. *Banks*

Commercial banks finance suitable entrepreneur schemes.

They give over-draft of 70 to 75 per cent of the value of raw material and semifinished goods. They also finance for working capital by several other means, such as Bill Discounting.

For fixed assets, they offer term loans of 50 to 60 per cent value of the fixed assets.

In case of technical entrepreneurs, personal loan is also being granted in selected cases.

Also there are following institutions set up by the Central and State Governments

FIRSHIP

P. J. SHAH
B.E. (Elec)

Following In-
assistance:
State Finan-

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small scale industries in the aspects
know and marketing.

S.I.C.O.M. (Director General of
Small Scale Industries)

It is a very good agency through which
small scale entrepreneurs can market
their products on a preferential price
basis under the G.S.P.P. (Govern-
ment Stores and Purchase Programme)
regulation.

S.I.S.I. (Small Industries Service
Institute)

As the name suggests assists and guides
the small scale industrial entrepreneurs
in number of respects:

It guides in the selection of location,
and suitable raw materials and machi-
nery.

It registers the entrepreneurs and en-
ables them to participate in the Cen-
tral Government Stores and Purchase
Programme (G.S.P.P.).

It provides the technical know-how,
such as designs and drawings of the
products, making tools, dies, jigs, fix-
tures etc.

It renders advice on how to achieve
optimum utilisation of men, material
and machines, through scientific man-
agement techniques.

It arranges for the training of mana-
gers, supervisors and workers.

M.S.S.I.D.C. (Maharashtra Small
Scale Industries Development Corpora-
tion)

Assists in exporting products, import-
ing bulk materials for small entrepre-
neurs and development ancillary units.

4. S.I.C.O.M.

In addition to the financial assistance
described earlier, arranges to carry out
project investigations bearing 75 per
cent of the expenses incurred.

In order to achieve the assistance from
the different organisations a streamlined pro-
cedure is set up for the ease of work. A
government department called the Directo-
rate of Industries scrutinises the application
as per the standards laid down by the Gov-
ernment, and registers small scale entrepre-
neurs on the small scale industries list. A
registration number called S.S.I. registra-
tion number is assigned to every small scale
industry. The S.S.I. number enables the
small scale entrepreneur to get a favourable
treatment with less cumbersome procedure
from several central agencies set up by the
government. Hence it is very essential to
get the S.S.I. registration number.

The procedure, if followed properly does
not take more than a few weeks. The ap-
plication, to get the S.S.I. registration
number, is to be forwarded to the Director
of Industries in the standard proforma. To
avoid delays, the standard proforma must
be filled in bearing following few points in
mind.

1. Industry must be in the approved zone.
2. The import content of the product must be ascertained and justified.
3. Requirement of scarce or controlled indigenous raw materials must be estimated on a justifiable basis.
4. The marketability i.e. the demand in the country should be estimated reasonable for a few years.
5. Documentary evidence of premises on the name of the company must be provided with the application.

6. Avoid being sub-tenant.

7. Give information asked to the point. Unnecessary details may delay the consideration of your application, as more material then becomes available to raise the point of objection.

8. Wherever required give the statistical figures with the references from where the data is obtained.

Addresses of Institutions which may prove useful to an entrepreneur are given below:

1. Maharashtra State Financial Corporation.

United India Building, 1st Floor,
Sir P. M. Road,
Bombay-400 001.

2. State Industrial and Investment Corporation of Maharashtra,
Nirmal,

Off Nariman Point,
Bombay-400 020.

3. National Small Industries Corporation
Prestige Chambers,
Kalyan Street,
Bombay-400 009.

4. Small Industries Service Institute,
Directorate of Industries,
Sachivaya Annexe,
Bombay-400 032.

5. Maharashtra Small Scale Industries
Development Corporation,
'Laghu Udyog Bhavan',
Sewree Koliwada Road,
Sewree,
Bombay-400 015.

6. Maharashtra Small Scale Industries
Development Corporation,
'Kripamidhi',

9. Walchand Hirachand Marg,
Ballard Estate,
Bombay-400 001.

★ ★ ★

CITY BEAUTIFUL

To keep the city clean,
Should be every citizen's dream,
Waste thrown in it's proper place,
Where mice cannot trace,
Will make the roads clean,
Gardens and lawns look natural green,
Make it a practice, don't be so mean,
O' Citizens! This is for your sake,
Please awake,
Beautiful the city,
Promise you will make.

BHAGWAN K. GURNANI
S. E. (Mech)

PROBLEM OF FLATS – Interest Calculation

Prof. L. L. BHIRUD

Head of Civil Engineering Department

CO-OPERATIVE housing societies have sprung up like mushrooms in cities today. This is but natural as the middle class person is unable to buy property (good will money) or ex-cessive deposits for living accommodation. To have an ownership flat is not a luxury but sheer necessity. Co-operative housing societies are playing a major role in meeting the demand for housing today. These societies are not however sailing smoothly. They have their problems, most of which revolve round monetary matters. In some cases, are no doubt complex but not difficult to solve amicably. The main problem pertains to interest calculation for the various flats. It is proposed to deal with this problem here.

How and why does this problem of interest arise? The problem arises due to the following factors.

- (1) The societies construct more than one building simultaneously. The construction actually spreads over many years during which prices fluctuate widely.
- (2) The various buildings are not similar to one another.
- (3) Any one building may contain flats having different pattern and size.
- (4) Some flats, may be in one building or different buildings, are completed earlier and handed over to the registered members while other members booked for flats of different pattern or size have to wait longer.

- (5) Some members join and leave the society even before they get possession of a flat.
- (6) Some members leave the society after staying in a flat for some time.
- (7) Members leaving a society are not permitted to sell their flat to any outsider at market price. They may be required to surrender it to the society at a low price, inspite of market appreciation, arbitrarily fixed by the society.
- (8) Some members get ready possession of a flat on joining.
- (9) Members joining late may be required to pay donation arbitrarily fixed by the society.
- (10) Some members pay more than others.
- (11) Some members pay the instalments regularly, while others do not.
- (12) Some members pay earlier than others.
- (13) Some members pay a big sum in advance instead of paying small.
- (14) The payments made by members may not bear the same ratio with the cost of flat in the case of each member.

It will be seen from the above that it is not fair to charge equal amount of in-

interest even to members in possession of similar flats. Members who pay more or who pay big sums in advance should be required to pay less interest than others occupying similar flats. Similarly members who contribute to cost proportionately more than others (may be occupying flats of different size and pattern) need to be charged less interest. All this is fairly simple to understand. But the crux of the problem is how to fix the exact incidence of interest to be borne by a member. Is it possible to do justice to each and every case. We have evolved the following formula to solve the problem.

FORMULA :

- (1) The society should treat the contributions, including monthly payments, made by the members from time to time as loan advanced to it for meeting the various expenses. This loan will be treated on par with loan taken from outside agencies or parties. It will bear an interest at least equal to the minimum rate of interest being paid by the Society to any outsider. The contribution plus the interest to date gives the total amount to the credit of the member. To simplify calculations, interest may be calculated at a *simple* rate and not a compound rate, monthly on the total contribution on
 - (i) the last day of the previous month or
 - (ii) the 6th day of the present month or
 - (iii) the last day of the present month.
 As calculations on the day basis are humanly impossible, they may be done month by month as suggested.
- (2) The expenses incurred by the Society on a flat from time to time (excluding the interest paid for it) will be written out item by item to date. This will cover the cost of construction, cost of land, taxes, maintenance charges, cellaneous charges, etc. Let the of such expenses divided by the expenses on all the flats of the Society be $r : 1$. Such ratio should be for each month.
 - (3) The interest to be debited to a equals r times the total interest payable paid by the Society in any month.
 - (4) The aggregate of the expenses plus interest forms the total cost of the to date.
 - (5) The amount to be recovered from existing member is equal to the total cost of his flat (as 4 above) minus the total amount to the credit of the member (as in 1 above).
 - (6) In the case of a new member the amount to his credit is zero. Hence he must pay the total cost as in 4 above. The Society has however the right to recover more from him if the general price level has risen during the time of construction or after the inception of the Society. The additional amount charged will cover the increase in land price as well as the increase in cost of construction.
 - (7) A member who resigns before occupying the flat (under construction) may be charged only taxes, maintenance charge miscellaneous expenses, plus the excess of interest debited to the flat over the interest earned by him on his contribution. The amount so charged may not be again recovered from a new member coming in his place.
 - (8) A member who resigns after occupying a flat may be charged as in 7 above. The Society may also recover depreciation charges unless these are more than compensated due to rise in the general prices.

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etc. Let the ...
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debited to a fl ...
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...y in any month ...
...expenses plus th ...
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...member the ...
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...as in 4 above, ...
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...before occupy- ...
...struction) may ...
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...ce.

...occupying ...
...in 7 above, ...
...deprecia- ...
...more than ...
...the general ...

...the business and simplicity of ...
...we consider a few examples.

...otherwise stated that:--
...A occupies flat A,

...B occupies flat B,

...expense on flat A in a year ...
...Rs. 30,000 (excluding in- ...
...).

...expense on flat B in a year ...
...Rs. 20,000 (excluding in- ...
...).

...the rate of interest is 12 per cent ...
...per annum,

...the Society is personified as a ...
...builder.

...year, and not a month, is taken as a ...
...unit of period.

...Example 1:
...A builder borrows Rs. 50,000 from the ...
...and builds flats A and B in one year. ...
...the interest to be charged to each ...

...It is clear that the builder borrows ...
...30,000 for flat A and Rs. 20,000 for ...
...from the bank. He has to pay ...
...500 interest to the bank. He debits ...
...300 to flat A and Rs. 200 to flat B and ...
...these amounts from members A ...
...B respectively.

...Example 2:
...Members A and B pay advance of ...
...Rs. 30,000 and Rs. 20,000 to the builder at ...
...beginning of the year. At the end of ...
...year the builder gives possession of flats. ...
...they have to pay any interest?

...Here the builder is not required to ...
...money from the bank. He gives ...

the members, flats worth the advances exactly. Hence he does not charge any interest to any body.

Example 3:

Members A and B pay advances of Rs. 20,000 and Rs. 30,000 respectively. How much interest should they be charged

Here the builder is using Rs. 10,000 of member B for completing the flat A. Hence member A must pay an interest of Rs. 100 to member B.

Let us apply our formula here. The advances are treated as loan. The builder pays interest, Rs. 200 to A and Rs. 300 to B. The total interest of Rs. 500 is recovered from them in the ratio of expenses incurred on their flats, i.e. Rs. 300 and Rs. 200 respectively. The result is as before.

Example 4:

Let the advance amounts of A and B be Rs. 20,000 and Rs. 15,000 respectively. The builder must borrow Rs. 15,000 from the bank. Calculate the interest to be borne by A and B.

The builder must recover interest on Rs. 10,000 from A and on Rs. 5,000 from B and pay the same to the bank. A pays Rs. 100 and B, Rs. 50.

Using our formula, the builder pays interest of Rs. 200 to A, Rs. 150 to B, and Rs. 150 to the bank. The total interest of Rs. 500 is then divided among A and B in the proportion of the expenses, i.e. Rs. 300 for A and Rs. 200 for B. The result is again as before.

Example 5:

Assume now that the builder is unable to estimate the costs of flats correctly in advance and hence borrows Rs. 60,000 from

the bank. Obviously then he charges the interest on this whole amount to A and B in the proportion of the expense. A has to pay Rs. 360 and B, Rs. 240.

Example 6:

Let the advance amounts of A and B be Rs. 20,000 and Rs. 15,000 respectively, and the loan from the bank be Rs. 25,000. The builder pays interest of Rs. 250 to the bank. What is the share of A and B?

The advance amounts fall short by Rs. 10,000 and Rs. 5,000 for the two flats. The builder cannot afford to recover interest only for these amounts from the members, for he has to pay interest on Rs. 15,000 to the bank. So he first charges Rs. 100 to A, Rs. 50 to B. The remaining interest amount of Rs. 100 is then debited in the proportion of the expenses, i.e. Rs. 60 for A and Rs. 40 for B. Thus A pays Rs. 160 and B, Rs. 90.

Using the formula, the builder pays Rs. 200 to A, Rs. 150 to B, Rs. 250 to the bank and recovers Rs. 360 from A and Rs. 240 from B, giving the result as before.

Example 7:

Let the advance amounts of A and B be Rs. 20,000 and Rs. 30,000 respectively, and the bank loan is Rs. 10,000. Calculate the interest. Using the formula, the builder pays interest of Rs. 200 to A, Rs. 300 to B, and Rs. 100 to the bank, after recovering interest of Rs. 360 from A and Rs. 240 from B. Thus A pays net Rs. 160 out of which Rs. 60 go to B, and Rs. 100 to the bank.

Example 8:

Let the advance amounts from A and B be Rs. 40,000 and Rs. 30,000 respectively. The builder obtains a loan of Rs. 10,000 from the bank for emergency or future requirements. Calculate the interest.

As the loan is obtained for future requirements of A and B, they must share the interest, even though the expenditure on the flats during the year is only Rs. 30,000 and Rs. 20,000 respectively. Here the logical solution is to treat the advances as loan and use our formula. Thus the builder pays Rs. 400 to A, Rs. 300 to B, and Rs. 100 to the bank after recovering Rs. 480 from A, and Rs. 320 from B.

Example 9:

Let the advance amounts of A and B be Rs. 40,000 and Rs. 5,000 respectively. The builder spends Rs. 50,000 and Rs. 10,000 on them after borrowing a loan of Rs. 15,000 from the bank. Calculate the interest.

It is clear that A must pay on interest of Rs. 100 and B, Rs. 50. Note that these interest figures are the same as those in Example 4 above. Even though the advances and expenditure vary greatly because the external loan obtained for each of them is the same.

Conclusion:

It will thus be seen that the formula is helpful in solving each and every type of problem by following a simple procedure in which advance are treated as loan and the total interest is divided among the members in the proportion of expenses incurred on them. The net interest recovered from them exactly equals that to be paid to the bank.



TELEVISION

TRANSMISSION AND RECEPTION

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Television is classified into two heads such as Television Transmission and Television Reception. This paper is an elaboration on this topic here. It is divided into two parts, the black and white Television System, though the advancement in colour TV spreads well into the realm of Television Systems.

T.V. Transmission covers the subject of Picture Signal, the Sound Signal and Control Signal which is then mixed with Control Signal and transmitted through a suitable antenna.

The transmission frequency in T.V. belongs to the V.H.F. and U.H.F. regions of the frequency spectrum. The process involves complex electronic circuits.

T.V. reception calls for the recovery of Picture Signal, Sound Signal and the Control Signal and their separation from each other. These signals are suitably shaped and processed and are applied to various electronic circuits and systems for the reproduction of picture and sound which is being transmitted.

T.V. Transmission:

The equipment required for T.V. Transmission are located in (i) Studio (ii) Control room and (iii) Transmitter room.

The studio contains T.V. Camera operated by the cameraman operating under instructions from the control room operator. Also the Audio System or the part thereof is located in the studio. The control room locates the necessary electronic equipments to control the T.V. Camera, a T.V. Monitor and other Audio Control Systems. The transmitter room contains

Video amplifier, Audio power stages, the Diplexer and output stage to the antenna. It also locates Modulators, Frequency Multipliers, Amplifiers, Pulse generator, etc.

The T.V. camera stores the optical image of scene being transmitted, by the virtue of the chemical coating in it which is then processed into a corresponding, timed electrical voltage signal by the scanning beam of electron which continuously deflects vertically and horizontally by suitable voltages. Output of the camera represents a true image of the scene at the studio.

The picture signal is amplitude modulated and the Sound Signal is Frequency modulated. The frequencies involved and the scanning pattern of the camera etc. are standardised.

The T.V. Transmission can be effectively understood by referring to the block diagram given in Fig. 1.

The signal flow is indicated by the arrows.

Audio System:

The microphone picks up the sound and produces the Sound Signal which is then amplified and fed to a Resonance Modulator circuit. The modulator and Sound Carrier Oscillator work in conjunction with each other. The modulator varies the frequency of the carrier Oscillator and its output becomes Frequency modulated. The wave forms are indicated in Fig. 1. The output is amplified in a Power amplifier which is then fed to the antenna through Diplexer. Diplexer is an electronic switch which connects the Audio and Video Signals to the antenna alternately.

