The Precursor

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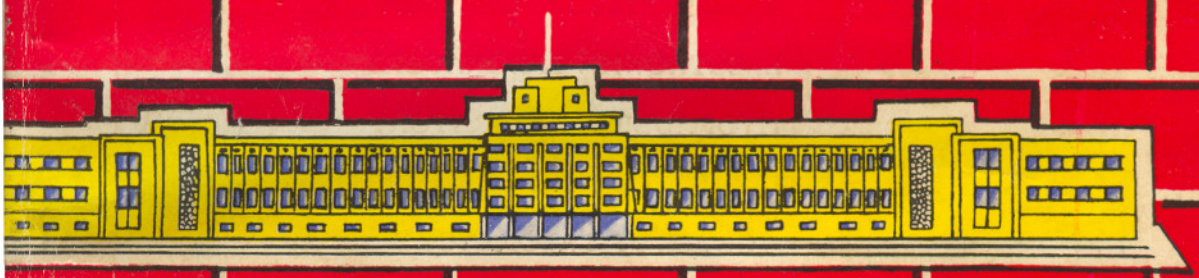

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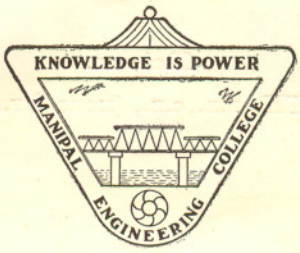

Volume: III

1960-61

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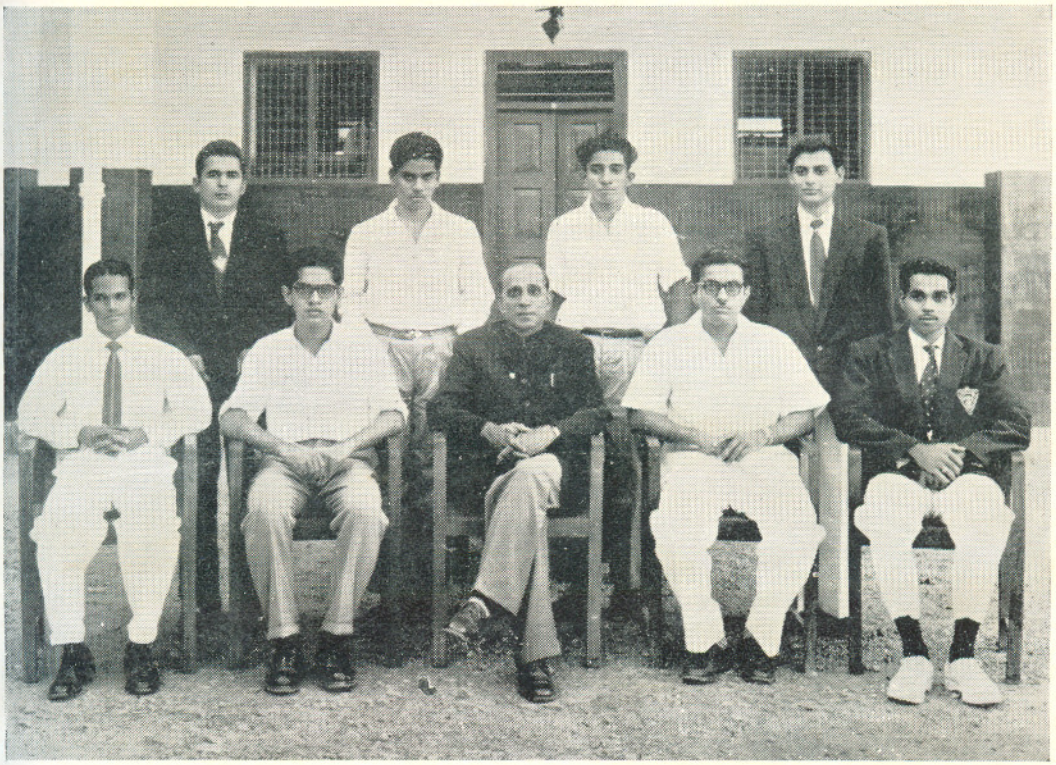

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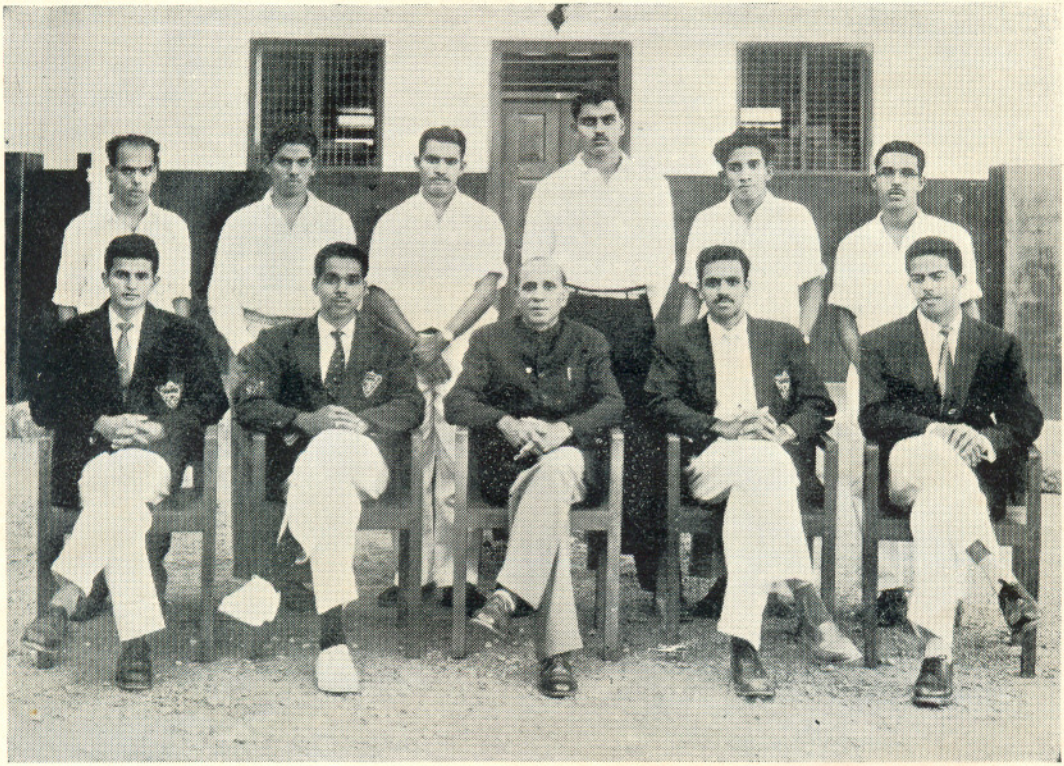