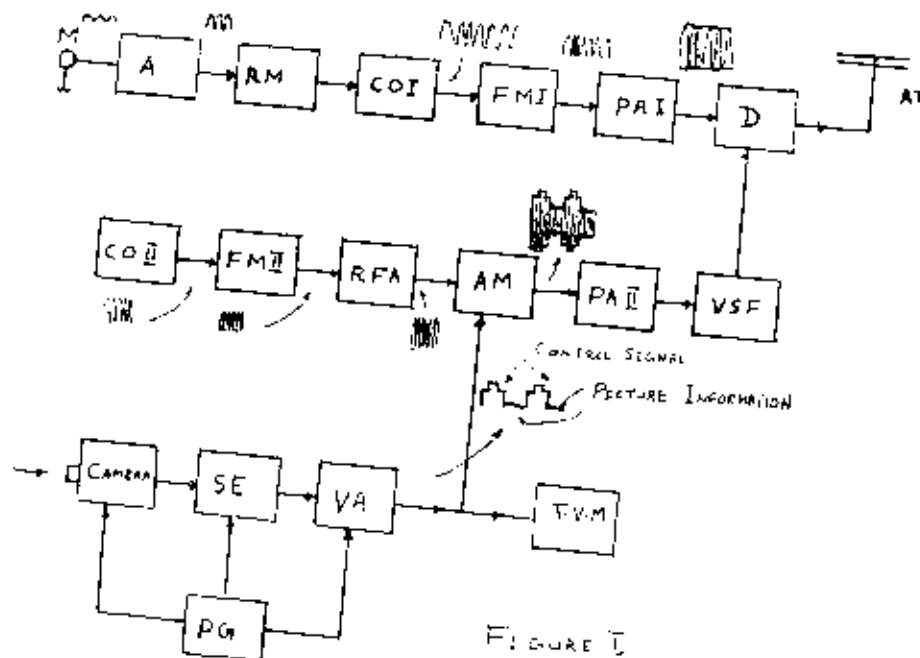
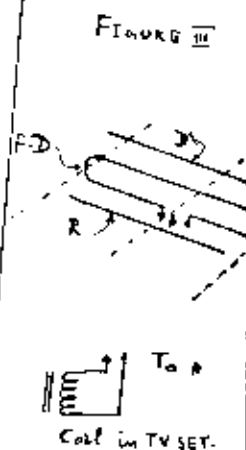


FIGURE I
T.V. TRANSMISSION



The Video System:
Camera gives the Video output which is fed into Amplitude Modulator. Camera output also feeds a T.V. Monitor in the control room. The vertical and horizontal deflection of the electron beam in the camera is controlled by synchronously acting sawtooth current waveforms fed into the camera deflection coils. Control pulses such as vertical blanking pulse, horizontal blanking, synchronising pulses, equaliser pulses are added to picture signal in the Video amplifier. All pulses are timed and controlled by the pure generator. All frequencies involved must be highly stable to achieve best results. Carrier Oscillator gives sinewave output which is multiplied in a frequency multiplier. This voltage after further amplification is fed to the Amplitude modulator. The Video voltage varies the amplitude of the V.H.F. sinewave of the oscillator and resulting

amplitude modulated Video Signal is transmitted to the antenna Via Diplexer. The waveforms at various points are indicated on the diagram I. The vestigial side band restricts the bandwidth of the transmitted signal as required. Antenna, in effect, is an LC circuit tuned to the required bandwidth. At high frequencies L and C appear as lengths of conductor spaced at distances which are functions of the transmitted frequency. The radiated energy from the antenna is oriented parallel to the earth's surface and can travel only in straight line. Hence to cover a wide area, the transmitting antenna is mounted at a very high tower. The connection from diplexer to antenna is effected through a matched cable length filled with inert gas.

T.V. Receiver:

A system of T.V. Reception is depicted as in Fig. II. The antenna receives the

FIGURE III

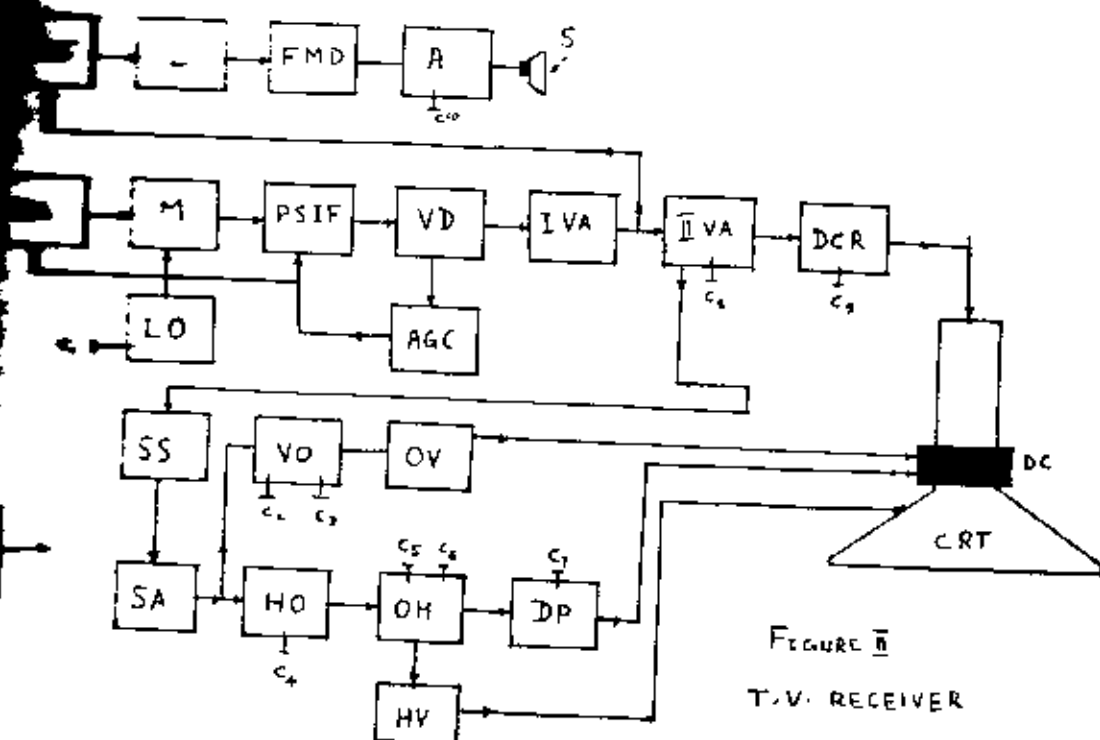
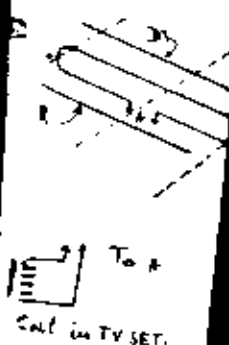


FIGURE II

T.V. RECEIVER

picture and sound signal and conversion into electrical voltage the signal is amplified in a Radio frequency amplifier. This output is fed to a mixer. The mixer also receives sinewave signal from a Local Oscillator which has control C_1 to tune in of channels desired. The mixer is a nonlinear device which combines the Modulating frequencies of both picture and sound signals. The output consists of different intermediate frequencies of picture and sound signals. This signal is fed to the Video detector. Here the picture signal along with control signals is separated along with Frequency modulated sound IF signal. First Video amplifier amplifies the Video Signal gives it to 2nd Video amplifier. Sound Signal "take off" takes place after the 1st Video amplifier. The 2nd Video amplifier gives the desired amplification level to the picture signal. Control C_2 of this unit is the contrast control which alters the gain of that stage. A Restorer circuit leads to the d.c. level control of signal which the brightness con-

trol C_3 . After this point the picture signal is applied to a suitable terminal of the Cathode Ray Tube.

An automatic gain control incorporated into the Video detector prevents the effect of signal fading by feedback effected to IF stage and RF amplifier as shown in Fig. II.

The separated Sound Signal is amplified in a Sound IF amplifier which is then fed to a limiter circuit which assures a constant amplitude signal. This signal is applied to the input terminals of frequency demodulator to recover the sound intelligence from the FM wave. This sound signal after amplification is applied to a matched speaker which reproduces the sound.

The output of the Second Video amplifier is also given to the input of Sync-Separating circuit. This is done by clipping devices. Thus the control signals are recovered from the picture signal. Further vertical and horizontal synchronisation pulses can be separated by integrating and differentiating the output of sync separator unit. This is possible by the virtue of difference in their

pulse width. The separated pulses drive the respective Oscillators which generate voltages of required shape and frequency to generate sawtooth shaped current wave form to drive the deflection coils of the T.V. tube (CRT).

Vertical Oscillator feeds a power stage which drives the vertical deflection coil. Horizontal Oscillator feeds a power stage which feeds the Horizontal deflection coil. A damper network is provided to prevent oscillation and the consequent deviation of waveform. Horizontal oscillator also generator high voltage required for the acceleration of the electron beam in the Picture Tube. The following controls are incorporated in the control signal processing circuits.

- C_v—Vertical hold control.
- C_v—Vertical size control.
- C_h—Horizontal hold control.
- C_h—Horizontal width control.
- C_h—Horizontal drive control.
- C_l—Linearity control.
- C_v—Volume control.

Hold controls vary the synchronisation parameters and width controls vary the amplification level in the system.

Some general information about T.V. in India:—

Channels employed are 3, 4, and 7. The frequencies are as below:

Channel	Frequency
3	60-66 MC/S
4	66-72
5	76-82
6	82-88

Scanning Details:

Interlaced Scanning is employed. One frame consists of two fields and 25 frames per second, is scanned by this camera. Hence vertical scanning frequency is 50 c/s. One frame employs 625 lines of horizontal scanning. Hence the horizontal sweep frequency is 625×50 c/s.

T.V. Antenna and Phantom Images:

See Fig. III centrefed folded D structure along with a director and reflector is employed as antenna. The system gives higher signal strength and sharp tuning feature which improves the T.V. Reception for a given channel. The aerial oriented properly with direction of transmitted signal orientation for better results. If T.V. receives transmitted and reflected signals ghost or phantom images will be obtained on the screen. By properly orienting the antenna ghost images can be got rid off.

Details of Diagrams

FIG. I	Symbol	Details
	M	Microphone
	RM	Reactance Modulator
	CO, COH	Carrier Oscillator
	FMI, FMIH	Frequency Multiplier
	PAI, PAII	Power amplifier
	D	Diplexer
	AT	Antenna
	RFA	Radio Frequency Amplifier
	AM	Amplitude Modulator
	VSB	Vestigial sideband
	SE	Studio Equipment
	VA	Video Amplifier
	PG	Pulse generator
	T.V.M.	T.V. Monitor

FIG. II	Symbol	Details
	SIF	Sound IF Amplifier
	L	Limiter
	FMD	Frequency Demodulator
	A	Amplifier
	S	Speaker
	RA	Radio Frequency Amplifier
	M	Mixer
	LO	Local oscillator
	PSIF	Picture & Sound Intermediate frequency amplifier
	VD	Video detector
	IVA, IIA, VA	Video Amplifiers
	DCR	DC Restorer
	AGC	Automatic gain control
	SA	Sync-pulse Amplifier
	SS	Sync-pulse separator
	VO	Vertical oscillator
	OV	Vert. out put
	HO	Horizontal oscillator
	OH	Horizontal output
	DP	Damper
	HV	High Voltage generator
	P	Power supply
	CRT	TV tube

FIG. III	Symbol	Details
	S	Folded dipole
	D	Director
	R	Reflector

Antenna Images:

folded Dipole
Director and reflector
The system gives
and sharp tuning
the T.V. Receiver
The aerial
direction of transmission
for better results
and reflector
images will be
By properly
most images can be

Antenna
Modulator
Oscillator
Multiplier
Amplifier

Frequency Amplifier
Modulator
Sideband
Amplifier
Generator
Antenna

Amplifier

Demodulator

Frequency Amplifier

Antenna
and Inter-
frequency amplifier

Antenna

Control
Amplifier
Generator
Antenna

Antenna
Antenna

Antenna

NUMERICAL CONTROL OF MACHINE TOOL

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Lecturer in Electrical Engineering

NUMERICAL control is the operation of machine-tool by numbers. Industrial machine-tool taking a long, hard and expensive look at the concept of machining numbers. N c (Numerical control in abbreviated form) is composed basically of two parts. These are the machine-tool and the machine control unit. The N c unit directs the operations. Numerical control of machine-tool was originally developed to solve the problem inherent in machining increasingly complex parts and tools for modern aircraft and space vehicles.

For all it is necessary to understand the N c process is. Formerly, the machine-tool operator had to take decisions concerning the efficient and correct use of machine-tool which in turn depended upon his craftsmanship, knowledge, and the skill. With N c these are no longer his province. Process planners, and programmers far removed from the shop now have responsibilities for these matters.

With N c, the idle time, or the time to move into position for new cuts is limited only by the capacity of the machine to respond. The utilization rate (chip making) is therefore, much higher than on a manually operated machine. MCU can deliver rapid and precise instructions to the machine. The actual utilization rate, being much higher, now compresses into 1 or 2 years the use that a conventional machine receives possibly in 10 years.

To understand what a machine control unit must do, and how it does these things, it might be well to review some functions that the machinist performs:

1. Studies the blueprint or sketch or in some cases, a sample workpiece,
2. Plans a sequence of operations by writing or mentally preparing the sequence.
3. Does calculations for speeds, feeds and dimensions when necessary.
4. Selects materials and the machine-tools and cutters to be used.

When he has prepared his roadmap, before actually machining anything he has, in essence, created a manuscript with instructions telling him what must be done. How he machines the workpiece is a product of his experiences in manipulations of dials, measuring instruments, cutting tools and numerous other pieces of specialised equipment and supplies. In any case, he knows the exact relationship of the work to tools' cutting edges so that by manually operating dials or other devices he can be certain that the final results will be accurate as the material is removed. In the above functions, a craftsman has—collected, stored, and transmitted information, which is essentially what a control system does.

How Numerical Controls Collect Informations:

When the manuscript has been prepared and the tape has been punched out for a specific job, the stage has been reached for the controller and machine-tool. The coded information on the tape then has to be given to the director by some means. An N c device called a reader is used to send this information to the control unit. Readers may be mechanical, photoelectric

or in some applications even pneumatic. Reader speeds vary considerably. Most mechanical readers are usually capable of reading 60 characters per second, while others are even faster. Photoelectric readers are available with reading speeds to 1,000 characters per second.

Electromechanical Readers:

These readers mechanically sense the codes punched into tape and convert each code into electrical impulses that are transmitted into the control unit. They sense the codes with pins that, when they enter a hole present in the tape, make contact and create the respective impulse. The sprocket on the reader feeds the tape past these pins at a predetermined rate of speed. The sensing pins are always in contact with the tape as it advances.

Photoelectric Readers:

Light shines through any holes in the tape. Beams that pass through the holes to a photocell are converted to electrical energy and amplifiers strengthen the signal enough to make it adequate for use in the controller. This type of reader has no drive sprockets to drive the tape. Capstans, either rotating with a brake system for stopping the tape or direct-drive capstans with printed circuit motors are used. Reading speeds upto 1,000 characters per second make smooth motions on arcs and other configurations possible.

When the reader transmits the coded information to the control in the form of signals, the part of the controller that accepts information now performs its functions. Registers accept proper coordinate information for the various axes, preparatory commands and auxiliary and miscellaneous functions. This information goes to the respective registers or sections where actuation signals are relayed to the machine-tool drives.

Some control are equipped with what is known as a buffer storage section. This

allows the control to accept information in the buffer register when an operation is done at the machine from the storage register. When that operation is completed, there is an immediate transfer from buffer storage to the machine actuation registers. This helps to reduce the time between reading and performing.

After the commands have been signalled to the machine-tool and slides or spindles start to position, there may or may not be information fed back to the control. The machine elements have indeed got to the precise locations as commanded by the control. This would depend on whether the control is an open-loop or a closed-loop system.

Closed-loop and Open-loop Systems:

Numerical control systems must perform many of the functions of the individual craftsman. In order to do this the controller may have information fed back to it. A machinist uses various measuring instruments as the feedback devices. A numerical system that has feedback information is called a closed-loop system. The measuring devices used are varied. Open-loop systems provide no check or feedback of information.

The closed-loop type of system has basically the following elements:

1. A variable to be controlled.
2. A device that constantly measures or monitors the variable and signals the control action to the condition or status (Transducer).
3. A comparator that receives the signal and compares the actual status with the desired conditions, detects any discrepancy and signals this error to the control.
4. A compensation command from the controller that reduces the error to zero and compensation command that becomes zero.

Feedback Devices:

Electric scales, Electro-optical scales, Magnetic scales, Synchros, Shaft-digitizers, resolvers, laser types, linear or rotary

information is
operation is be
from the active
operation is
immediate transfer
the machine
steps to lessen
performance.
been signalled
screws or spindles
may not be
control that
indeed gone to
ended by the
on whether
a close-loop

Systems:

Just perform
individual
the con-
fed back to
measuring
devices. A
feedback of
loop system.
are varied,
check or

has basi-

ed. 2. A
or moni-
control as
ducer).
the signal
with the
crepancy
4. A
controller
compen-

scales,
tizers,
rotary

Feedback devices may be:
1. Absolute or in-
2. Subject to wear or not sub-
ject to wear.
count down linear or
minimum increments on
screws or other members.
Pulses are gene-
rated and feedback to the control. When
the control registers zero
the speed command, the machine will
stop. It should be noted that a slow down
element occurs at a predeter-
mined point from the count down zero so
that wear does not occur.

Feedback Devices:

Feedback devices sense and constantly
monitor variations in levels of voltage. The
member on a machine may over-
shoot in both directions and hunt for the
null-point that allows it to stop. This posi-
tion is achieved when the null-point is
reached. Nulling occurs when the actual
position is equivalent to the reference signal.