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Editorial

We are presenting with pleasure our College Magazine "The Precursor", third year in succession. Though it was intended to bring out the issue by the end of the academic year, there has been some delay for which we earnestly apologise.

All over the country the 100th birth day celebrations of Dr. M. Visweswaraya, the renowned Engineer-Statesman, was celebrated. To show our humble gratitude to the elderly statesman, it was decided in the very first sitting ofthe Magazine Committee to conduct an essay competition on the Life and achievements of Dr. M. Visweswaraya and to publish the best in the Magazine. Accordingly the Prize awarded essay by Sri V. Padmanabhan appears elsewhere in the magazine.

There have been astounding improvements in the College, a concise account of which may not be out of place in these columns. The shifting of the College from the building meant for K. M. C. Hospital to the new Building forms one of the landmarks in the history of the institution. The new building, a view of which appears on the cover sage, when completed stands as a monument to the genius of the founder Dr. T. M. A. Pai.

All the Departments, Civil, Mechanical and Electrical are fully equipped and have a full compliment of well qualified and experienced professors, a like of which stands in comparison to any well established institution of its kind in our country.

In the coming years with the introduction of Mechanical and Electrical branches and with the increase in the number of intake of students both to pre-Engineering and First year class, the College will be entering into another stage of development.

We deeply acknowledge the help rendered by all the contributors to the Magazine and also to our beloved Principal and other members of the staff who have co-operated with us in the getting up of the Magazine.

EDITORS.

Faith of the Engineer

(Courtesy of Engineers' Council for Professional Development, New York)

(Contributed by JACOB KOSHY)

I AM AN ENGINEER. In my profession I take deep pride, but without vain glory; to it I owe solemn obligations that I am eager to fulfil.

As an Engineer, I will participate in none but honest enterprise. To him that has engaged my services, as employer or client, I will give the utmost of performance and fidelity.

When needed my skill and knowledge shall be given without reservation for the public good. From special capacity springs the obligation to use it well in the service of humanity, and I accept the challenge that this implies.

Jealous of the high repute of my calling, I will strive to protect the interests and the good name of any engineer that I know to be deserving; but I will not shrink, should duty dictate, from disclosing the truth regarding anyone that, by unscrupulous act, has shown himself unworthy of the profession.

Since the age of stone, human progress has been conditioned by the genius of my professional forbears. By them have been rendered us able to mankind nature's vast resources of material and energy. By them have been vitalized and turned to practical account the principles of science and the revelations of technology. Except for this heritage of accumulated experience, my efforts would be feeble. I dedicate myself to the dissemination of engineering knowledge, and especially to the instruction of younger members of my profession in all its arts and traditions.

To my fellows I pledge, in the same full measure I ask of them integrity and fair dealing, tolerance and respect, and devotion to the standards and the dignity of our profession; with the consciousness, always, that our special expertness carries with it the obligation to serve humanity with complete sincerity.

Life and Achievements of Dr. M. Visvesvaraya

Sri V. PADMANABHAN

FRAIL and thin, immaculately dressed in a serge suit with a tie to match, the head adorned with a laced Mysore turban, Sir M. V. has become a symbol of progress and prosperity. His name has been a synonym to honesty, integrity, devotion to duty. efficiency and hard work. On the 15th of September 1960, Sir M. V. entered the 100th year of his fruitful and eventful life. At this hour as one looks back through the century one finds that the history of the nation for the last few decades has been inextricably interwoven with the life of Sir M. V. as he is popularly known.

Sir Mokshagundam Visvesvaraya was born on the 15th of September, 1861 in Muddenahalli, a small village 38 miles from Bangalore, as the son of orthodox brahmin parents. His father, the late Srinivas Sastry was a sanskrit scholar and a devoted student of scriptures. He spent most of his time in pilgrimages. Srimathi Venkachamma, his mother, was a strong-willed and pious lady, who was mainly responsible for his early education and upbringing. When Sir M. V. was five years old, a theft occured in his house which upset his mother greatly. Considering the village to be unsafe, she moved to the adjoining village of Chikballapur.

Sir M. V. began his education in the Chikballapur school. Young Visvesvaraya proved himself to be an industrious and intelligent boy. Nadhamuni Naidu, one of his senior most teachers was quick to percieve these qualities in the boy which were chiefly responsible for the position of emminence he could attain in life. It was Nadhamuni Naidu who developed in his favourite student a taste for good reading.

His maternal uncle Sri H. Ramayya, who acted as God-father to him, took a keen interest in his education. Once Srimathi Venkachamma took Visvesvaraya to a relative's house and stayed there for two months. Coming to know of this Ramayya wrote to his sister and asked her, 'Are you training Visvesvaraya to be a shepherd? You don't seem to give any attention to his education!' Touched to the quick, Venkachamma returned immediately.

When Visvesvaraya was still a lad of fifteen, his father died. Soon after his father's death, Visvesvaraya went to Bangalore and continued his studies, first in the Wesleyan Mission High School and then in the Central College. He took his B.A. with distinction in 1881.

Life in Bangalore for Visvesvaraya was by no means comfortable or easy. In order to meet his expenses, he had to give private tuition in a Coorgi family. He slept in their house and early in the morning after teaching

the children walked to his uncle's house for food and then on to the college. In spite of all these difficulties Visvesvaraya made his mark at college. He commanded the respect and admiration of his friends and lecturers. He was the beloved of his principal Mr. Charles Waters. Mr. Waters took a keen interest in his progress. Often he asked Visvesvaraya to work out complicated mathematical problems on the board. Mr. Waters was so pleased with Visvesvaraya for his deep sense of duty and punctuality that he presented his personal copy of Webster's Dictionary to him. After his retirement Mr. Waters returned to England and settled down in London. Sir M. V. never failed to call on him whenever he visited London. The deep affection and regard that Mr. Waters had for Visvesvaraya can be gauged from the following incident. Before he died, Mr. Waters asked his wife to go over to India and present a pair of gold links he was using, to his old and distinguished student. Mrs. Waters carried out her husband's wish. To this day Visvesvaraya cherishes this gift.

After passing his B.A., Sir M. V. prosecuted his further studies in Poona on a Mysore Government scholarship. He joined the Poona College of Science and took a degree in Engineering. He completed his course in two and a half years instead of the usual three. He won the James Berkely Prize by standing first in the Bombay Presidency.

Visvesvaraya entered his official career in February 1884 as an assistant, engineer of the Bombay P. W. D. This was a post gual ranteed to the first among the successfu- candidates. By dint of hard work, single-minded devotion to duty and his efficient handling of affairs, Sir M. V. became the object of unstinted praise by his superiors both Indian and English. It may be mentioned here that once Sir M. V. was accused by his superior officer, of lacking energy and obedience to orders, when he proposed to postpone, on account of heavy monsoons, an engineering work. Accepting the challenge, Visvesvaraya completed the work in time under very unfavourable conditions. This pleased the official who made the adverse remark, very much. He not only reversed his opinion, but also encouraged Visvesvaraya to appear for a practical examination much earlier than the usual time. Sir M. V. came out successful and was promoted to the higher grade. Within twenty months of his entering the service, he reached the first grade, which was indeed a remarkable achievement.

Sir M. V. possesses a fertile and inventive brain. While serving in the Bombay P.W.D. he designed a new type of flood gate, which has been named after him. This is an ingenious device for automatically controlling the flow of water over the spill-way of a dam. These gates were first installed in the Khadakvasla Dam in Poona. This invention of his has been acclaimed as a very important contribution to Irrigation Engineering. Another of his valuable contribution to the same subject is the 'Block System of Irrigation', Invited by the Indian Irrigation Commission, appointed in 1901, to put forward a working scheme for making irrigation more popular and economical in India, Sir M. V. evolved the 'Block System of Irrigation'. The system aimed at the economical utilisation of the irrigation water yielding the maximum benefit to the cultivator. The scheme was approved by the I.I.C. which described it as 'very complete and well considered'. But in implementing it Visvesvaraya met with opposition from many officials and some cultivators. However, he went ahead boldly

with the scheme and implemented it successfully.

Visvesvaraya served in the Bombay P.W.D. for nearly fourteen years during which period he executed many important engineering works. In 1908 he resigned from service, long before he was due to retire, when he found that political conditions of the day would not permit his being made the Chief Engineer, even though he deserved it. The Bombay Government regretted his resignation very much and granted him a pension, taking into consideration the 'exceptionally meritorious services' he had rendered.

By this time his fame had spread far and wide and he had made a large circle of influential friends like Mahadeva Govind Ranade, Gopal Krishna Gokhale, Bal Gangadhar Tilak and V. S. Srinivas Shasthri. On the social side he was responsible for the starting of Deccan Club.

Immediately after his resignation from the services of the Bombay P.W.D., he went on a foreign tour. He could not complete his tour as he received an urgent invitation from the Nizam of Hyderabad to take up the office of the special consulting engineer. However, he finished a part of the tour before taking up the post. On his return from foreign tour he received a telegram from the Dewan of Mysore requesting him to accept the office of the chief engineer of the Mysore State. As he was already committed to his assignment in Hyderabad, he declined the offer. But, two months later he again received an invitation from Mysore to join the State services as chief engineer. He joined the Mysore service as chief engineer on November 15th, 1909 after much persuasion from His Highness the Maharaja Krishnaraya Wadiyar who was impressed by his "high qualifications and distinguished services." Visvesvaraya has no intention of taking up routine service under any Government. Therefore he made it a condition, for joining the service, that the Government should give him free scope for initiating large schemes of technical education and industrial development.

In compliance with its assurance the Government appointed two committees, one on technical education, and another for industrial development, with himself as Chairman of both. In meeting after meeting he addressed Visvesvaraya stressed the need for industrial development and education. He pointed out that the only remedy for the economic and social evils of the day lay in increased production, technical, and scientific advancement and improved education. He reeled out statistics to show where and in what ways India and Mysore were behind the industrially advanced countries of the world like Japan, U.S.A. and U. K. and how she could improve. He coined such impressive slogans as 'industrialise or perish', 'Produce or Perish', 'investigate, educate and organise' etc. With his drive and imagination, he hustled the people of Mysore as they had been never before and instilled into them a love for hard work.

While he was chief engineer he put forward a scheme to harness the waters of the river Cauvery, for irrigation and generation of power, by constructing a dam at Kannambadi. This scheme met with strong opposition from the Madras State which feared that the supply of water to Mettur Dam will be cut off by the construction of the Kannambadi Dam. However, Visvesvaraya fought boldly and ultimately succeeded when he became Dewan.

He is responsible for the expansion and development of railways in Mysore. While he was chief engineer he initiated steps for the construction of new lines and to take over the existing line.

In November, 1912, Sir M. V. accepted the office of the Dewan at the instance of His Highness the Maharaja. For six years he held this post with distinction and honour. In this short period of six years, under his efficient and inspired leadership, Mysore achieved tremendous progress in all fields, including those of education, industry, agriculture and sericulture. It was he who brought into being the Mysore University, a State Bank, an Economic Conference and the Chamber of Commerce. He also drew up plans for the establishment of the Iron and Steel Works at Bhadravati and the Lakkavalli Hydel Project. His ambition was to make Mysore industrially, economically and educationally advanced. He can truly be called the architect of Modern Mysore.