Absolute and Incremental Devices:

A feedback device that is absolute always
knows its actual position. Each position
has a specific value. These devices are
highly immune to errors or power failures.
Incremental devices, while less expensive
than absolute systems are susceptible to
errors. Absolute systems can correct a
reading error on the next reading. Incre-
mental systems cannot make these adjust-
ments.

Immunity to Wear:

Feedback devices for measuring position
may be immune to wear. There is no phy-
sical connection between the moving
machine element and measuring device.

One example is Electro-optical scales.

Rack and pinion measuring devices are
subject to wear. The quality of most of

these, however, is very high and wear-
resistance is excellent.

Classifications:

1. Point-to-point or positioning system.
2. Continuous path or contouring systems.

1. Point-to-point, is simply the movement
of the machine table (with the workpiece
clamped or loaded in some manner (to a
specific position under the cutting tool. On
some point-to-point machines the spindle
travels over the workpiece to a specific
point. In either case, the path taken to get a
position is of no consequence since the cut-
ter is withdrawn while travelling to each
point.

2. Continuous-Path Systems: In con-
tinuous path programming, the path the
machine-tool cutter takes in moving from
one position to another, is of the utmost im-
portance. It is this path that will produce
the desired contour on the workpiece. This
contour may consist of straight-line cuts
(including angles) and radial cuts. Motion
in one axis or more than one axis simul-
taneously may be required at any time in
the programme.

Trends:

There is no question that N/c is going to
influence much of the future development
of manufacturing. N/c machines are helping
to build new N/c machines. As more reli-
ability and lower costs are developed, it is
entirely believable that systems may be
allowed to operate unattended. Machining
centres that finish all sides of workpieces
without human handling are examples.

As with most technological advances, the
size of control packages will decrease due
to plug in modular circuits and the appli-
cation of micro circuits that have been
developed.

Tapes and tape readers will gradually be
phased out as interfaces connected directly
from computers bypass these items. This
concept of a remote computer directing

machine tools is already a reality. Another variation of this is a direct computer-to-machine hook up to eliminate cables and other hardware leading to remote computers. The computer in this case needs only the capability to direct the specific machine.

Adaptive controls that sense all the forces of the clip-making processes, and feed in-

formation back to the control so it can adapt to specific situations already in existence. One application of the adaptive controls is a case where a machine may start to dull. Measurement of the forces involved may, when fed back to the control, cause modifications to be made in speeds and feeds.

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WIT-BITS

I read somewhere that life seems to be a fifty-fifty proposition. Women have their beauty secrets and men have their secret beauties.

Most men don't give women a second thought. They're too busy with the first one.

Women are braver than men. That's why they show so much more backbone.

In Hollywood, success is relative. The closer the relative the greater the success.

When women go wrong, men go right after them.

Sometimes the law of gravity doesn't work. For instance it's easier to pick up a girl than it is to drop her.

It's an established fact that kissing shortens life—single life.

Of course love is blind. That's why men have to depend so much on their sense of touch.

A linguist is a man who has mastered every tongue but his wife's.

A brunt offering is the modern girl's idea of a home-cooked dinner.

And in conclusion, dear young friends, never get discouraged. Remember, Rome was not built in a day.

NAGPAL ASHOK

T. E.

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TREATMENT OF TOWN REFUSE

D. D. DESAI

M. E. PH. (Dom.) B. E. (C), M. I. E., M. I. A. W. P. C. (India)

Lecturer in Civil Engineering

USUALLY the technicians prefer to burn the solids when the population figure is lower than 50,000 or more than 1,00,000, and to transform the solids into compost for the size of the population, ranging between 50,000 and 1,00,000. However, in order to eliminate solid city refuse, it is necessary to provide furnaces suitable to eliminate the quantity of solids which can not be sold as compost. It is therefore, essential to have plants suitable both to burn the solids and to transform them into compost. The plants so installed must very rapidly stabilize the material so that it does not smell and can be piled up in high heaps occupying a small surface.

Composting Progress:

Compost is an organic fertilizer produced by fermentation of city refuse. This fermentation is a natural biological process whereby the organic matter in the refuse is broken down by bacteria to convert it into stable material rich in nitrogen and other constituents which are useful as fertilizer.

There are two basic methods of natural composting viz. aerobic and anaerobic. In the aerobic process the organisms feed on the organic matter in the presence of oxygen. Oxygen present in the matter is used up forming carbon dioxide and in the process large quantities of heat are given off. This heat raises the temperature of the refuse heaps to 60°C to 70°C killing the pathogenic bacteria. There is no emanation of foul gases or odour. Experience has also shown that flies are neither attracted by nor bred in fermenting compost in which aerobic conditions are maintained.

In the anaerobic process, the fermentation takes place mainly by putrefaction of

the organic material. In the process carbon is converted to methane gas and hydrogen sulphide gas is also generated. Both these gases give off foul smell. Very little heat is generated and therefore the destruction of pathogens depends mainly on biological action of the various intermediate and end-products of putrefaction. This usually takes a minimum of 5 to 6 months. Compost undergoing anaerobic fermentation also attracts flies and serves as a breeding ground, unless the composting heaps are covered.

Composting has been practised in India for a very long time, especially in rural areas. There are two well-known methods for composting viz. the Bangalore and Indore methods. In the Bangalore method, the refuse is put in about 120 cms. deep trenches and covered with earth. It is then left for about 4 to 5 months at the end of which the compost is dug out. The process here is mainly anaerobic i.e. it takes place in the absence of oxygen. In the Indore method, the refuse is put in about 90 cms. deep pits without any earth cover and is turned over at regular intervals. The process here is mainly aerobic and the compost is produced in about 3 to 4 months. In both these methods, the refuse is put in the pits as received without any attempt to either pre-condition it or sort out the non-compostable material. The composting operations are carried out exclusively with manual labour, and there is no mechanization of any kind.

The slum and Low Income Group people, having inadequate sanitary facilities, normally make their kids to defecate on the street sides, railway track sides and such open public places like playgrounds and at

times parks and parking places! When the scavengers of town municipalities or corporations sweep the aforesaid places, the refuse so collected thus normally contain human intestinal parasites. The refuse generally composted along with night soil, as stated above, is a known source of these parasites. The technicians of the day also suggest to add to the compost sludge from the sewage treatment plants.

The Central Public Health Engineering Research Institute, now the National Environmental Engineering Research Institute, collected some 700 samples from 12 Indian cities in monsoon, summer and winter seasons. Suspensions of the samples were prepared by using a modified form of 'Formolether' technique and subjected to microscopic analysis. The NEERI (India) observed only two, namely *A. Zumbrioides* (Round worm) and *T. trichiura* (whip worm), predominantly existing in the samples. The tests further concluded that the said species of the Intestinal parasites were present in more samples in monsoon than in winter.

Samples collected from high income group in all the cities, except Baroda, did not contain these parasites while samples from slum and low income group invariably contained them. About 50% of the samples collected from such sites where refuse and nightsoil were being disposed of together contained the said parasites. The NEERI scientists also observed that none of the samples tested from Chandigarh and Rourkela contained, *A. Zumbrioides* and *T. trichiura*. This is because the cities like Baroda, Chandigarh and Rourkela are more or less completely sewered, have low population density, and in general exhibit better sanitary conditions.

Further, among the various special problems created by the adoption of skyscrapers, is the problem of refuse disposal. The NEERI studied the problem at the request of the National Buildings organisation,

Government of India; to tackle and answer this problem, the NEERI suggested the use of a refuse chute. A refuse chute can be installed in multistoreyed buildings for conveying and collecting refuse in a hygienic manner from flats at different heights. The refuse is received from successive flats through the inlets located on the vertical system of pipes that discharge into the collecting chamber and cleared at suitable intervals. Most of the buildings constructed by the Maharashtra State Housing Board are invariably provided with such refuse chutes.

Mechanised Composting:

Mechanised composting aims at pre-conditioning the refuse prior to natural fermentation for its conversion into compost. Though theoretically this fermentation can be either aerobic or anaerobic yet in practice, aerobic fermentation is almost exclusively used in mechanised composting plants. The various steps involved in the pre-conditioning of refuse are:

(1) Shredding of the refuse to a size of usually less than 5 cms. to make it more amenable to fermentation.

(2) Removal of as much as possible of non-compostable material such as iron, glass, porcelain, etc.

(3) Grinding the refuse either after composting or after steps (1) and (2) above, to produce a finely textured product to make the compost more suitable for use. The grinding can be done with the help of an equipment known as a Garbage grinder.

(4) Handling the refuse mechanically from one stage to another to reduce manual labour.

(5) Turning over the fermenting refuse in the windrows by mechanical means during the aerobic fermentation stage, to maintain aerobic conditions and high temperatures.

The technicians prefer to burn sewage sludges together with solid refuse. When the refuse is to be disposed off by the Incineration process, the burning plant should be able to burn the solids without great fuel consumption and should be equipped for: Cinder collection, fumes purification and heat utilization, both as steam and electric power when plants for more than one million inhabitants are involved.

There are several other methods of refuse disposal like, dumping into the sea, sanitary landfilling or controlled tipping, ploughing in fields, hog feeding, grinding and discharging to sewer, etc. etc. It is difficult to discuss the said methods because of the space limitations.

It is estimated that the refuse disposal service in large cities costs about 5% of the total city budget! A town having population of 100,000 person will produce about 20,000 tonne of refuse and 8,000 tonne of nightsoil annually! The compost plant will produce about 18,000 tonne of compost per year using these two materials. The percentage of N, P_2O_5 and K_2O in the compost with or without nightsoil will be about 1.20, 0.73 and 0.80 and 0.85, 0.65 and 0.82, respectively. The capital cost of mechanical compost

plant to handle this load is estimated as Rs. 18 lakhs excluding the cost of land which will give the final product at about Rs. 10 per tonne. In larger compost plants, the cost of final product may come down to Rs. 5 per tonne, or so. This may be compared with chemical fertilizers in India with N:P:K, ratio of 12:4:12 which are available at about Rs. 500 to Rs. 600 per tonne.

Lastly, the careful storage, collection and safe disposal of Town Refuse by composting can increase India's agricultural output and can economically solve the problems of urban and rural sanitation and development, and safeguard the Public Health against the spread of epidemics like Typhoid, Diphtheria, Diarrhoea, Trichinosis, etc. and it is actually the mission of a Public Health Engineer!

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Glasses have an amazing effect on vision especially after they have been filled several times.

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MOTHER

VANOO IQBAL

T. D. (Meeh)

AS Shalini reached the bus-stop her pulses quickened—would he be there again? She looked round. Yes there he was again—the man with the child. He was, as usual dressed neatly. The man was young and handsome. The boy was around three years of age. Shalini had first noticed them a fortnight back. Every evening they were there as though waiting for her. The child then point out to her and the father would nod his head and speak to him.

Her job at the advertising company was satisfactory. Her life at home was passably happy. Yet this experience at the bus-stop was somehow very upsetting. She began to wonder why the man came there every evening. All kinds of thoughts ran through her mind until her peace was shattered. Was it just a coincidence? Was she making a mountain out of a mole-hill? Or, was there really something sinister behind this seemingly small incident? Perhaps the fact that the child always accompanied the man played upon her womanly instincts and she could not bring it upon herself to confide in anyone.

Nearly a month elapsed. One day as usual Shalini went to the nearby restaurant for lunch where she always met her friends Madhu, Beena and Shaheen. They worked at different nearby places but met for lunch. Shalini was about to begin her meal when her attention was caught and held by the man at the opposite table. There he was with the child. A sudden feeling of dizziness swept over her and she lost all appetite for food. Why were they following her? Where would all this end? Were they becoming bolder? What if they next followed her to her house? Now, was the time to speak to her friends. But how? There were the man— and the boy—seemingly

ENGLISH SECTION

come for a meal just as any one else in the restaurant. Her friends might just laugh at her. Thinking such a thing. A man alone lying in wait for her was understandable. There were men who came steadily to watch a particular girl who might have caught their fancy. But this was rather peculiar. The boy was always with the man— at a safe distance, but always watching her. Intuitively she knew that they were talking about her. But how could she explain all this to her friends? They were such gay, carefree girls and Shalini was sure they would only tease her about caring for the man. And so, once more she held her tongue.

And now every lunch break was a heart break for Shalini. She told her friends that they should try lunch at some other place. She made her voice sound appealing to try and coax them. "Variety is the spice of life" so how about trying some other restaurant for a change? asked Shalini. Beena replied, "oh no, old is gold and here we stay!" Shalini gave in because insistence on her part would make them ask questions. But very soon the man and the child were spotted by the observant eyes of Madhu. One afternoon she whispered, "Hey, did anyone of you notice the young man with a child at two next table?" Shaheen said, "What's there to notice about them? Anything funny?" "No, not funny something queer." "Queer? Why, what's wrong?" asked Beena. Madhu replied, "I don't know what's wrong, but they come here at the same time as we do, and believe me I cannot say who is smarter in staring at us. The father or the son. It looks as though they can't keep their eyes off us—or-perhaps one of us!" The girls had forgotten all about Shalini. She sat numb as though she was guilty of an affair with the man. Then suddenly through her foggy mind she realised that Beena, the boldest of them all, had got up. Shalini willed herself to follow

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what she was saying. "I'm going upto his table, girls. I want to ask him a few questions!" Beena's voice was rich with malice. Before she could take a step Shalini was up. Something, some inner force propelled her out of her seat and gave her a clear vision. There at the table she saw the young man with a little boy, coming day in and day out to look at her. They did her no harm. Why then should they probe into his private life? In a restaurant, with so many others present why humiliate the two of them? "Wait, Beena. They come here because of me. So please don't question him," said Shalini. Her voice was pleadingly loud and it carried to the man's table. Suddenly he realised the trend of the girl's conversation. In a moment he had approached them. Holding the child by his hand the man spoke softly, gently. "I am sorry if there has been any misunderstanding ladies. I can explain. Three months back I lost my wife. One day she was there with us smiling, loving and the next she was gone

---an accident took her away. Her body was so badly mangled that we had not the heart to show it to my son. I told him that his mother had gone away and would come back after some time. Then one day my little Sunil suddenly cried out, 'There Daddy, there's mummy'. His voice was almost broken with joy. I looked at where his little finger pointed and there madam I saw you. My heart nearly stopped beating when I saw how closely you resemble my late wife. I explained to Sunil that you were not his mother. But he begged of me to take him everyday just to be able to look at you. 'Daddy, Let me only look at her. I feel so happy when I see her. Daddy, please, only till mummy comes back!'. The man's eyes had filled with tears. The girls were choked with emotion. But in Shalini a strange feeling bestirred. There were no tears in her eyes. There was only a great happiness that this happened to her a deep longing to take the little child to her heart!

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THE THREE STUDENTS

N. V. KAKADE

S. L. (Meh)

MR. GOURDON GAMES and Sir Donald Robbins were spending some weeks in one of the great University towns. One evening they received a visit from a tutor Mr. Milton Holmes. On this occasion he was in such a state of agitation that it was clear that something very unusual had happened.

'I trust, Mr. Games,' he said, 'that you can spare me a few hours of your valuable time. We have had a very painful incident at the college and if you were not here, I wouldn't know what to do.'

'I am very busy just now,' answered Mr. Games. 'I should prefer to call in the police.'

'No, no my dear Sir. This is one of those cases where for the credit of the college we must avoid a scandal.'

Mr. Holmes poured out his story. 'I must explain to you that to-morrow is the first day of examination for Sir John Wilson Scholarship. I am one of the examiners. My subject is German and the paper consists of a large passage of German translation which the candidate has not seen. The passage is printed on the examination paper, and it could naturally be a great advantage if the candidate would prepare it in advance. For this reason, great care is taken to keep the paper secret.'

'Today at about 3 o'clock, proofs of this paper arrived from the printers. I had to read it over carefully. At 4.30 my task wasn't yet completed. I had, however, promised to take tea in a friend's room, so I left the proof upon desk. I was absent rather more than an hour. When I returned I was amazed to see a key in the lock. For a moment I thought that I had left my own there, but on feeling in my pocket, I

found that it was all right. The only duplicate belongs to my servant a man whose honesty is above suspicion. I found that the key was indeed his, that he had entered my room to know if I wanted tea and that he had very carelessly left the key in the door when he came out.

The moment I looked at my table I was aware that someone had gone thro' my papers. The proof was in three long slips of papers. I had left them all together. Now I found that one was lying on the floor, one was on the side-table near the window and the third was where I had left it.

For a moment I thought that my servant had examined the papers. He denied it, however, and I am convinced he was speaking the truth. The alternative was that someone passing had noticed the key in the door and had entered to look at the papers. A large sum of money is at stake for the scholarship.

I made a careful examination of the room, when I saw that the intruder had left other traces of his presence. On the table were several shreds from a pencil which had been sharpened. A broken tip of lead was also lying there. Evidently, the rascal had copied the paper in a great hurry, had broken his pencil and had sharpened it.'

'Excellent,' said Mr. Games, who was recovering from his good temper.

'This was not all. I found a clear cut in my smooth table about 3" long. Not only this, but on the table I found a small ball of clay with sawdust on it. There were no footmarks. I came straight to put the matter into your hands. Do help me,

KAKADE
S. F. (Med.)

Mr. Games. Either I must find the man or the examination must be postponed. I wish to settle the matter quietly.

'I shall be happy to look into it', said Mr. Games. 'Had anyone visited you in your room after the papers came to you?'

'Yes; young Devdutt Rao, an Indian student came into ask me some particulars about the examination'.

'And the papers were on your table?'

'To the best of my belief they were rolled up.'

'No one else in your room?'

'No.'

'Where is your servant now?'

'He was very ill, poor fellow! I left him collapsed in the chair. I was in such a hurry to come to you.'

'You left the door open?'

'I locked up the papers first,' Mr. Games gave a mysterious smile.

On the ground floor was Mr. Holmes' room. Above were three students one on each storey. It was already twilight when the scene of the problem was reached. Mr. Games halted and looked earnestly at the window. Then he approached it and looked into the room.

Mr. Games examined the carpet.

'I am afraid there are no signs here' he said. 'Your servant seems to have recovered. You left him a chair, you say. Which chair?'

'By the window there.'

'I see. Near this little table. What has happened is very clear. The man entered and took the papers from the central table. He carried them over to the window table, because from there he could see if you came across the courtyard and so could escape.'

'As a matter of fact, he would not,' said Holmes. 'for I entered by the side door.'

'Ah, that's good! Let me see the three strips. No finger impressions. Well, he carried over this one first and copied it. How long would it take him to do that? A quarter of an hour not less. Then he tossed it down and seized the next. He was in the midst of that when your return made him escape in a hurry—in a great hurry, since he had no time to replace the papers. You were not aware of my hurrying feet on the staircase as you entered the outer door?'

'No.'

'He wrote so famously that he broke his pencil and had to sharpen it again. The pencil was not an ordinary one. It was about the usual size with a soft head; the outer colour was dark blue, the maker's name was printed in silver lettering and the piece remaining is about an inch and a half long. Look for such a pencil and you have got your man. When I add that he owns a large and very blunt knife, you have an extra aid in solving the problem.'

Mr. Holmes was somewhat overwhelmed by all this information. 'I can follow the other points', said he 'but the length...'

Mr. Games shook his head impatiently. 'Let us be practical,' said he.

'I understand there are three students who use this stair and are in the habit of passing the door?'

'Yes, there are.'

'Have you any reason to suspect anyone of them more than the others?' Holmes hesitated.

'One hardly likes to throw suspicion where there are no proofs.'

'The lower of the three is Gilchrist, a fine scholar and athlete. He plays in the Rugby team and Cricket team for the col-

lege. He is hardworking and industrious. He will do well.

The second floor is inhabited by Devdutt Rao, the Indian. He is a quiet fellow, well up in his work.

The top floor belongs to Alexander Dickens. He is a brilliant fellow when he chooses to work, but he spends his time on harmful and wasteful pleasures. He was nearly expelled in his first year.

'Then it is he whom you suspect?' said Mr. Games.

'I dare not go as far as that. Out of the three he is perhaps the least unlikely.'

'Exactly. Now Mr. Holmes, let us have a look at you servant.'

'I understand,' said Mr. Games, 'that you left your key in the door.'

'Yes, Sir.'

'When did you enter the room?'

'It was about half past four.'

'How long did you stay?'

'When I saw that Mr. Holmes was absent I left at once.'

'Did you look at these papers on the table?'

'No, Sir, certainly not.'

'How is that you left the key in the door?'

'I had the tea-tray in my hand. I thought I would come back for the key. Then I forgot.'

'Has the outer door a spring lock?'

'No, Sir.'

'Then it was open all the time?'

'Yes, Sir.'

'When Mr. Holmes returned and called for you, you were very much disturbed?'

'Yes, Sir. I nearly fainted, Sir.'

'You stayed here when your master left?'

'Only a minute or so. Then I locked the door and went to my room.'

'Whom do you suspect?'

'Oh, I wouldn't venture to say Sir.'

'Thank you; that will do,' said Mr. Games.

'Oh, one more word. You haven't mentioned to any of the three students whom you attend that anything is a miss?'

'No, Sir, not a word.'

'Very good. Now Mr. Holmes, we will take a walk, if you please.'

'Your three birds are all in their nests,' said Games, looking up. 'What's that? One of them seems restless enough. It is the Indian, who is pacing swiftly up and down his room. I would like to have a peep at each of them. Is it possible?'

'No difficulty,' Holmes answered. 'It is not unusual for visitors to go over them. Come along.'

Mr. Holmes knocked at Gilchrist's door. A tall young fellow opened it and welcomed them.

Next, these two happened to visit the Indian, who gladly received them.

But, at the third room, the door was not opened at their knock and a stream of bad language came from behind it. The fellow in this room was very discourteous and under the circumstances, rather suspicious.

'Can you tell me his exact height,' asked Games.

'He is taller than the Indian, not so tall as Gilchrist. I suppose 5 feet 6 inches would be about it,' said Mr. Holmes.

'That is very important,' said Games. 'And now, Mr. Holmes, I wish you good-night.'

There were only four stationers of any importance in the town and at each Games produced his pencil chips and tried to buy a duplicate. All agreed that one could be ordered, but it was not a usual size of pencil.

'No good, my dear Games,' said Mr. Holmes. 'This, the best and only final clue, has come to nothing. But indeed, I have

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little doubt that we can build up a good case without it.'

The next morning when Mr. Games visited Mr. Holmes' room, he was in a state of agitation. In a few hours the examination would begin and he had to decide between making the facts public and allowing the culprit to compete for the valuable scholarship. Mr. Holmes ran towards Mr. Games with two eager hands outstretched.

'Thank Heaven that you have come! What am I to do? Shall the examination proceed?'

'Yes, let it proceed, by all means.'

'But this rascal - - ?'

'He shall not compete.'

'You know him?'

'I think so. If this matter is not to become public.'

The servant entered and shrank back in evident surprise and fear at their judicial appearance.

'Kindly close the door,' said Mr. Games to the servant. 'Now, will you please tell us the truth about yesterday's incident?'

The man turned white.

'I have told you everything, Sir.'

'Nothing to add.'

'Nothing at all, Sir.'

'Well then, I must make some suggestions to you. When you sat down on that chair yesterday, did you do so, in order to ~~hide~~ some object, which would have ~~shown who had been in the room?~~'

The servant's face was ghastly.

'No, Sir, certainly not.'

'I frankly admit that I am unable to prove it,' said Games. 'But it seems probable, since the moment Mr. Holmes back was turned, you released the man hiding in that bedroom.'

The servant licked his dry lips.

'There was no man, Sir.'

'In that case you can give us no further information. Would you please remain in the room? Stand over there near the bedroom door. Now, Holmes, I am going to ask you to have the kindness to go up to the room of young Gilchrist and ask him to step down into yours.'

An instant later the tutor returned, bringing with him the student. He was a fine figure of a man, tall and agile. His troubled blue eyes glanced at each of the Sirs and finally rested with an expression of black dismay upon the servant.

'Just close the door,' said Mr. Games.

'Now, Mr. Gilchrist, we are all quite alone here and no one need ever know one word of what passes between us. We want to know, Mr. Gilchrist, how you, an honourable man, ever came to commit such an action yesterday?'

The young man staggered back and cast a look full of horror and reproach at the servant.

'No, no, Mr. Gilchrist, Sir, I never said a word- never one word!' cried the servant.

'No, but you have now,' said Games. 'Now, Sir, you must see that your chance lies in a frank confession.'

For a moment Gilchrist tried to control his features. The next, he had thrown himself on his knees and burst into a storm of sobbing.

'Come, come,' said Games kindly. 'It is human to err, and no one can accuse you of being a heartless criminal. Perhaps it would be easier for you if I were to tell Mr. Holmes what occurred.'

From the moment, Mr. Holmes, said that no one, not even the servant, could have told that the papers were in his room, the case began to take a definite shape. If the proofs were in a roll, he could not possibly know what they were. The man who entered knew that the papers were there. How did he know?

'When I approached your room, I examined the window. I was measuring how tall a man would need to be in order to see as he passed what papers were on the central table. I am 6 feet high and I could do it with an effort. In your description of Gilchrist you mentioned that he was a long-distance jumper. Then the whole thing came to me in an instant.'

'What happened was this. As this young fellow was passing your window he saw by means of his height, these proofs on your table and guessed what they were. As he passed your door, he noticed the key left by your servant. A sudden impulse came over him to enter and see if they were the proofs. When he saw that they were indeed the proofs, he yielded to temptation. He put his shoes, which had several spikes on the table.

'What was it that you put on that chair near the window?'

'Gloves,' said the young man.

Mr. Games looked triumphantly at the servant.

'He put his gloves on the chair and he took the proofs, sheet by sheet, to copy them. He thought Mr. Holmes would return by the main gate and that he would see him. As we know, Mr. Holmes came back by the side-gate. There was no escape. He forgot his gloves, but he caught up his shoes and darted into the bedroom. You observe that the scratch on that table is slight at one side but deepens in the direction of the bedroom door. That shows us that the shoes had been drawn in that direction, and that the culprit had hidden there. The earth round the spike had been left on the table. I walked out to the ground this morning and saw there

black clay which is used in the jumping pit where some fine saw dust is scattered over it to prevent the athlete from slipping. Have I told the truth, Mr. Gilchrist?'

The student had drawn himself up straight.

'Yes, Sir, it is true,' said he.

'Good heavens, have you nothing to add?' cried Mr. Holmes.

'Yes, Sir, I have. I have a letter here, Mr. Holmes, which I wrote to you early this morning, in the middle of a restless night. Here it is. I have said, 'I have determined not to go in for the examination. I am going out at once.'

'I am indeed pleased to hear that you did not intend to profit by your unfair advantage,' said Holmes. 'But why did you change your mind?' Gilchrist pointed to the servant.

'There is the man who showed me the right way to act,' said he.

On hearing this, Mr. Games said to the servant, 'Can you not clear up the last point in the mystery and tell us the the reason for your action?'

'It was simple enough, Sir. At one time, Sir, I was butler to Gilchrist's father. When he lost his money I came to the college as servant, but I never forgot my old employer. Wasn't it natural I should speak to him as his dead father would have done and make him understand that he could not profit by such a deed? Could you blame, Sir?'

'No, indeed!' cried Mr. Games, springing to his feet.

'Well, Holmes, I think we have cleared your little problem up, and our breakfast awaits us.'

★ ★ ★

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fast



U. V. Gurnaste
Second rank - B.E. (E)



J. N. Shah
First rank - T.E. (M)



Mr. M. K. Sanghani
First class - T.E. (C)
(First rank)

*There is no
impossibility to
him*



P. J. Shah
First - T.E. (E)



G. K. Sadekar
Second rank - T.E. (M)

*who
Stands prepared*



Mr. Umesh Choksi
First class - T.E. (C)
(Second rank)

*to
conquer every
hazard*



P. S. Parab
Second rank- S.E. (M)



Kum. L. R. Mahant
First class- S.E. (E)
(First rank)



C. M. Arolkar
First rank- S.E. (M)

*



Mr. N. M. Havewala
Our General Secretary



S. K. Sable, I.E. (M)
Sports

*



S. G. Mamanla
Mountaineering besides
Engineering.

A PROFESSIONAL WAY TO MATRIMONY

RAJU. B. ADVANI

S.E. (Mech)

IF you are deeply in love with some girlish creature to the extent of marrying her but are too chicken-hearted to talk to her father, then you are my man. Dr. Kissinger always studies the background of a person he is going to negotiate with, to gain psychological advantage. So should you. You must know what the girl's old man does for a living. The rest you leave to me (excluding the girl). I shall teach you how to write the right epistle which will break the ice and get results. Some examples:

If he is a BOXER

Man, your daughter is a knockout. She knocked me in the very first round of our first encounter. We've decided to get married to have daily encounters. Any move to block our marriage will get a black eye. With a swift move I'll hold the hand of your daughter. She has got me well hooked....

If he is a WIRELESS OPERATOR

Hello, Hello, your future-son-in-law calling over. Your daughter had broadcast a four-letter message on shortwave sometime ago. My heart which was operating on the same wavelength and frequency got the message. We have been exchanging messages for quite a long time over. Now we want to cut down expenses by living under the same roof. Over and out.

If he is a PILOT

Good morning, gentleman, this is your girl's suitor speaking. We are flying high in the clouds at superplatonic speed. Wea-

ther is getting rough. Visibility is zero because love is blind. We want to land safely with your permission, otherwise crash-landing in marriage registrars office is possible. Awaiting instructions.... Roger Dee.

If he is a MINISTER

I understand you are holding a general election for the seat of son-in-law. I am filing the nomination. Your daughter has already assured me of her unanimous vote. It obviates the necessity to hold the polls. Hope you will declare me elected unopposed in a democratic spirit....

If he is a CONTRACTOR

Vide your daughter's notice No. MAR/6-L? MAA (38.28.36) regarding procurement of nicals, clothing and jewellery till death. I had submitted tenders along with many other young men. My tender being the highest, your daughter has accepted it. Now I only need your sanction to start preliminary ground work.

If he is a METEOROLOGIST

Daddy-o, your daughter has been showering love on me. We are not fair weather friends. We are tired of basking in parks on clear days. Now we want to move into a house to shelter our love from the coming monsoon. Will you please forecast your assent to our union.

If he is a CRICKETER

Morning Sir, My heart has declared itself LBW (LOVE BEFORE WEDDING) to your daughter's charms. She threw her

heart, I dived and took a marvellous catch inches off the ground (like Solkar). We have made a huge score of runs to hotels and movies. Now we shall declare the end of our innings by adding only seven more runs. Those runs will be around the sacred fire. How's that? Please don't disallow our appeal.... It's a genuine appeal.

If he is a DOCTOR

Your daughter and I are seriously love-sick. Our hearts miss their beats when we see each other and our blood-pressure goes up. Would you take up our case and advise us to proceed to some hill station for a

change of climate and celebrate our honeymoon....

*If he is an ELECTRICAL ENGINEER
(from S.P.C.E.)*

I got the shock of my life when I saw your daughter. She is charged with a high voltage and I have the least resistance. This results in a current of large magnitude and power factor one. This current has lit the dark corners of our heart. Now I intend to install a proper meter in my house, i.e. I want to get direct connection by becoming your son-in-law.

★ ★ ★

RACE

HEMCHANDRA S. AGASHE

S. E. (Mech)

10—9—8—7
6—5—4
3—2
1 — — — — —
Hi! Be fast.
Race began
The race for popularity,
The race for career?
The race for money
The race for a stomach!!
I am also running in this race
Rushing towards my goal
Trying to overtake my competitors.

Trying to catch the speed of clock.
At once
I happened to know,
That clock is running,
With unbelievable speed.
I understood,
That race is very tough
It is very difficult
To get first,
To show your place in the vast world.
But to your surprise
I am still running in the race
Hoping to win it.

★ ★ ★

CRICKET

HEMCHANDRA S. AGASHE

S. E. (Mech)

I am playing
A match of cricket
A match of life.
I am batting
Against pacers and spinners
Against opponents and teasers
Finding gaps (opportunities)
With my playmate

With my life-partner.
I am hooking, driving and cutting
Towards the boundary line,
Towards the goal line.
Now my score is twenty,
A long way to century.
I have to do so many things,
During my life's century.

★ ★ ★

Culture is not just an ornament, it is the expression of a nation's character and at the same time a powerful instrument to mould character. The end of culture is right living.

—W. Somerset Maugham

WANTED

A REWARD is offered for information leading to the arrest of Fiddy Current, charged with the induction of an eighteen-year-old coil named Milli-Henry found induced, half choked and robbed of valuable joules.

This unrectified criminal, armed with a ferrite rod, escaped from "Eveready Primary Cell" where he had been clapped in ions since Faraday.

With an erg to be free, his escape was carefully planned in three phases. First he fused the electrolyte, then he climbed

through the grid despite the impedance of the warders whose reactance was too slow. Finally, he went to earth in a magnetic field.

What seems most likely is that he stole an A.C. motor. This is of low capacity and he is expected to try to charge it for a megacycle, and return by a short-circuit to ohm. He may offer series resistance and is a potential killer.

By Order
MANIK H. NAIK
F.E. (III)

★ ★ ★

BEWARE OF THE CHEAT

A CHEAT is on the prowl in the city. He claims to be an employee of Ohm and promises to give athletic young electrons "good" jobs by using his so-called influence with Ohm.

He has so far cheated inductance and capacitance and decamped with their valuable joules. He has also throttled the current mercilessly. This unlawful act was committed when the current went with him in a core near Ampere street. The current surged forward but as the cheat was

armed with heat, the current had to reverse bias. Finally he broke down. Capacitance was also humbled in the same way even though it was gauged.

The culprit is dark-complexioned, around 25, well built and usually wears see-thru' shirts. He calls himself "Mr. Resistance".