Sir M. V. toured foreign countries three or four times. He was particularly impressed by the progress and development in Japan. He was acutely aware of the backwardness of Indians. He firmly believed that India could raise her economical and social standards by rapid industrialisation and mass education. He was far ahead of his time in advocating Planned Development. In fact he can justly be called the Father of Planning in India. In his books entitled 'Reconstructing India' and 'Planned Economy', he put forward his suggestions for the development of the nation.

Sir M. V. possesses an affable nature and he is never known to have got angry. He is extremely polite and courteous to all his visitors, irrespective of their position or wealth. He is always neatly and elegantly dressed.

He is extremely tidy in his habits and possesses a methodical mind. He never tolerates solvenliness. He has a passion for precision and hard work.

He is generous, but never extravagant. He values selfless work, unattached by pecuniary or other vested interests. This is evident from the fact that he donated the entire sum of two lakhs of rupees, which the Mysore Government offered him as emoluments for his services in connection with his work at Bhadravati Iron and Steel Works, for the starting of the Occupational Institute at Mysore.

He attaches great importance to worth and merit and while in service he saw to it, that only the deserving candidates were selected for appointment to posts under the Government. He never allowed any relative of his to get any favour from the Government.

An interesting question that several people ask him is "What is the secret of your long life?" To them he always says 'Hard work, desciplined habits, modesty in luxury, contentment and cheerfulness'.

Sir M. V. is a curious mixture of the Modern and the orthodox, the orient and the occident. In him is combined the best of both the West and the East. In his 100th year today, he is still active and energetic. This Grand Old Man of India is really the Grand Old Young Man of India. I pray that this 'Karmayogi' lives for many more years to come, continuing to be a source of inspiration and guidance to us.

The Wonder World of Silent Sound

Sri K. V. K. KARANTHA, B.SC., GRAD.I.E.

SOUND waves vibrating at a very high pitch, can do a job in a matter of seconds, which would be by other means, considered mpossible. Usually sound vibrations beyond the audiable range of the human ear (called as silent sound or ultrasonic) are used. Silent sound wave is a strange potent power that can do anything, from disintegrating a fish swimming in a tank, kill the bacteria contained in milk, clean the dirtiest material, treat diseases like osteoaritrities, to test the soundness of concrete, spot the submarine in the sea, weld aluminium, drill holes of any shape in metals and non metals alike.

Much of the fundamental knowledge of ultarasonics was provided by Professor Gaines of Texas University in U. S. A., who made a serious study of the behaviour of silent sound shortly before the World War II. By a special type of microphone with quartz crystal vibrated to produce sound waves, he was able to batter to death a gold fish swimming in a tank and disintegrate blood corpuscles dropped in it, in a matter of few minutes. Much research and study have gone to make ultrasonics a wonder tool in the hands of the engineer today.

When a tuning fork is set in vibration or a violin string is plucked or a flute is blown, sound waves are set up which are audiable to the human ear. When electric current is applied to the opposite sides of a thin flat piece of quartz, it vibrates by slightly increasing and decreasing in length, there by producing sound waves of such high frequency that they are no more audiable to the human ear. The top note detectable by a human ear is between 10,000 and 14,000 cycles per second, while the ultrasonic wave may vibrate at anything from twenty thousand to one and a half million cycles per second. The number of vibrations per second is governed by the strength of electric current applied to the sides of the quartz plate. The method of generation of ultrasonic waves from an electrified crystal is called as piezo-electric effect. A circuit diagram for a simple piezo-electric generator is shown in figure 1. A similar effect can also be obtained by magnetising and demagnetising iron or nickel which results in a slight change in the length, thereby setting up the vibrations and cause the iron or nickel to emit the sound waves. Iron rod is placed inside a coil of wire through which electric current is passed. By means of an oscillating valve, high frequency current is passed resulting in magnetisation and demagnetisation. The strength of the current passing through the coil can be varied to alter the intensity of ultrasonic waves. This method of producing sound waves is called as magnetostriction.

Washing clothes or dishes is a laborious and tedious process. Today there are machines in the market working with 40,000 cycles per second ultrasonic waves (which sound only bats can hear) and they can clean even the dirtiest job in mere six minutes. Powerful very rapid vibrations of soundwaves create millions of small bubbles and are collapsed by a process called 'cavitation'. Due to the tremendous pressure and heat generated, the bubbles explode, thereby blasting off the dirt from the dishes and clothes. Engine parts having oil, grease, carbon and dirt are now a days cleaned bright and clean, all in a matter of seconds with the help of such machines.

When silver bromide is dispersed in gelatine by ultrasonic waves, a clearer photograph is obtained. Sound waves are used for mixing up pigments smoothly in oil to give a finer dispersion in paint.

Ultrasonics is used to get a better and clearer picture of the internal organs like cerebrum, heart, lungs etc., which would not show up clearly in an X-ray. Very high frequency sound waves (about 1,000,000 cycles per second) are used, to treat many a crippled afflictions. It is not known how silent sound cures. Probably the internal tissues are heated or the parts are shaken up thoroughly to straighten things out. Ultrasonic microscope is aiding the bacteriologist, and is now being used to examine minute things which cannot be seen by the naked eye or with an optical microscope.

In the Atomic reactor plants there is a frequent need for the removal of radio active dust and oil from the instruments, tools and other articles retrived from 'hot areas'. Sound waves offer a faster and more effective method than conventional means.

Since sound travels as a wave, it can be focussed into a beam. By noting the time interval between the transmitted and the reflected waves, ocean depths can be gauged or the presence of a shoal of fish or a submarine be correctly detected.

For an engineer too, ultrasonic instruments have become a handy tool for testing the strength of concrete or detect flaws in castings or determine the stress in the material without the slightest damage being done to the object under test.