By Order
MANIK H. NAIK
(F. E. III)

★ ★ ★

The Fateful day of the 26th January

- ★ Babar died on 26th January 1530.
- ★ Shershah defeated Humayun on 26th January 1534.
- ★ Jehangir was born on 26th January 1554.
- ★ Tipu Sultan began the battle with the English on 26th January 1799.
- ★ East India Company and Calcutta made a 'treaty' on 26th January 1776.
- ★ The sale of women in India was declared illegal on 26th January 1818.
- ★ The English captured Kabul on 26th January 1832.
- ★ The first railway from Calcutta to Bombay was started on 26th January 1853.
- ★ The Telephone system in Bombay, Madras and Calcutta was started on 26th January 1861.
- ★ The Law of Taxation came into force on 26th January 1868.
- ★ The Bombay High Court was founded on 26th January 1869.
- ★ Our country took the pledge of complete Independence on 26th January 1930.
- ★ The constitution of Indian Republic came into force on 26th January 1950.

Compiled by:
PANJABI M. A.
(F.E. III)

★ ★ ★

Our greatest glory is not in never failing but in rising every time we fall.

- Confucius

The world is a comedy to those who think; a tragedy to those who feel.

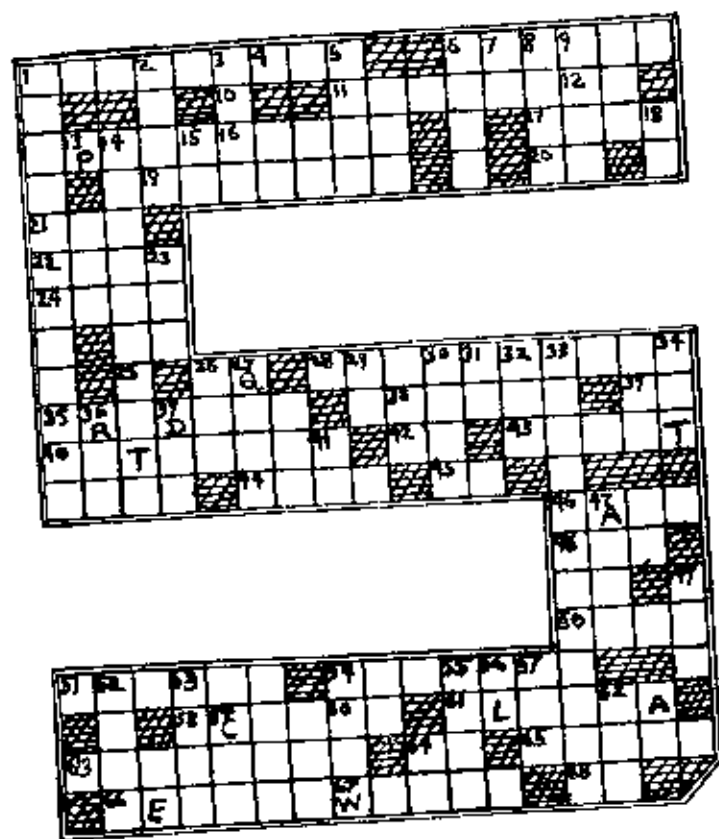
- Horace Walpole

Fame is a vapour; popularity an accident; riches take wings only one thing endures; character.

- Horace Greeley

Live by enthusiasm, don't by necessity; and, if you fail, make failure a stepping stone.

- Woodrow Wilson



ENGINEERING CROSSWORD

by NAVROZ HAVEWALA

CLUES ACROSS

1. Reaction of metal by reaction with environment. (9).
2. Or — vely charged atom. (3).
3. Book of the Christians. (5).
4. Active constituent of atom. (8).
5. Nickel Alloy with highest magnetic permeability. (9).
6. Mixture of 2 or more metals. (5).
7. Minerals extracted from Earth to obtain metals. (4).
8. Country where Industrial Revolution started.
9. Chemical Symbol of inert gas used for red advertising light. (2).
10. India's most industrialised nation. (3).
11. Process of metal by pouring it in molten state into moulds. (4).
12. Member of the Indian Steel Industry. (4).
13. Output ÷ Input expressed in percentage. (10).
14. Metal used only to tip pen nibs. (7).
15. Most suitable; perfect. (5).
16. Cerium, chemical symbol. (2).
17. Metal used to alloy aluminium for aircraft alloys. (8).
18. Metal: good conductor of electricity and (symbol). (2).
19. Grand. Sumptuous meal. (5).
20. Metal used to galvanise steel. (4).
21. Unit of ionisation potential, (abbreviated).
22. Best substance known to man. Used in Gun Powders. (4).
23. Most common construction material. (3).
24. Heavy metal used to sheath electric cables.
25. General Secretary of 1973-74. (Surname).
26. G.S. of 1972-73. (Surname). (7).
27. Stop, discontinue. (5).
28. Chemical symbol for element used in rectifier. (2).
29. Northernmost State of the U.S.A.; formerly State of Czarist Russia. (6).
30. G.S. of the current year. (8).
31. Chemical symbol of a gaseous halogen. (2).
32. Principal. (5).
33. Hydraulic machine: converts energy of high velocity jet into Mechanical Energy. (6-5).
34. Man's oldest, simplest and most useful invention. (5).
35. Chemical symbol of Antimony. (2).

CLUES DOWN

1. Ability of material to conduct heat or electricity. (12).
2. Not common. (4).
3. It floats on molten metal, prevents it from oxidation and absorbs its impurities. (4).
5. Inert gas used in advertising red light. (4).
6. Acoustic headache in all bad auditoria. (4).
8. Most common metallic element in use. (4).
9. Narrow, round, deep hole. (4).
10. Angle between Current and Voltage in an inductive circuit is called angle of ———. (3).
12. Mineral mined to extract metal from it. (3).
14. Property of a body which enables it to regain its shape and size after deformation. (10).
15. Manganese. Chemical Symbol. (2).
16. Best conductor of electricity known to man (Symbol). (2).
18. Light, shiny metal used to coat steel-sheet for the canning industry. (Symbol). (2).
23. Black sticky residue obtained in destructive distillation of coal. (3).
25. Town with big population. (4).
26. Shiny metal used to coat sheet steel for the canning industry. (3).
27. Puzzle. (4).
29. Chemical symbol of 8 down. (2).
30. Without work or use. (4).
31. Cerium. Symbol. (2).
32. One wing of India's defence forces. (3).
33. Chemical decomposition due to electricity. (12).
34. Even then; despite. (3).
36. Tear violently. (3).
37. Civil construction to create an artificial lake. (3).
39. Caesium, chemical symbol. (2).
41. Manganese, symbol. (2).
47. Land measure. (4).
49. Numbers not divisible by two. (3).
52. As you sow, so shall you ———. (4).
53. Public Sector company manufacturing heavy electric machinery. (4).
55. Superior among the two sexes. (4).
56. Same as 42 across. (2).
57. Pet name for father. (3).
58. Public Sector electronics firm. (Abbreviation). (3).
59. Abbreviation for hundred weight. (3).
60. Cutting instrument for wood, metal. (3).
62. Russian secret police. (3).
64. Same as 39 across. (2).

SOLUTION ON PAGE No. 71

MY TRYST WITH AN ESTATE AGENT

"One of the effects of the spiralling demand on real estate in Bombay is that agents now-a-days do not consider it necessary to conceal the defects in their properties"

—Comments a Bombay daily.

By NAVROZ HAVEWALA T.E. (Mech)

I MET him at the gate as decided. We looked up at the house. He glanced at his watch in a not surreptitious manner.

"It's nice," I said. "I'd love to stay in Bandra."

"No sense in going in then. This is Khar."

"Oh, surely not? I understood this area is called. I mean it is within Bandra?" I said.

He shook his head. "No. Not Bandra."

"Not even border of Bandra-Khar?" I pleaded. He took a cigarette from his pack, skillfully avoiding my reaching hand. "Khar" he said with a finality that plunged me into deep frustration.

"What do you expect," he taunted, "for एक लाख सतहगर हजार (1 lakh 77 thousand)?"

"एक मिनर" I corrected him.

"बो तो कलका भाव है। आज एक मिनर है। और कल तो आपकी घरवडेगाभी नहीं।"

"Let's go in," I said. "The sun is too much here."

"What do you think is inside? Kashmir?"

"The tile roof must be making quite a lot of —"

"Part tiled roof" he said, "Rest is corrugated sheets."

"Call a spade a spade, that's our motto" he continued. "See that crack in the ceiling. You'd think they would build Dedh Lakh Bungalows carefully."

"It doesn't look so bad" I said. "Maybe a plastering defect. A kadiya can fill that in two splashes of his —"

"That's what the previous owner used to think." He crushed out his cigarette on the wallpaper and continued: "Until his dog fell through and broke his neck. Dangerous, these floors."

"But strong," I hurried to add. "No chance of rot, peel, that sort of —"

"You wait till your plumbing sticks up its arse. Want to see the kitchen?"

I followed him.

"Of course," he said over his shoulder as he kicked the door open. "the foundations are my private joke. I won't be here when the road outside is completed — one 7-tonne trailer, and you're liable to find yourself with half the roof in the downstairs bathroom."

"Oh, I didn't know we had an extra bathroom" I said. "That's good —"

"I wouldn't show it to you," he said. "I wouldn't even talk about it, not so soon after breakfast."

"This is the kitchen."

"Kitchen?" I said. "It's a bit on the small side but —"

Before I could hurriedly add that it was okay with me, he interrupted me: "Small? You're lucky there are no mice."

"Well, you don't have mice in a modern house isn't it?" I reminded him.

"Right. We may find rats. But mice! Never."

"Oh. Well, we have a cat so —"

"Lucky you have the first floor for the cat, then." "Why?" I expressed my surprise.

to eat's on the first floor, you and I can sleep above it on second floor. I don't want it stamping overhead all day long watching you and your friends through the gaps in the floor."

I came back out into the "Hall". He opened another door open and the latch led to the floor.

"Imagine that's the dining room?" I

"Adequate for a buffet supper of people provided you have small plates" as he replaced the latch with its screws into the screw holes. "The other leads to the garage. You've got a

"Fiat 1100" I volunteered.

"I'll forget it outside. And don't make a mistake of changing it for an Ambassador. Fellow next door bought an Ambassador and drove it right into his garage. I spend night there. Wife fed him through the gaps."

"I can get very good craftsmen down here." He continued, "But you'll have a day off from work. They don't work at night."

I was puzzled. "Why not?" I asked. "This area? After dark even the police come in pairs."

"Let's go upstairs" I said, and started up. At the first landing I realised I was alone. He shouted from below:

"मन ठीक है ना?"

"Yes," I said. He joined me, and apologised: "I never trust these stairs. I reckoned you must be about my weight."

"बारा है" He suddenly exclaimed after some time. "It's twelve already." He turned and cautiously descended. "What do you say. You buying this house?"

"I want a little time to think it over." I said.

He patted my arm. "Do yourself a favour, fella," he said gently. "Now look, am I going to sell it to you, or am I wasting my time?"

"But, I am not fully sure - -" I was begging when he wrenched open the front door. A queue stretched down the path and into the street.

"Says he is not sure!" cried the agent.

Instantly, the queue disintegrated into a wild mob. "One at a time!" yelled the agent, beating a clearing among the crowd. "Let's do this properly. I want - -"

I edged through the pitiful clamour and out into the road.

★ ★ ★

Give every man thy ear, but few thy voice; take each man's censure, but reserve thy judgment.

- Shakespeare

A wise man reflects before he speaks; a fool speaks, and then reflects on what he has uttered.

-From the French

Hope is a better companion than fear.

An optimist sees an opportunity in every difficulty; a pessimist sees a difficulty in every opportunity.

नाईट ड्यूटी

अरुण विश्वनाथ प्रसूदेसाई
(बी. ई. मिहोल)

रात्री साधारण दीड दोनचा सुमार असावा. रस्त्याच्या या टोकापासून त्या टोकापर्यंत एवढांतां हवालदार सावंतच्या तीन चकरा मारून आल्या होत्या. नेहमीच्या विश्रान्तिच्या हप्त्याची वेळ आली होती.

थोडामा आराम करण्यासाठी तो "भाटीया क्वाँथ स्टोअर्स" च्या पायरीवर बसला. डाव्या खांतातून विडी आणि उजव्या खांतातून काट्याची पेटी काढली. विडी पेटवून त्यात एक मस्त झुरका घेतला आणि ओठांतून हळूहळू धूर बाहेर सोडायला सुरुवात केली.

तांडातला मसज्जा धूर बाहेर येण्यापूर्वीच कुठून तरी कुणी "धावा सोडवा, हो ५५" असा ओरडल्याचं त्याच्या कानावर आलं! कुणातरी बर्दचा आवाज वाटत होता. हवालदार सावंत ताडकून उभा राहिला. त्यानं हातातली विडी फेकून दिली. दंडुका सांवरला आणि आवाज नक्की कुठून आला ते पाहू लागला.

"भाटीया क्वाँथ स्टोअर्स" नंतर तीन दुकानं सोडून उजव्या बाजूला एक छोटीशी गल्ली होती. तिकडून त्या गल्लीतूनच आवाज आला होता. हवालदार सावंत धावतच त्या गल्लीकडे गेला. गल्लीच्या आतल्या बाजूला ४, ५ घटीगण एका बाईंशी दंगामस्ती करण्याचा प्रयत्न करीत होते. चार पाच गुंडांपुढे विचारी एकटो बाई काय करणार? ती जीराने ओरडावचा प्रयत्न करीत होती. पण एकाने तिच्या तांडावरच हात दावून ठेवल्याने तिला ओरडताही येत नव्हतं.

हवालदार सावंतने रक्त ते दुष्य पाहतांच डोक्यापर्यंत चढलं! त्यात एकदम चाल केली ति आपला दंडुका एका गुंडाच्या टाळव्यांत हाणला. डाव्या हातानं

खिशान्ती शिटी काढून फुकाची तेवढ्यांत आपला दंडुका त्यानं दंडुकाचे रंगे दिले.

हवालदाराचा म्हावनार पाहतांच तिच्या शिटीचा आवाज ऐकतांच गुठ पार पडून गेलं. त्या बाईकडे पाहिलं. ती आपला नेहरा दोन्ही हात आंकून घेऊन थरथरत उभी होती.

"बाई आतां पावरण्याचे काही कारण नको कोण तुम्ही? अशा रात्रीच्या वेळी एकट्यादुकड्या फिरत आहा? त्यानं गमजावणीच्या सुरांत विचारलं. बाईने तांडावरच हात काढले. ती अतिशयच वेगळी होती. तिचं रूप पाहतांच ब्रह्मचारी सावंत गारं झाला. मी बाई हृदके देत देतच म्हाणाली ;

"मी आणि माझे म्हातारे बाबा आम्ही दोघां त्या टोकांला खोणटानं राहलो. बाबांना दम्याचा विकार आहे. आज रात्री त्यांचा स्वान अगदीच कोंडला. त्यांचो अवस्था पाहवेना. मी डॉक्टरला बोलवायला जात होते तो वाटेन या मुंडांनी धरलं. तुम्ही वेळी आतां म्हाणून बरं! नाहीतर...!" अन् ती अधिपत रडू लागली.

बरं बरं बाई. आतां रडू नका, मी तुम्हाला पोचवीन पण तुमच्याकडे डॉक्टरला घाबला पैसे आतां कां? तिच्या अंगावरच्या जुनाट फाटक्या कपड्यां पहात हवालदारानं विचारलं.

"नाहीत" अशा अर्थी तिने फक्त मान हलवला.

"मग पावेवरी कुठला डॉक्टर घेईल तुमच्यादरोबरी असं करा हे बस रुपये घ्या तुम्हांला ---! आतां माझ्यापाशीही एवढेच आहेत!"

मि व्यायचे नाकारले ! पण हवालदारने
न्यायलाच लावले. तिच्या डोळ्यांतले कुत्रेनेचे
हवालदार सावंतला आपले जीवन सावंतको
गळे वाटले.

मी तुम्हाला पोचवतो." तो म्हणाला.
कशाला तुम्हाला उगीत त्राम ! जार्ज मी
"पण कां हो इयं तुमची राज नाईट ड्यूटी
? तिनं विचारलं !

मी. रोज नाही. कधी कधी ! " सावंत म्हणाला.
आहे कां ? तिनं पुन्हां विचारलं.

म्हो. उद्या तर मला सर्वत्र दिवस सुट्टी आहे !
" सावंतनं म्हण विचारलं. "कधी नाही.
विचारलं ! " ती म्हणाली नि सावंतकडे एक
डुकुन निघून गेली.

जिचा विचार करीत जिवोनीरी येळ निथं
या.

री तो झोपून उठला तोंच इन्स्पेक्टर साहेबांकडून
जावणं आलं. तो पोलीस स्टेशनवर येण्यावर
जालं की आज ज्याची रावपाळी होती तो
र राणे अजानक फार आजारी पडलाय !
शेवजी सावंतलाच पुन्हां नाईटड्यूटीला जायचं

जादा काम असून देखील सावंत आनंदाने नाईट-
ड्यूटीवर गेला.

तीन चक्रे सारख्यावर ती भाटीया स्लॉशच्या
पायगीवर बसला. त्याने चांथी विडी पेटवली व झुरका
घेतला. कालची आठवण येत होती त्याला, उतक्यांन
"धांवा-मोडकां" अशी किकाळी ऐकु आली.

त्यान विडी फेकली नि दंडुका सावरला-धांवत
तो उजव्या गल्लींग गिरला. चानपाच गुंड एका बार्डशी
दंगामस्ती करित होत !

सावंतने दंडुकाच्या प्रहार एका गुंडाच्या डाळक्यावर
केला नि डाव्या हातान शिटी फुकली.

हवालदाराचा खडावारा पाहून नि त्याच्या शिटीचा
आवाज ऐकून गुंड पळत गेले.

तोडवर बोन्ही हात घेऊन ती बार्ड थरथरत
उभी होती.

"बाई आता घाबरण्याच कारण नाही. कोण
तुम्ही ? " त्यान सगळावणीच्या स्वरांत विचारलं.

बार्डनं तोंडवरचं हात काढले.

त्या देखण्या बार्डचा केतण पाहतांच हवालदाराच्या
डोक्यावर आभाळ कोमळल्याचा भाम झाला. सावंतचा
विजून वफा झाला.

कारण ती "कालनीच" बार्ड होती !

★

‘एक भिकारी’

जे आहे एकाला ५ वर्षांपासून चालत पायी
कितलो कोणताही फरक त्याच्या ठायी
'घोडे, वाढ ना माई !'
कितला त्या (?) कडे
फिरवितात माना हुसरोकडे
कितला त्याला धावे घोडेसे वेसे
जे नाही काही खिशात वेसे
कितला ही फिरवावी लागते मान हुसरोकडे
कितला हे रहाटगाड चालणार कितली पुढे
कितला ठाऊक लागतो कितली काळ पुढे -- ! ! !

शंखे आर. बी.
बी. ई. (सिवील)

मजोगत !

अंकितो मनी असंभवनीय प्रीति
तोडूनो वलशाली अशा मिली;
चंचल मन करी स्वर्गात वास्तव्य,
संपविता येते नसूनी मर्त्य-दिव्य;
क्षणात व्हावे, प्रियकर फुलांचा,
तर बुडबुडयासम मंग होई स्वप्नांचा,
वृक्षरुपान करावे परहित शक्य
परन्तु स्वार्थ लोभ करीते अशक्य,
अशात होईल पुरस्कार 'तेज-प्रेयांचा'
परि प्रीती-असुयपुढे निभाव न लागे त्यांचा.

शंखे आर. बी.
बी. ई. (सिविल)

♦♦

सरदार पटेल यांच्या अहमदाबाद येथे १९३० साली नगराध्यक्ष असताना केलेली.

काही महत्वाची कार्ये

डॉ. टी. कालेंकर
(इलेक्ट्रीशियन)

सरदार पटेल यांची जन्म शताब्दी मूक आहे तेव्हा त्यांच्या चरणी काहीशा आठवणी उंबत आहे.

(१) अहमदाबाद येथे ब्रिटॉरिया गार्डन (राणीबा-वाग) भेदे जवळ आहे. तेथे लोकमान्य टिळकांचा पुतळा ठेवण्याचे सरदारांच्या मनात आले. मग काय विचारला त्यांनी लगेच त्यावेळचे जिल्हाधिकारी. (कलेक्टर) यांना या बाबतीत लिहिले. ते होते ब्रिटिश

त्यांज कडून उत्तर आले. ब्रिटॉरिया गार्डन मध्ये हा पुतळा वसवला येत नाही. कारण ब्रिटॉरिया ही ब्रिटिश साम्राज्याची राणी होती व तीचे नाव या बागेला आहे. व लोकमान्य टिळक तर ब्रिटिश साम्राज्याचे तट्टुर विरोधी व ब्रिटिश लांकावदल हिन्दुस्थानच्या जनतेत असंतोष पसरविणारे जनक म्हणून प्रसिद्ध आहे तेव्हा अशी परवानगी देता येत नाही.

हे पत्र वाचनांशणी सरदार अनीशय क्रोधायमान आले. त्यांनी लगेच उत्तर धाडीले. जर दोन दिवसांच्या आत टिळकांचा पुतळा वसवण्याची परवानगी दिली नाही. तर ब्रिटॉरिया राणीचा पुतळा रस्त्यावर नेवून ठेवला जाईल. व मग या बागेला टिळक गार्डन नाव दिले जाईल. लगेच परवानगी मिळाली व टिळकांचा पुतळा वसवला गेला.

(२) पहिल्यान्हा दुर्धेश्वरला अंकुश बाँडर वक्स हॉने सरदार पटेल अेडे दिवशी पाण्याची बीने कांणी भरली नाही. हे पाहून वसले हॉने, तेव्हा त्यांच्या पाहण्यात आले की ब्रिटिश लष्करी? कॅम्प (शाही-बाग) येथे आहे व हे लोक आज वीस वर्ष झाली (जेव्हा पासून बाँडर वक्स सुरू झाले, तेव्हा पासून) पाण्याची बीने भरतच नाही. लगेच सरदारांनी ६ महीन्याची नोटीस दिली कि या सहा महीन्यात जर मागील थक वाकी व या सहा महीन्याचे धोत भरले गेले नाही, तर त्या लोकांपासून कॅम्पचा पाणी पुरवठा बन्द केला जाईल.

(३) कमीशनर साहेब, व त्यांची गोरीवाळे यांना वाटले कि या धमकीला कांण दाद देतो.

सहा महीने पूर्ण झाले. लगेच त्यांनी त्या दिवशी पाणी पुरवठा अधिकारी यांना फोन केला कि कॅम्पचे पाणी बन्द करा. कॅम्पाचे पाणी बन्द झाले. सर्व कॅम्पातील गोरीवाळे लालीलाल झाली. कमीशनर साहेबांनी पाणी पुरवठा अधिकार्यांना फोन केला "पाणी का बन्द आहे?" त्यांनी उत्तर दिले सरदार पटेलचा हुकुम आहे त्यांच्याशी बोला. कमीशनर साहेब दाण दाण करत नगरपालिकेच्या सरदारांच्या ऑफीसात आले. सरदारांना भेटण्या करीना आत मध्ये पत्र पाठविले सरदारांनी उत्तर पाठविले की आत मध्ये काँन्सीलरची मभा चालू आहे. केव्हा पूर्ण होईल ते मागता येत नाही. उद्या ११ वाजता या. कमीशनर साहेब भडकले. त्यांनी आत पत्र पाठविले छीक आहे उद्या भेटतो पण लावडनांव आमचे पाणी चालू ठेवा.

सरदारांनी उत्तर पाठविले लुमच्याशी. बोलणी झाल्या शिवाय व काही अेक निर्णय झाल्या शिवाय, तसे काही अेक करता येत नाही. कमीशनर साहेब पाय आपटीत निघून गेले.

दुसरे दिवशी सरदार ऑफीसात येउन बसले. बरोबर ११ वाजले ते आले नाही व प्यूनला सांगितले तुम्ही ११ वाजता आतात नाही. ते निघून गेले म्हणून, मागितल्या प्रमाणे ते ११-५ ला आले सरदार नाहीत म्हणून खूप भडकले. प्यूनने त्याचा नीरोप दिला कमीशनर साहेबांनी विचारले आता कांडे भेटनील त्यांनी मांगीतले की डॉ. कानुगांच्या बगल्यावर, सरदार तेथे होते. कमीशनर साहेब बोलले की मी फक्त ५ मिनिट वेट झालो तुम्ही निघून गेलान ५ मिनिटे तुम्ही थांबला पण नाही. सरदारांनी उत्तर दिले तुम्ही लांक तर स्वतःला फार व्यक्तीशी समजतात राग असो का?

माहेबांनी तेथे पाण्याचा विषय काढला
सांगितले की या सर्व गोष्टी येथे थोड्याच
मिन चला ओफीस मध्ये.

जैन मध्ये आल्यावर सरदारांनी सांगितले की
येथील कॅम्पाच्या अधिकाऱ्यांनी त्यांची वीले
व रीम चढवले तर लंडनचे मेयर काय
सो जे केले आहे तेच त्यांनी केले असेने का
नंतर माहेव काही बोलू शकले नाही. व सर्व
च्या रकमेचा चेक दिला. व म्हणाले की भग
ना आम्हाला हुमरे वांटर वरमं था

रांनी उत्तर दिले. नगरपालिके जवळ पैसा
नंतर माहेव म्हणाले वर आम्ही आमचे
चे वांटर वरमं बांधतो सरदार म्हणाले फार
मने वाकीच्या शहराच्या भागाना अधीक पाणी
अशा रीतीने अहमदाबाद मध्ये दोन वांटर

(१) सरदार पटेल अहमदाबाद येथील मिळील
महत्वाची वेग चालवत होते. अक तार
सदारांनी वाचली व कोट्टा करून कोरांच्या
राकली. मध्याकाळी गुजरात कलत्र मध्ये
वकीलांनी विचारले वल्लभभाई कोणाची
? सरदारांनी ज्ञाननेने उत्तर दिले.
तो ती मेली. आता उद्या सकळच्या वाडीने
जातो. केवदा हा कणखर पणा.

(४) सरदार पटेल १९३१ मध्ये सावरमती जेल
मध्ये होते अंके दिवशी जेल सुप्रिन्टेन्डेने काही क्रीमीनल
कैदी वीले व नांगी नले "शामतक ये मारा वगीचा विन्कुल
सफा कर डालो" सरदार म्हणाले "अच्छा माहेव विन्कुल
सफा कर देता हूं मग सरदारांनी बरोबर दिलेली माणसे
घेवन मारी जाते उपटून राकली फुल झाडांचे कुठे
उचलून अंका वाजुना फेंकुन डींग केला. फुला झाडाच्या
आजुबाजुना वीटांची सरकल्ल वीकांण चीकांण केले
होने त्या सर्व वीटा काढून फेंकुन दिल्या. मध्याकाळी
सुप्रिन्टेन्डेने आले त्यांनी विचारले "कम् वल्लभभाई
काम हो गता" सरदार म्हणाले "हो गया भाव विन्कुल
सफा कर दिया." सरदारांनी सफा केलेली जागा दाखवली
सुप्रिन्टेन्डेने काय बोलणार ? पुढा सरदारांना काम
सांगितले नाही.

(५) अहमदाबादला क्रीकेट मंच हांती गवर्नर
येणार होते सरदारांना आमवण होते सरदार फाटका
जवळ फाटके धांनार फाटक्या चपला घालून बसले.

वेडी विद्यागोरी तीनकड म्हणाल्या काय वल्लभभाई
अशा वा फाटक्या वेणाल तुम्ही बसता गवर्नर येणार
आहेत सरदार म्हणाले गवर्नर मंच पाहण्या येणार
मला थोडेच पाहणार ? पाहिले तर त्यांना कळुदे की
त्याच्या मुळे आमच्या देशाची ही देता झाली आहे.
मग विद्यावेनने नव्याचपला आपून दिल्या व फाटका
जवळ घाबून गिला. सरदार त्याच वेणाल बसुन राहिले
मग गवर्नरणी त्याच वेणाल हसतंदाखन पण जाले.

स्वप्नप्रवास !

वरचे फिरावे
ते गीत गावे
जागे जावे
पाहून यांवावे.

ठांबूस-काळसर मृत्तिकातून
बनू अमंगलातून मंगल घेऊन,
तदनुष आली आहेत, सुषमा लेऊन,
हे सूर्यविणाच्या फुलांची समृद्धी पाहून.

वाटले तेथेच राहावे
त्यातले एक फुल खुडावे
सुवास घेण्यास नाच खुपसावे-
प्रेम-प्रतीक म्हणून सदस्यात खोवावे

त्याच फुलावर बसलेले 'एक फुलपाखर'
पण कोणी म्हटले आहे 'मन पाखर'
मनास वाटले उडून जावे जवळून
अरे रे ! हा स्वप्नप्रवास नंतर आल कळून.

गावस भास्कर श्रीमसेन
प्रथम वर्ष

आल्या श्रावणसरी

प्रदोष डी. प्रधान

डी. ड. इलेक्ट

आज सकाळपासून हवेत गारवा आला होता. उन्हाच्या तामाने कोनावलेल्या मनावर एकप्रकारे उन्हाहाची छाया पसरली होती. निमर्ग हा एक महान् जादूगार, बहुशुणी आहे. स्वतःच रूप पावतून, विविध प्रकारची सोंग घेऊन गाजवी मनावर त्या गुरूकणनेच परिणाम निमर्गाला वांगलाच करता येतो.

आजचा गारवा, अप्रचर्च निमर्गाने पावटलेले रूप मनाला कमलीनरी अनामिक ओढ लावत होते. नकळत मनाला 'श्रावणाच्या हुनांची' चाहुन लागली होती. ह्या 'श्रावण हुनांचे' स्वागत करण्यास सृष्टी अणू आमुगलेलीच होती. कळत, नकळत निमर्गाची ही स्मंदन माझ्या मनाला जाणवत होती.

वरुणाची ओंजळ मेघपुणाली भरून आली होती. सोसाट्याच्या वाऱ्याने ती मागी पुणे वाहून येवी आणि त्या मेघपुण्याने नारे जलमराग उघडून दिले. मनान कुठेतरी अध्रुकरणे चित्र साकारले जात होते -

"श्रावणमासो ह्ये मार्ताण्ड हिरवळ दटे जोडीकटे."
माया निमर्गाचे स्वरूप असा पावटून गेल होता.

एखाद्या कुशल चित्रकाराने रंगाच चित्र साकार करावे तसे समोरचे दृश्य दिसत होते. श्रावणमासातील निमर्गदृश्य किती सुंदर दिसताने! मध्येच कोमळणाऱ्या पावसाच्या मरी आणि मधुनच डोकावणारे सूर्यकिरण, जणू एकमेकाशी लपडावाचा खेळच खेळताने. श्रावण-धारांमध्ये स्नान करणारी हिरवी सृष्टी पाहिली की श्रावणमासातच हिरवा थालू तेवून. पुजेच गार्हस्थ्य घेऊन शंकराच्या मंदिरात भक्तिमत्ताने मार्त्यकनेन समोर उभी रहाने.

दूरवर पसरलेली हिरवळ, तिच्या जोडीला वाऱ्याच्या

स्पर्शाने पुनर्कित होऊन झंजणारे वृक्ष, मारच कानमोहक आणि सुंदर !

या कोमळणाऱ्या श्रावणमरीचे शिदू अंगावर उडताने की गाजण्याचे मोहकून निघते. श्रावणमराग हा तसे वैकल्यांचा माम अगता. निमर्गाने देखील जलमोले मोहकल्या मनाचे दान करण्याचे व्रतच या मासात घेतले दिसते.

श्रावणमरी कोमळत अगतता जे दृश्य दिसते ते पाहून मनात कल्पना येते की निमर्ग हा एक महान् तारवी आहे आणि या मरी त्याच्या सुखानून पडत झंजणारे सामवेदच आहेत जणू ! जो आनंद घरी मिळत नाही तो निमर्गाच्या, साश्रिध्यात जायतो. या आनंदात घरणे करताना 'Kouts' म्हणतो - "Ever let the fancy roam pleasure never is at home"

मनावर या श्रावणमरी विलक्षण जादू करतात. निमर्ग हा एक पातळकाचा पावतलेचा गुजारी आहे आणि या श्रावणमरी त्याच्या अभिप्रेत पात्रातून पडणा पावत जन्मविदू आहेत ह्याची मनोमन खात्री होते. एकप्रकारचा नैसर्गिक उन्माद, आनंद या मरीच्या आगमनात होती. या श्रावणमरी आणखी नवल वरचस काही गांगूळ जाताने, पण ते फक्त अंतर्मनत आणत.

दूरवर अमर्त्येच्या देवळातून मधुर घंटागाद काढत पडतो. जणू तो साव बोवतच असतो - "ज्याची तुम्हाचातकाप्रमाणे प्रतिक्षा करीत होतात. त्या श्रावणमरी आलेल्या आहेत." आणि मानवी मनानून, ओठावरी रिमलातून त्याला प्रतिगाद मिळतो - "श्रावणात थोड्या निळा वरमला रिमझिम रेझिम धारा, उलगाड्या लाडातून अवचित हिरवा मारणिसारा" - - -

‘बेस्ट’ बस

‘बेस्ट’ बस आहे
तो आसूचीच आहे ॥१॥
‘अंधेरी’ नगरीत कमी खर्चात नेते
वेळपडली तर फुकट ही नेते ॥२॥
नाव ‘बेस्ट’ असे तिचे
अजब प्राणी असे ॥३॥
नाव तिचे कंडक्टर असे
ब्रठरापागड जातोची एकच भाषा जाणे ॥४॥
गोपकुमार, ए राजकुमार,
मोनाकुमारी पुढ सरक की हेही त्यातले ॥५॥
कुणीही यावे उमराहून जावे
वाटले मनास तर भाडे द्यावे ॥६॥
मिन्हाईक म्हणुनी ‘दक्षिणा’ कंडक्टरला
सज्जनाना ॥७॥
ठाकुर एच. आर.
एस.ई. (मॅक.)

*

मनीषा....!