Until recently the strength of concrete mix could not be tested at the construction site, owing to the fact that in order to determine its strength, concrete bad to be tested to destruction. But with ultrasonic test equipments now developed, concrete can be tested when being poured afresh or after curing has taken place. To determine the strength of concrete the instrument having two identical transducers, one acting as a transmitter and other as a receiver are used and the specimen to be tested is placed beneath the instrument. The time interval measured by comparing the interval between the transmitter marking pulse and receiver marking pulse, is noted on a caliberated oscilloscope screen. As the concrete sets, its strength increases and so, does the velocity of propagation of ultrasonic waves through it. Any crack or flaw can also easily be detected with the instrument. Thus ultrasonic testing has become a powerful tool for the Civil Engineer to build stable and sound structures.

Owing to comparitively high vibrations and speed, capable of being set up, ultrasonic waves are used in accelaration tests to determine the point at which metal fatigue of aircraft structures takes place by applying long periods of continuous vibrations to the specimen.

When aluminium and certain kinds of metals are to be soldered oxides are formed so quickly during the application of soldering iron that the joint is never perfect. But when an ultrasonic iron is used, the intense vibrations are communicated to the molten solder and the oxide film is erroded thereby making the solder reach the metal surface and combine with that. Thus aluminium is now being used for many useful purposes which were once thought impossible. Ultrasonic soldering iron not only heats the part, but also batters the oxide film to provide the grip for the solder. The construction of the soldering iron is shown in figure 2.

Usually heavy steel castings and forgings have blow holes, cracks or flaws. By using silent sound, it has now been possible to locate the exact position of the defect in pieces of steel many inches thick. An instrument transmitting silent sound is placed over the object to be tested as illustrated in figure 3. When high pitch sound waves are passed through the object to the bottom are reflected back, they are detected by the detector. If the sound waves are interrupted due to the flaw in the material, it can easily be observed due to the lag in the impulses projected on the oscilloscope screen.

For machining metals and non-metals alike, ultrasonic waves are used. Abrasive grains are repeatedly driven into the work piece by the linear oscillation of the tool. The transducer unit (see figure 4) converts electrical energy to mechanical energy and the tool does linear oscillatory motion due to the phenomenon known as magnetostriction. The abrasive cuts through and the hole it makes is the exact shape of the bit (the bit, incidentally, need not be hard at all) so that one can cut squares or any odd shape.

Though ultrasonic waves have only recently been put to the various uses listed above, it is still to grow to its full stature and utility. It is finding wider and wider applications in the various branches of human activity. Sound waves, once considered useful only for the blind bat to grope it's way in the dark to search its food, has now become a handy and versatile tool in the hands of man to enable him build a happier and safer world of tomorrow.

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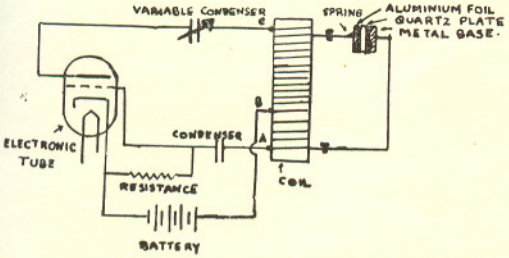
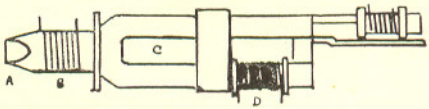


FIG 1. CIRCUIT DIAGRAM FOR A SIMPLE PIEZO-ELECTRIC GENERATOR.



A: NT B: ELECTRIC HEATING ELEMENT
C: MAGNETO STRICTIVE GENERATOR FOR PRODUCING WAVES OF SOUND
D: ELECTRIC SUPPLY TO THE GENERATOR

FIG. 2 ULTRASONIC SOLDERING IRON.

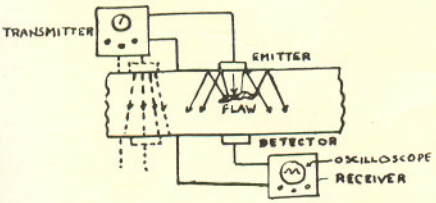


FIG 3. ULTRASONIC FLAW DETECTOR

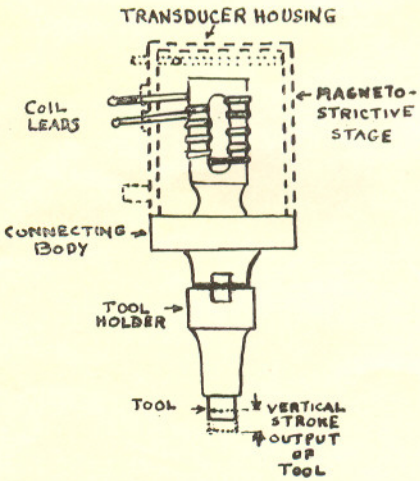
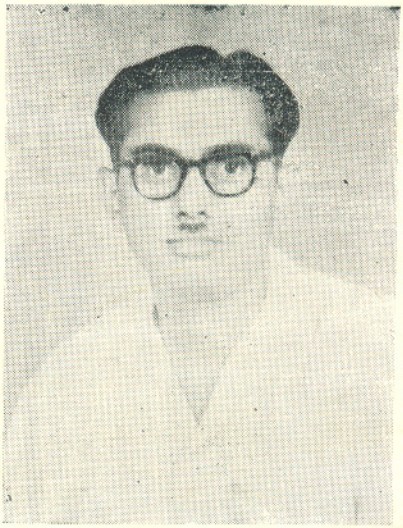


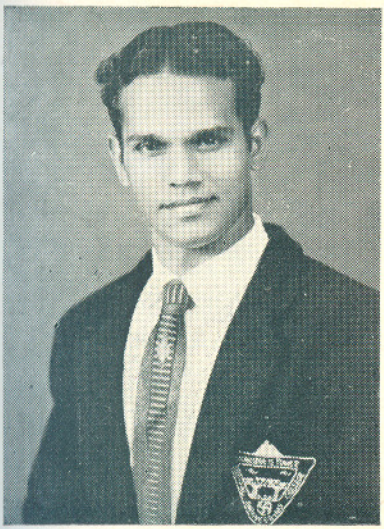
FIG 4. DIAGRAMATIC LAYOUT OF MAGNETO-STRICTIVE TRANSDUCER