इब्यो असे हो धडधड कसली
जानुरले मन दर्शनासाठी ॥१॥
द्वारी येतो तुझ्या दर्शना
परंतु मज मुख चंद्र दिलेना
मनास माझ्या खेन पडला
धैर्यशील मी अनुनि इतुका
म्हणुनी तुझिया मार्ग सजणी
येतो केवळ दर्शनासाठी ॥२॥
तुझ्या विना मी असेन इकडे
मन मम द्यावे तुझ्याचकडे
दुःख कुणा ग सांगू मनीचे
एकांतात बसुन मी रडे
किरह व्याकुळ होऊन मनो
मुरतो आहे दर्शनासाठी ॥३॥

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59

कविता

मुबत नाहिम् काहि, तरीहो काही तरी मुबतेच आहे !
वेड्यावाकड्या रेघोदद्यातून तू कशीतरी
आकारतेच आहेस !
शब्दांनी मढवलेली, अलंकारानी सजलेली
अशी तू साकारतेच आहेस !
स्पष्ट-अस्पष्ट कल्पनांनी तरिही तू सजतेच आहेस !
यमक, अनुप्रास, शब्द-वाक्यांनी तू मस्त भरत आहेस !
बागडत यावे एखादे मूल,
तशीच तू येत आहेस !
अहा ! काय मजा पहा !
माझी, माझी स्वतःची कविता आज जन्म घेत आहे !
अजय त्रि. लऊळ.
तृतीय वर्ष (मेकॅनिकल)

*

स्वरूप तुझे ग सुंदर गोरे
नयन सनोहर टपोर घारे
सोते सम तू देवी भासे
आराध्य अन् कुल देवत माझे
तुझा भक्त अन् चाकर म्हणुनी
नेहमी येतो दर्शनासाठी ॥१॥
अखेरची ग एक मनीषा
घे माझी तू प्रेम-परीक्षा
उरी धरुनी मी आहे आशा
हृक्काच्या ग मधुर स्पर्शा
लावू नको मापुडे मज प्रिया
दर्शना तुझिया घेयं धराया ॥२॥

धैर्यधर गोपाळ मांजरेकर
(अप्लाईड फिजिक्स डिपार्टमेंट)

5

....અને આવતીકાલ

વિજય સંઘવી

એસ. ડી. ઈન્સ્ટિટ્યુટ

કાલે જ આ જાપાની ડી.વી. સ્ટેડની હરાજ થશે, ફિપાટની હરાજ થશે. કાલે બધા એક પાછા ફરશે. અને હવે વનું ખાંચી નહીં શકાય. જેક મેનેજરનો ફોન આવ્યો ત્યારે ફેરવું આસાનીથી કરી દીધું, સવારના ઉપરની જેકે પેસા ભરાય તથા કાશ! કોઈ દેવાજ નથી રહ્યો..... આજરોની દેમારનમાં તિરાડ પડી છે, અને આવતી કાલે તે તૂટી પડશે. કોફી ખાધું..... મિત્રો હસશે..... સંભળીઓ શાજી થશે..... કાલે જ ખંજુ પડે, ફેલ્ટ છોટવો પડશે, ઓફિસ ને છોટવી પડશે, કાલે..... પત્ની મો ફેરવી જશે, ખેત્રીનો સગાઈ તૂટે, આખાથી કોલેજ નહીં જવાય, આવતી કાલે 'ફોન્ડ સર્કલ' નહીં રહે, દેવદાસને આજરૂ માનમરનમાં ખંજુ જ બંધ, આવતી કાલે.....ખસની ગાઈનમાં, ફેનની ટિફ્ટ કાઢવા, અને ભાંગેર દેવા પરામાં મામૂલી કોકો સાથે રહેવું પડશે, આવતી કાલે દેવદાસ નહીં લાય, નીચિમાં નહીં ગાય, રંગીન થીયું નહીં લાય કે એ રંગીન રાત નહીં ગાય, કાલે કશું જ નહીં લાય, કદાચ કાલે પોતે પણ નહીં લાય.....

કાલના કાળને કાલના બોના બંધાવ ભગીરથ પ્રપાસા તિરૂપ્પ વાયા. લોકસમાંના કાળના કિમતનો એક, મેકર-સિલક, પોલિસીઓ ફેલ્ટ, ડી.વી. એર કંટ્રીશન ઓફિસ સુધમાં એક નજીકના મિત્રમાં તબલ ફેરવી. અને મિત્રોને ગંધ આવતી જતા એક સેવરેકસવાળાઓને ફેરવે દરેકે પડાવે માંજવાવાળાની વેગારે જાતી અને છેલે એ સ્વસ્થતાના અને આવ્યો.

આવતી કાલે એકમાં પેસા ભરાવાની હતા, મેનેજરને છેલે તાવેડા કરી હતો, છતાં આવતી કાલે અનિવાર્ય હતી. ગઈ કાલના શેર બજારનો ખેતાર આજરો આવતીકાલે ફેટપાથ પર હતો, જેને પૂછવા પછી જ એનો ભાર થતો એ આજે બિનારી થશે; તેની આવ સમજવા મિત્રો કિવસમાં દસબાર ફોન કરતાં તે આવ ક્યાં છુપાઈ ગયાં એની ખબર ન હતી. એકલે લાથે અને ઝડપે..... એકલે લાથે જ એક આ આખીએ સુપર કીમી કરી હતી. છતાં આજે એ બાંચી પડ્યો હતો.

કાલે એક મોહનવાલ માસવાડીની રાત માની લીધી હોત અને બધા લેણદારોને નવધવી નાખ્યા હોત! પણ એ દેવદાસના માનથી હતો. મોહનવાલ ન હતો. પણ આવતી કાલે એનાથી નહીં જરવાય. આવતી કાલે એનું અસ્તિત્વ મિટાતી દેશે. એ પાંડલાં જ એક પોતે પોતાનું અસ્તિત્વ મિટાવી દેવું જોઈએ. શા માટે આવતી-કાલને શરૂ કરવું! દરિયામાં ઝંપલાવો ન શકાય! ફેન તોયે ન આવતી શકાય!

ત્રીજવાર સચિતશાલનો ફોન આવ્યો; ઓપરેટરે કશું સચિતશાલ જ ફોન કરે છે. સચીત એકો મિત્ર જેને હંમેશાં પેસાતી જરૂર પડે ઘરમાં જ્યારે ખાવાનો ફીફો થાય ત્યારે ફોન કરે અને માંગ્યો કરે. 'તારા સિવાય કોણ છે મારું?' એમ કહેતાં પ્રેમી-ચારેકો ફેટલાઈ તાર બંધ થયો હશે. એકદમ જેક એને પણ આપી દોષા લાય, અને છૂટ.....દેવદાસને ફરતો તે મટે. ઓપરેટરને ફોન દેવું ફોન આવતી કાલે છે એકને પણ મળવાની કે વાન કરવા સુધી ના પાડી દેવી.

ઓફિસનો સ્ટાફ પણ ચૂપ થઈ ગયો. બધાં એક ખોળે કામ કરતાં હતાં. પણ કામ જ નથી. પણ કામનો દેખાવ કરી રહ્યાં છે. પણ બધાં જ નજામાં હતાં મુનીમ કે નીચમ.

પણ આવતી કાલે..... પત્નીની ઓંગા સામે જોઈ નહીં શકાય, ખેત્રીનો સગાઈ તૂટે. એ ખંજુ જરૂર નહીં શકાય, કશું જ નહીં..... કશું જ નહીં.....

આવતી કાલે કાલે કાલે જ નહીં અને શરૂ નહીં જઈ શકાય.

આવતીકાલ એને ગળી જાય એ પાંડલાં એ જ આવતી કાલે જાણી જશે..... દેખવ પર પડેલી કાલની કી-શેન ઉપાડી અને કીમી થવા ગયો ત્યાં તે સચિતશાલ પસમસતો આવ્યો. એના એ મિત્ર, લેખદાર મિત્ર, પેસા માનવા જ આવ્યો છે. ખુને ના પાડી છતાં હટુથી થઈ આવ્યો. કેવલ પર બેઠેલી સ્વીચ બુક પાછાડતાં આવ્યો, આ..... ત્રણ કિવસથી માસીસાથે સંતાનકુડી રહે છે, મને ખતી ખબર છે..... તારા ખાતામાં મને લોડરીના દીનામમાં ગાંજવા ગામ ફિપા ભરી દોષા છે.

★

નિતિકારીની 'ખુમારી'



ભરત ર. કોઠારી
બી. ઈ. (મિક).

નાવનના બગવા'ની મહાન રાજકીય ક્રાન્તિના મૂળપાયોમાં બિહારના મર્દ મહારાજ કુંવરસિંહનું નામ વિશિષ્ટ રહ્યું છે. ત્યાં લગી કુકુર કુંવરસિંહ રહ્યા ત્યાં લગી તેમણે અંગ્રેજો વિરુદ્ધ પોતાનો ક્રોધેશ આઝાદીના યજ્ઞમાં ફરકતો રાખ્યો.

કે વખત કુંવરસિંહ શાહબાદ જતા ગુપગુપ નાવમાં ગંગા પાર કરી રહ્યા હતા. અંગ્રેજ સૈન્યને આ કથાંથી જાણ થઈ ગઈ, એટલે પછી અંગ્રેજ સૈન્ય કેપ્ટન લુગડે કુકુર કુંવરસિંહ પાછળ પડ્યો. કુકુર નદીકિનારે આવી પહોંચ્યાં, ત્યારે હજુ એ વિશાળ પટમાં જ કુંવરસિંહનું નાવ હતું.

એટલે, કેપ્ટન લુગડે કિનારા પરથી જ કુંવરસિંહ મંદૂકનું નિશાન લાકડું. અને, ભાંગેજો કેપ્ટનની એ જાણી કુંવરસિંહના જમણા હાથના કોડા વાળી.

કુદિલે તોતિ અજમાવીને પોતાના મહાન દેશમાં સૌ સામ્રાજ્યનો પગદંડો જમાવનાર અંગ્રેજો પ્રત્યે એકને ખૂબ જ નફરત હતી. પોતાના જમણા કોડા માં રીતની અંગ્રેજ અધ્યાત્મી જાણી વાજતાં એ મહાન વિદ્વાનો : 'એક અંગ્રેજની જાણીથી માત્ર જમણા અપવિત્ર બન્યો છે.' આમ બોલી પોતાના હાથ

હાથમાં તલવાર પકડીને, એક જ ઝાટકે 'અપવિત્ર' અનેલા જમણા હાથ કાપી નાખ્યો, ને ગંગામીથાના પવિત્ર તળમાં આ રીતે એ છુટ્ટો પડેલા જમણા હાથ ફેંકી દેતાં, એ મહાન નિતિકારી બોલી ઊઠ્યા હતા : 'હે ગંગામીથા, જે હાથ કપડી અંગ્રેજની જાણીથી અપવિત્ર બન્યો છે તે હવે મારા કશા કામનો રહ્યો નથી. એટલે હે મીથા, હું હવે તેને તારા મોળામાં પધરાવું છું.'

× × × × ×

ચીની અફસરે ઈન્કરબ્લુ માટે આવેલા યુવાનને પૂછ્યું :

'મનુષ્યના ગંધની શરૂઆત ક્યારથી થઈ?'

'આદમ અને હિવાથી.'

'એમની રાષ્ટ્રીયતા થી હતી?'

'ચીની.'

'શાબાલ! અફસરે કહ્યું : 'પણ તમને એની થી રીતે ખબર પડી?'

'નરત સરળ છે. એમની પાસે રહેવા માટે ઘર ન હતું કે પહેલા માટે કપડાં નહોતાં, ખાવાપીવા માટે કોઈ વસ્તુ ન હતી અને છતાં, 'અમે સ્વર્ગમાં છીએ.' એમ તેઓ માનતા હતા.' યુવાને કહ્યું.

× × × × ×

ખોવાઈ ગયેલી સજની

આકાશના દુધિયા રહ્યા પરથી અનંતમાં ખોવાઈ ગયેલી
હે સજની!

તને ખોળવા તારાંઓએ નિષ્ફળ હોડાહોડ કરી...અને અંતે
પૃથ્વીની કબર જેવા અંધકાર પર આસથે એનાં અસંખ્ય
નયનો વડે આંસુ સાર્યા.

પણ ત્યાં તો,

તારી વેણીનાં ફૂંકનો નથો કરી લયડિયાં ખાનારા સમીરે
જાહેર કર્યું,

કે તું અંધ વ્યાપી છે.

એટલે ક્યાંય નહીં જડે.

વિજય સંઘવી

બી. ઈ. (ઇલેક્ટ્રિકલ)

દાડમના દાણા

- (૧) મિલન નહીં તો મિલનનો ઉમંગ પકડી લે.
ન સંગ લેવ તો વિતેલો પ્રસંગ પકડી લે.
સહારો છૂટી જાય તો કલ્પનામાં જીવી લે.
તણખણું નહીં તો તરંગ પકડી લે.
- (૨) બીજને પણ માન અપમાન લેવ છે.
સર્વને પોતાતણું ભાન લેવ છે.
ચાંદનીમાં મુસ્તાક બનેલા ચંદ્રને શું ખબર
અમાસે તારાઓનું પણ તેજ લેવ છે.
- (૩) રણમાં ભટકતાં મનડાં,
ઝાંઝવા પાછળ દોટ મૂકે છે.
અથગઈ પછગઈ થાકે છે ત્યારે
પ્રભુના નામની પોક મૂકે છે.
- (૪) જગતને મેં મારું જીવન આપ્યું
સ્નેહનું મુજ સૌચન આપ્યું
બદલાની ભાવના ન હતી છતાં
મૂર્ખનું મને ઉપનામ આપ્યું છે.

પ્રદીપ ગોસલીયા

એફ. ઈ.

“મારી ‘એ’”

કુખની આંધી જેને નથી સકતી રોકી,
જિંદગીની મુશ્કેલીઓ જેને નથી સકતી રોકી,
જોઈને જેને ચાંદની પણ થાય અદેખી,
એવી છે, અવગેલી, કપાળી મારી ‘એ’ અનોખી.
સદાબહાર તારવની સુરાવલિ સમાન,
મુખમાંલિના ઝાલ જાણે છૂટ્યું તીર નૂટી કમાન,
પ્રીતની ડોરથી બંધાયેલી એ સોલામણી નાર,
નથી લાગતું મને જીવનમાં કદી પામશે હાર.
મંદ સૌમ્ય તારવની રમણટ મુખ પર સદા રમે,
આપ્સરા-સી ભાસે જ્યારે કુળ-વનનમાં બમે,
દિલના તલસાટ અને વિશુદ્ધ પ્રેમને નમે,
ચંચલ લલિત્રી-સી આ ‘પુષ્પવેલ’ મને ખૂબ નમે.
પરંતુ, ન જાણું જનકીનાથે કાલે શું થવાનું છે,
આજ મિલન, તો કાલ વુટા થવાનું છે;
નથી ખબર એ સમે ‘આશિક’ તારે શું કરવાનું છે?
ખબર છે અટકી કે સલામે... આંસુ જીવન વ્યતીત કરવાનું છે.

મહેશ ડી. રાહૈડ

એસ. ઈ. (સીવીલ)

પ્યાસ

- (૧) કોણ માને છે કે અમાં વીરનો આખાસ છે?
નુપ્ત લોકોએ કરેલા કારમે ઉપહાસ છે.
રણ ઉપરના ઝાંઝવાને ઝાંઝવાં સમજે નહીં.
કોઈ વિહ્વળને ભટકતા જીવનની એ પ્યાસ છે.
- (૨) ના દિસે લોક એ મરકે ન મરકે તોય શું?
એવો આંખે અશ્રુ સરકે ન સરકે તોય શું?
પ્રેમ તો છે અંધ એને શું શુકન કે અપશુકન?
અંધનું કોઈ નયન ફરકે ન ફરકે તોય શું?
- (૩) મંઝિલ બનીને આવ ન રહેબર બનીને આવ
મુજ માર્ગમાં ભલે ન તું સહચર બનીને આવ
કિન્તુ મને ન છોડ અટૂંકા પ્રવાસમાં
કંઈ એ નહીં તો છેવટ હોકર બનીને આવ.

પ્રદીપ ગોસલીયા

એફ. ઈ. વન

‘ચા’

તુલ્યો લકીમો આ દુનિયામાં દવા મારી છે નહિ.
તું ‘ચા’ તમો બીમાર છું, બીજી બીમારી છે નહિ.
વિષ્ટન નથી તો કંઈ નથી, બ્રુકમાન્ડ નથી તો કંઈ નથી.
અરે ચા તમો બંધાણીને ચા નથી તો કંઈ નથી.
મારો જનાજો ઉચકવા તમે ચાના બંધાણી બોલાવજો.
બેચાર ડબલા બ્રુકમાન્ડના ક્રોડળને બદલે બાંધજો.
સ્મશાને જતા, તમે સો સ્નેહીઓ ચાપ-ચાપ પૂકારજો.
પાછા વળી સો સ્નેહીઓને ચાપનું સ્નાન કરાવજો.
આખર તમે એ ચાલ થકી ચિતા મારી જલાવજો.
આરસ તમો મુંજ કબર ઉપર ‘ચા’ એમ કોનરાવજો.
મારી મરણતિથિ એ, તમો સર્વેને ટી પાટી આપજો.
જે ચા ન પીતા હોય તેને મારા સમ દઈ પીવરાવજો.

અરત ૨. હાહારી

બી. ઈ. (મેક)

मित्रो, शादी करना सीखो

पंजाबी एम. ए.

[एफ. ई.]

मित्रो, शादी करना सीखो ।

या बिना सौत मरना सीखो ॥

कुँआरी न मिले, विधवा हो हो, अथवा दो बच्चों वाली हो ।
 ऐँडी-भेंडी, सूनी-लंगड़ी, गोरी-भूरी या काली हो ॥
 उसका सुख-मण्डल देख देख, ठण्डी आहें भरना सीखो—
 मित्रो, शादी करना सीखो ।

वह बिना दोत की बुढ़िया हो, अथवा जाफ़नी गुड़िया हो ।
 ढाई मन का भारी बण्डल, अथवा चूरन की पुड़िया हो ॥
 इन बातों में क्या रक्खा है, किस्मत से तुम लड़ना सीखो—
 मित्रो, शादी करना सीखो ॥

शारदा ऐकट से क्या डरना, चाहे छोटी सी लल्ली हो ।
 घबराते से कुछ काम नहीं, बारह फुट लम्बी बल्ली हो ॥
 सीढ़ियाँ लगाकर लालाजी, ऊँचाई पर चढ़ना सीखो—
 मित्रो, शादी करना सीखो ॥

बिन शादी के है बरवादी, बाबूजी बन जाओ दूल्हा ।
 वरना दफ्तर से घर आकर, गर्मी में फूँकोगे चूल्हा ॥
 सब भूल जाओ बाबूगिरी, इस आफत से डरना सीखो—
 मित्रो, शादी करना सीखो ॥

यदि पैसा पास नहीं होगा, नोटों के ढेर लगा देगो ।
 इस तरह तुम्हारी किस्मत का, वह टेलिफोन लगा देगो ॥
 लेला के पीछे तुम मजनू बनकर चलना सीखो—
 मित्रो, शादी करना सीखो ॥

यदि सिगल तुम रह जाओगे, नहीं जगह रेल में पाओगे ।
 भाड़े पर मांगोगे मकान, प्यारे फटकारे जाओगे ॥
 दो पायें हो तुम चौपाये बनकर आगे बढ़ना सीखो—
 मित्रो, शादी करना सीखो ॥

जैसी भी पत्नी मिल जाए, चरणामृत उसका पान करो ।
 सोते-जागते, खाते-पीते, देवोजी का गुणगान करो ॥
 उसकी चप्पल को चाट-चाट कर, चमकीली करना सीखो ॥
 मित्रो, शादी करना सीखो ॥



क्या यही स्वराज्य मिला

पहारीआ बिमल

[टी. ई. मका]

स्वराज्य मिला, शासन मिला, फँली चारों ओर खुशियाली ।
सोचा अब स्वप्न होंगे पूरे, मनेगी हर घर दिवाली ॥
कोई छोटा-बड़ा न होगा, सबको मिलेंगे समान अधिकार ।
जाति पाँति का फर्क न होगा, होंगे एक भ्रान्त सरकार ॥
नेता होंगे वही, सुनेंगे कहानी सबके सुख दुःख की ।
देश की सेवा में, न करेंगे परवाह अपने सुख की ॥
पर हाथ दूटा बज्रपात, उन आशाओं उम्र स्वप्नों पर ।
आजादी की भवहोशी में, पड़ गया पर्दा अकल पर ॥
आजादी मिली, लेकिन रही कुछ सोमिन लोगों तक ।
क्या इसलिए संग्राम हुआ, जिसे देखते रह गये अंग्रेज तक ॥
आजाद देश की आजाद जनता, उनको क्या भिना आज,
बहती हुई पेंहगाई, अथाह गरिबी और शासन में फँला भ्रष्टाचार ।
हर चीज की सोमा होती है, हर सब की सोमा होती है,
जब सग्न हो टूट जाये तो, रहेगा कहाँ से शिष्टाचार ॥
जनता ने अब शुरु किया है, लड़ना अपने अधिकारों के लिए ।
शांति से जब हुई न मुनवाई, तब जनता ने सहारे आंदोलन के लिए ॥
जब तक पेट की आग न बुझेगी, कपड़ा तन पर जब तक न होगा ।
और न होंगे सर पर छत, तब तक ज़ारों में आंदोलन रहेगा ॥

मेरा नाम इंजीनियर !

ए साई ! ज़रा पढ़ते चलो ।
हायड्रोलिक्स ही नहीं सीकेनक्स भी,
रोड भी, रेल्वे ही नहीं एरपोट भी,
स्ट्रक्चर ही नहीं एम. एस. भी,
ए साई
तू जहाँ आया है,
बो कोई आर्टस नहीं सायन्स नहीं,
कॉमर्स नहीं, बी एड नहीं,
कुकींग नहीं, म्यूझिक नहीं, इंजीनियरी है,
और प्यारे, इंजीनियरी एक बड़ा पहाड़ है,
और पहाड़ों चढ़ने के लिए,
तेजस्वीको भी और बुढ़को भी,
चमचा को और चमची को भी,

जी. एस. का भी और सी. आर. को भी,
'CLEMENT' से 'Dolipade' तक
'वासुधाणी' से 'जुन्नरकर' तक,
दिनरात पढ़ना ही पड़ता है.
ए भाई
ए. टी. के. टी. से डरता है क्यों ?
सबमोशन पे मरना है क्यों ?
पास किसी ओल्ड स्टुडेंट के,
जबतक तू न आयेगा,
ग्लास कोपी क्या चीज है,
वह नहीं जान पायेगा !
हँसता हुआ आया है,
और रोता चला जायेगा,
ए भाई ! ज़रा पढ़ते चलो

—प्रदीप गोसलिया,
एफ. ई.

गझल

बहुत कठिन है गर, इसका तू गम न कर ।
 नाव है तो क्या, रफ्तार कम न कर ॥
 के रंज-व-गम हों जब, बरदाश्त से बाहर ।
 को अपनी सय के, नशेमें तू जम न कर ॥
 मोलनेसे तुझ से, जमाना खफा हो गर ।
 के डर से अपने, कलम को फलम न कर ॥
 अगर न मैं रहूँ, तो बात ही है क्या ।
 बेरो मिथाने की, कोशिश सनम न कर ॥
 का मैं सामना, कांटों से हो अगर ।
 का मुस्कुरा तू, सर अपना छम न कर ॥
 न बहुत रोया है, लोगों के लिए तू ।
 और उन के वास्ते, आँखें तू नम न कर ॥

ॐ

अब्दुल

हीनके-चमन है, जाने है सब ये राज ।
 बिना ये गुलशन, हो जाये दूटा साज ।
 तेरे बालों में, ये सजता है बहुत खूब ।
 न कर किसीका, करते हो उस पे नाज ॥

वानू इकबाल
 तृतीय वर्ष (मेकेनिकल)



वानू इकबाल

❖❖

REPORTS

INDIAN GAMES

THE interest in Kabaddi and Kho-kho among students showed a sharp rise according to latest figures. Actually there were two challenges to be met. The onslaught of examinations was fast gaining; but still the interest in the Indian games was worthy of notice. Practice used to go on daily, even a month before the final tournaments. We played friendly as well as competitive matches against a number of colleges (e.g. Parle College).

In the University Kabaddi Tournaments we put up an excellent performance and we reached the semi-finals, which we lost un-

H. M. RAJE (F.F.)
Secretary

fortunately. Our opponents were M.V.-L.U. College. In the University Kho-kho Tournaments we caused many upsets and finally reached the semi-finals. But here we suffered a set back and had to give way to the better team M.L.D. College.

Our B.E. (Mech.) student and captain of our Inter-Collegiate Kho-kho team Shri Janjekar was selected for the Inter-University team as captain.

We are thankful to students who showed keen interest in Kabaddi and Kho-kho and to the Principal who gave full encouragement and supported the activity wholeheartedly.

Prof. M. M. RANADE
Ex-Officio

CINE CLUB

THIS year the Cine Club was a grand success. It started off with a bang with the screening of the film ARADHANNA (in colour), shown free to all members.

This was followed by showing a number of hit films, the first being THE TRAIN (in colour) followed by CHASTITY BELT (in colour) and AAG during 1st term.

NAVAL SAIGAL
Secretary

The second term started with the screening of JEWEL THIEF followed by the MERCENARIES (in colour), AMNE SAMNE (in colour) and DO RAASTE. MERI APNE (in colour) was another Cine Club presentation, screened at Navrang theatre as a part of the College Day celebrations.

Prof. M. M. SHAH
Incharge

INDOOR GAMES

As usual Table Tennis got the pride of place in sports events of our College. Table Tennis attracted more students than any other indoor game. The Table Tennis tables were all the time busy when the Gymkhana was open.

Selection tournaments were conducted for selecting the team to represent our College in Inter-Collegiate Tournaments. The following students were selected:

Shri M. E. Khairaz—T.E. (C) Captain.
Shri R. M. Mantha—S.E. (C)
Shri K. S. Merchant—T.E. (C)
Shri L. S. Phadnis—T.E. (M)

Our team did not fare well in the team individual championship matches at the Inter-Collegiate Tournaments. But in team championship Shri Khairaz defeated Rajul Shah who was the opponent in finals of the individual events.

Our team consisting of the above four players represented our College in Lions Club (Juhu) Table Tennis tournament

held in January 1975 and I am proud to say that we retained the Lion's Club Table Tennis Trophy for the second year in succession. In the same tournament in the individual competition both players from our college contested the finals and Shri Khairaz defeated Shri Mantha and won the singles crown for the third time in a row.

Our college team consisting of Shri Gandhi A.R., B.E. (F) and Shri Chittal N.R., S.E. (F) represented our college in the Inter-Collegiate Chess Competition. The same two players won prizes in the College Day Competitions.

College Day tournaments for Carrom were conducted. Banerji A.R., T.E. (M), was the winner and Desai N.G. of S.E. (C), was the runner-up. In Inter-class team championship T.E. (Chapnerkar and Banerji) were winners and S.E. (Desai and Kamal) were runners-up.

M. W. MARATHE
Incharge Indoor Games



Hatred ceases not by hatred.
Hatred ceases only by love.

—Buddha

Integrity is the best among laudable things;
Learning is the best asset;
Health is the foremost among gains;
Contentment is the best happiness;
Kindness to all is the highest Dharma.

—Mahabharata

The mother is weightier than the earth.
The father is higher than the sky.
The mind is swifter than the wing.
Thoughts are more numerous than grass.

—Mahabharata

WALL PAPER

WE started this interesting activity rather late. Due to the delayed commencement of the new academic year, students could not devote much time for this activity. However, there was always something attractive and useful for our student readers, on the wall paper. To mention some, the articles of D. Narayan, B.E. (M), fine sketches and paintings by Kishore Vasudev, S.E. (E) and P. B. Khichadia, T.E. (C), good Marathi poems by H. B. Thakuri, S.E. (E) and Arun Mhatre, T.E. (C).

Mr. A. V. Prabhudesai, B.E. (C), took keen interest in running the wall paper. He conducted a sort of quiz programme through

the wall paper. The wall paper has continued to encourage all types of talents of our engineering students. The Art Exhibition arranged by our students, could reveal the large number of engineer-artists we have. The wall paper has been greatly helpful in knowing about the merits of these artists.

We hope to introduce many more new and exciting items in our wall paper during the next academic year.

We thank all those students who contributed for the wall paper during this year.

Miss L. E. Thailamani
Mr. A. V. Prabhudesai

Mountaineering

IT is heartening to note that one of our students Mr. Surendra G. Mamania B.E. (C) is an active member of our University Hiking and Mountaineering Club.

He has completed basic mountaineering course at the Nehru Institute of Mountaineering, Uttarkashi, in last March. There he obtained very good grades. He has the honour of climbing 18,000 feet (about 5,300 metres) on a mountain known as Shivling in Gomukh-Gangotri region.

He was recommended for an advanced course in Mountaineering conducted by the Himalayan Mountaineering Institute at Darjeeling and has also been selected. He will shortly undertake the course.

Mr. Mamania deserves our compliments for participating in such an adventurous activity. We are confident that he will scale 'higher peaks' after the advanced course.

Editor.

LIST OF STUDENTS WHO PASSED THE BACHELOR OF ENGINEERING EXAMINATION HELD IN MAY 1974 AND OCTOBER 1974.

MAY 1974

(Civil) First Class

D. S.

Prasanna S.

Wala Y. A.

P. T.

Wala H. F.

Shetty Z. N.

S. V.

Navatia V. R.

H. V.

R. B.

A. B.

Shetty M. R.

S. J.

S. S.

Sh J. S.

Sh J. A.

H. G.

V. L.

M. V.

L. D.

Sh B. V.

Sh S. P.

Y. I.

Sh Class

Sh P. N.

R. K.

A. C. K.

L. M.

S. S.

Sh A. I.

Shule P. N.

B. T.

M. N.

Sh M. N.

Sh M. M.

Sh H. J.

Sh K. H.

Sh A. K. Y.

Sh V. D.

Sh S. R.

A. J.

Upadhyaya G. K.

Vhatkar S. D.

Dalal K. V.

Kanvinde D. H.

Soudagar V. V.

Pass Class

Gokhale U. R.

B. E. (Mechanical) First Class

Bhonsale A. V.

Dhargalkar P. A.

Doshi C. G.

Fernandes J. A.

Gandhi S. M.

Iyer G. K.

Kadam A. S.

Kelkar S. K.

Manjit Singh

Mehta K. N.

Rajan S. S.

Ramkrishna K.

Ramanujan S.

Rao M. S.

Rao V. V.

Sheth D. S.

Asrani B. R.

Budhiraja J. S.

Dandekar R. K.

Desai A. M.

Dighe S. S.

Doshi P. C.

Fatiwala S. A. M.

Goradia P. R.

Indulkar S. H.

Jariwala C. V.

Joshi J. V.

Kapadia G. V.

Lillaney R. A.

Mankani P. R.

Mehta Y. H.

Merchant G. K.

Mhatre A. R. Y.

Mhatre A. V.

Nabar A. B.
 Nadiadwala A. V. A. S.
 Nevatia R. S.
 Pai S. R.
 Pandey M. C.
 Pankar A. B.
 Paralkar P. M.
 Parekh B. K.
 Parekh P. G.
 Pundle A. S.
 Rao A. V.
 Raul V. D.
 Rupawala A. K.
 Sabnis R. S.
 Saliya B. S.
 Saple C. R.
 Sardesai R. N.
 Shah N. J.
 Shah P. H.
 Shah V. R.
 Shah V. M.
 Shelar C. P.
 Sheth D. J.
 Shirodkar V. M.
 Shirvaikar S. R.
 Subedar S. P.
 Tailor P. V.
 Talvelkar D. N.
 Tankiwala M. A.
 Tarkad S. V.
 Thawani M. L.
 Vadhar M. N.
 Wadia D. J.
 Waykole V. V.

Second Class

Prahlajgaonkar S. M.
 Salvi V. S.
 Sathe V. V.

B. E. (Electrical) First Class

Tamaneekar A. T.
 Vora S. V.
 Choksi V. R.
 Golatkar S. K.
 Kadakia S. R.
 Kinariwala V. N.
 Parekh S. P.
 Buch V. G.

Gumaste U. V.
 Joshi V. S.
 Kadakia V. M.
 Nerurkar G. B.
 Sathe M. R.

Second Class

Billimoria N. J.
 Doshi H. K.
 Mulay M. D.
 Sathe P. W.
 Sayed M. Z.
 Shah S. R.
 Sheth R. V.
 Dangaria J. J.
 Dave V. P.
 Menghani M. P.
 Pataskar D. V.
 Patel S. M.
 Pathak S. N.
 Patwardhan V. G.
 Shah H. K.
 Shah K. M.
 Vaidya H. D.
 Badle R. M.
 Bhatt B. M.
 Chettiar A. A.
 Gokhale S. M.
 Gupta R. M.
 Jagirdar R. A.
 Jhaveri B. K.
 Joshi Y. M.
 Kadakia P. B.
 Kansaria B. G.
 Kapadia N. N.
 Ketkar S. B.
 Kothari K. K.
 Kothari N. R.
 Kutur R. P.
 Marathe R. G.
 Raichura N. N.
 Shah V. K.
 Shah Y. S.
 Sobhani R. R.
 Upadhye P. V.

Pass Class

Jiwani N. E.
 Shah R. S.

NOVEMBER 1974

(Civil) First Class

Patil C. D.

Patil Class

Patil N. L.

(Mechanical) First Class

Patil D. P.

Patil Ramesh C. N.

Patil P. S.

Patil V. G.

(Electrical) First Class

Patil P. S.

Joshi R. V.

Second Class

Sumbe B. K.

Advani A. G.

Hiranandani P. M.

Raheja B. C.

Bhargava B. B.

Dalvi S. S.

Fernandes A.

Purohit R. N.

Rajpurkar P. A.

★ ★ ★

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