Office Bearers of the Magazine Committee

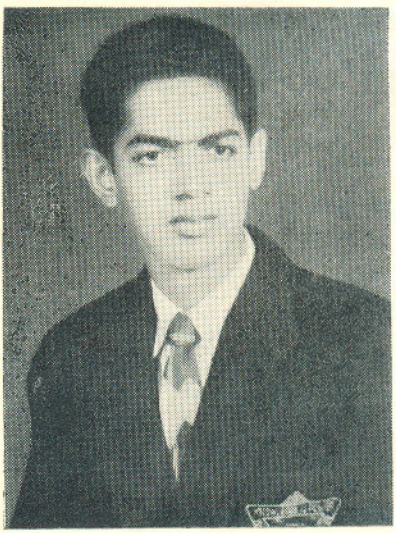
Sri M. N. Kamath
Principal & Chairman



Sri K. S. Krishna Murthy
Staff-Editor

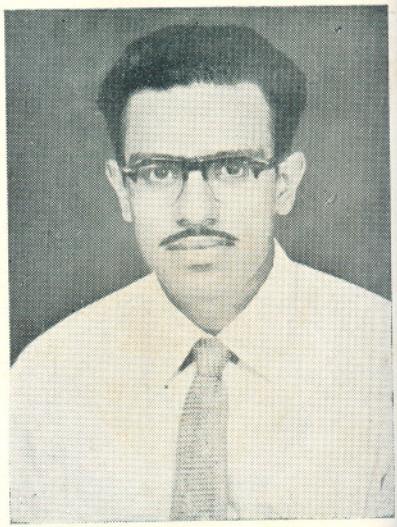


Sri K. P. Varkey
Secretary

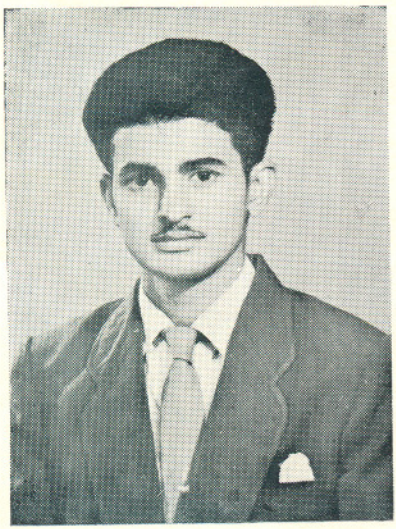


Sri Jacob Koshy
Student-Editor

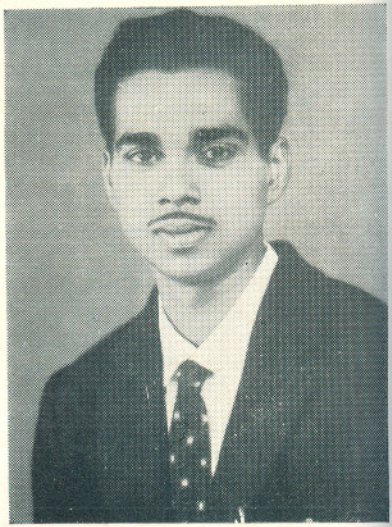
P. Venkatramana Bhat
Vice-Chairman



Sri Keshava Kini
Student President

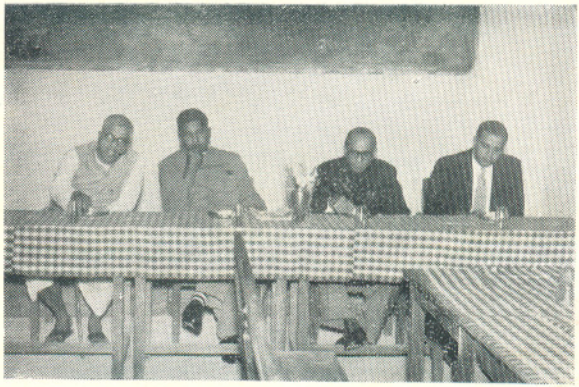


Sri John Abraham
Student Vice-President



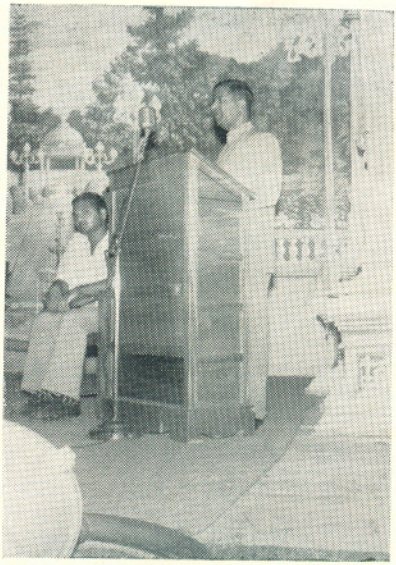
Sri George Thomas
General Secretary

—At the Entrance



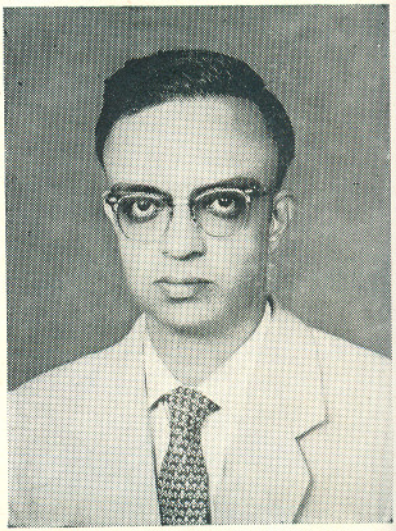
Sri S. W. Saldhana with Dr. T. M. A. Pai—
Over a Cup of Tea

Dr. T. M. A. Pai welcoming the Chief Guest



Sri Saldhana addressing the Students

Sri M. N. Kamath
Chairman



Sri B. V. Krishna Murthy
Vice-Chairman

Sri Edwin Goveas
Sports Secretary

Sri K. M. Ballal
Physical Director

Productivity and Standard of Living

M H. KINI, B.SC., (ENGR.)
Work Study Engineer,
Philips [India] Ltd., POONA.

THE main task confronting a Welfare State is to raise the standard of living of its people. The standard of living of any man is the extent to which he is able to provide himself and his family with the things necessary for sustaining and enjoying life and this varies greatly from country to country. A poor man in the United States would be a rich man in India.

The minimum requirements for a decent standard of living could be summarised as follows :—

1. **Food :**—enough food to replace the energy used every day in living and working.
2. **Clothing :**—enough clothes to permit physical cleanliness and afford protection from the weather.
3. **Housing:**—housing which could give protection under healthy conditions.
4. **Hygiene:**—sanitation and medical care for preventing disease and treatment during sickness.
5. **Education:**—education to enable every man, woman and child to develop their talents and abilities to the full extent.

The average standard of living of any community is directly related to the amount of goods and services produced in that community which obviously leads us to the conclusion that the only way of raising the standard of living is to increase the production of goods and services. There are two main ways of achieving the objective: One is to increase employment, the other is to increase productivity towards which every engineer can contribute immensely and thus help our country in its collosal task of providing the common man with the minimum necessities of life.

The definition of productivity, put in simpler terms, is nothing but the arithmetical ratio between the amount produced and the amount of resources consumed in the process of production. It must be clearly understood that the increase in production does not necessarily mean increase in productivity as the former one represents only the quantum while the latter one indicates the ratio of input and output. If a steel factory, producing a certain amount of steel, doubles its production by doubling the plant and equipments, the productivity of this factory remains the same even though the production has increased as the ratio of the amount produced and the amount of resources used does not change.

The main resources available at the disposal of an enterprise can be classified as follows:—

1: Land & building:—

Land situated in a convenient location on which to erect the buildings and other

facilities vital for the operations of the enterprise.

2. Materials:—

Materials that could be converted into products to be sold. Even fuel, chemicals and packing materials are included in the list of materials.

3. Machines:—

Plant, equipment and tools used in carrying out the process; transporting and handling materials; heating, ventilating, air-conditioning and generating power; office equipment and furniture.

4. Man power:—

Men and women engaged to carry out operations of manufacture or service, to design and do research, to plan and control, to buy and sell.

The output derived by utilising the above mentioned resources determines the productivity of an enterprise and it is the main responsibility of the management to plan, direct, motivate, coordinate and control in order to produce maximum goods and services from the available resources. Even though the methods employed to find ways and means to increase productivity are varying from industrity to industry, from case to case, the basic approach is as follows:—

1. Select the job or process to be studied.

2. Record every minute detail in the proper sequence from direct observations in the most convenient form for facilitating proper and quick analysis.

3. Analyse and examine every fact critically and challenge everything done, considering in turn: The purpose of activity, the place where it is performed, the sequence in which it is done, the person who is doing it, the means by which it is done.

4. Develop the most economic method taking into account all the circumstances.

5. Study dispassionately the new developed method to find out whether it is really economical and there are no loop holes.

6. Define new method as precisely as possible.

7. Instal the new method.

8. Give a close follow up and watch the results.

Example:—A glass factory was planning to construct a new building at a cost of nearly Rs. 100,000/- as it was finding acute shortage of space for storing the finished goods, but a work study engineer made a thorough study of the problem on the same lines as mentioned above and found that about 25% of the space available in the existing stores building was occupied by obsolete items which could be just thrown out as scrap. Moreover as the glass bottles are brittle, the sacks containing bottles were stacked to a height of only 10 feet even though the ceiling was 25 feet high. So it was decided to construct a mezannine floor to the existing stores building at a height of 12 feet and at a cost of about Rs. 30,000/-. Thus the work study engineer solved their space problem and saved nearly Rs. 70,000/- for the firm. Such instances are numerous and it is beyond the scope of this short article to explain in detail how to employ the technique of work study for increasing productivity.

In the foregoing paragraphs some effort has been made to suggest that the way to material prosperity of a nation lies in increasing productivity; systematic approach and common sense are the main guides in achieving this end in the fields of agriculture and industry. Every engineer, when he enters into practical life, should not be satisfied with merely having produced quality goods but aim at producing them at the minimum cost in order to get maximum returns from the resources employed.

DO YOU KNOW!

That

(1) The quick brown fox jumps over a lazy dog

(2) Pick up my box with five dozon liquor jars

Contains all 26 English letters in them ?

Glimpses of Alternating Current Motors

Sri BABANI SHESHAGIRI PAI

Electric motors can be classified according to principles of operation, according to construction and ventilation methods and according to operating characteristics. As most, or all, public supplies are on the alternating—current system, the choice is normally restricted to alternating—current motors.

I

Alternating—current motors are theoretically more complicated; but tremendous progress has been made in their design and construction, so much so, that almost exclusively they are, nowadays, used in industry, throughout the world.

The number of poles in a motor and the frequency of the supply determine the SYNCHRONOUS SPEED ($N_s = 60f/p$ revolutions per minute, p being the pairs of poles and f the frequency in cycles per second, of the supply) and alternating—current motors are usually classified relatively to this speed:-

1. Those motors which operate at synchronous speed are called SYNCHRONOUS MOTORS;
2. Those motors which operate at speeds other than synchronous are called A-SYNCHRONOUS MOTORS.

II

Synchronous motors have their field, which forms the rotor or the rotating part, produced by a direct—current, whereas the stationary, or stator, is supplied with an alternating current. Stable working is only possible for synchronous motors when the speed in revolutions per second is equal to the frequency of the supply divided by the pairs of poles. This speed is, obviously, independent of the load up to a certain limit; if the load torque exceeds this limiting value, the machine stops. Once stopped, it cannot restart even if the load is removed. It is necessary to run it up, by some external means, to a speed approximating to synchronism, when it will pull into step and continue to run.

Synchronous motors are not so widely used as induction motors, the reasons being (1) they must be excited with direct current; (2) they are more difficult to start; and (3) they need more supervision than induction motors.

The cost of a synchronous motor is greater than that of an induction motor of the same rating. Synchronous motors are generally used for long continuous duty where the advantages of high efficiency and power factor control offset the increased capital costs.

III

Asynchronous motors can be divided into:—

(1) Induction motors and (2) Commutator motors.

IV

In 1885, Professor Galileo Ferraris of the University of Turin invented the first induction motor in the toy form. Almost simultaneously, but independently, Engineer Nikola Tesla, connected with Westinghouse Electric and Manufacturing Company, conceived the modern induction motor in practiceable form and later in 1888 took a patent known as the Tesla Patent.

Induction motors consist of a "Stator" and a "Rotor", the former supporting windings which receive Electrical energy from the alternating-current supply, the latter carrying windings in which the working current is induced.

The late Dr. Charles P. Steinmetz, connected with the General Electric Company, pointed out that from one point of view the induction motor may be regarded as a direct evolution from the direct current shunt motor; that from another, it is closely akin to the static transformer; that from still another it resembles a generator feeding a fictitious resistance.

But the original or classical method as evolved by Nikola Tesla employs the "Rotating (or Revolving) Magnetic Field" as the central feature. This method is the most realistic in many respects.

A rotating field can be produced directly by supplying a fixed winding with polyphase alternating currents (in actual practice, three -phase alternating currents). This rotating magnetic field (1) is constant in magnitude, being in the case of three-phase alternating currents, equal to one and half times that due to one phase acting alone and (2) rotates at synchronous speed with respect to the stator.

These two statements, which are of great importance, can be proved by TWO ways :—

1. **GRAPHICAL METHOD OR VECTOR METHOD.** In this, the three alternating magnetomotive-force-vectors are drawn and their resultant computed at different space or time intervals. This is the usual method taught to the students, while teaching them the three-phase induction motors.
2. **FRESNER METHOD.** In this, the alternating magneto-motive force of each phase is resolved into two oppositely rotating components, each having a constant magnitude equal to half the maximum value of the original magneto-motive force and rotating with the periodicity of the latter. This method is taught to the students while teaching them the single-phase induction motors.

There are two types of three phase induction motors: (1) Squirrel-cage induction motor and (2) Slip– ring induction motor.

In the squirrel-cage induction motors the rotating magnetic field sweeps across the rotor-conductors, and electro-motive forces are induced in them. Since these conductors form a closed circuit, a current flows, the direction of which is, by Lenz's law, such as to oppose the change causing it. This change is the relative motion of the rotating field and the rotor, so that, to oppose this, the rotor runs in the same direction as the field for which (i.e., to cause rotation) a torque must be produced. The actual speed of the rotor is, and must be, always less than the synchronous speed by an amount called "The Slip" (e g. a 6-pole motor running at 960 R.P.M. off a supply of 50 cycles per second would have a slip of (50 x 60)/3—960=40 R.P.M. which may be expressed as 40 x 100/1000=4 per cent).

The electro-motive force induced in the rotor is proportional to the slip; on no-load, when the torque is determined only by the losses of the machine, the slip is small; as the load increases the rotor current must increase to provide the greater torque. This necessitates an increased rotor electro-motive force, which is provided by an increased slip, i.e., a reduced speed. The torque-speed characteristic of an induction motor is, therefore, similar to that of a direct-current shunt motor.

The rotor of the slip-ring type of induction motor has a winding which consists, in its simplest form, of a coil winding similar to that employed on the stator. The rotor circuit is given a high resistance, so that a starting torque may be developed. The resistance is gradually cut out as the machine speeds up, and ultimately the three slip-rings are short-circuited by means of a collar which can be pushed along the shaft to connect all three slip rings together. This ensures minimum rotor resistance and, therefore, maximum efficiency when running; in order further to reduce losses, the brushes are sometimes lifted from the rings when full speed is attained. This reduces friction loss and wear on the rings and brushes.

A simple single-phase induction motor is not capable of producting a rotating magnetic field and it is not self-starting, although it will continue to run if it is started and brought up to speed by an auxiliary device. This takes the form of an auxiliary stator winding spaced 90 electrical degrees, i.e., half a pole-pitch, from the main winding and connected, in series with an impedance, to the main supply. This impedance is chosen to produce as great a phase displacement as possible between the currents in the main and auxiliary windings, so that the machine starts up virtually as two-phase motor. The added impedance may be an inductance, or a resistance.

In the capacitor induction motor, the impedance connected in series with the auxiliary winding to produce the necessary phase displacement, takes the form of a capacitance, instead of an inductance or resistance.

Combining the characteristics of the synchronous motors and induction motors we get what is known as the synchronous induction motors, the typical applications of which include fans, pumps, blowers, generators, air-compressors, ammonia-compressors, machinery and line shafting in industrial works such as cement mills, rolling mills, flour mills, paper mills, rubber works and textile mills.

V

To obtain improved speed control, starting torque and power factor, alternating current commutator motors have been developed. These may be, broadly, divided into two classes:—(1) Single Phase Commutator Motors and (2) Three-Phase Commutator Motors.

VI

The single-phase commutator motor may be divided into the three distinct types: (1) The Single Phase Series Motor (2) The Single Phase Shunt Motor and (3) The Repulsion Motor.

The principal constructional differences between direct-current and alternating-current Series Motors are that the stator core and yoke of the alternating-current Motor are laminated to reduce eddy currents created in the cores by the alternating flux, and that compensating coils are fitted in series with the armature to improve commutation. The speed-torque characteristic of the single-phase series motor is similar to that of the direct-current series motor, so that it is suit-

table for traction service. Small series motors, which usually have no compensating coils and are designed for operation at high speed, are often intended for use on either direct-current or alternating-current. These are the so-called **"UNIVERSAL MOTORS"**. Due to their high speed such motors have quite a high power output for their size and weight, and consequently are very suitable for portable machines.

The Single Phase Shunt Motor has two sets of brushes: One brush set lies in the axis of the stator winding while the other is at right angles to this, each pair of brushes being short-circuited. The stator winding is connected directly to the supply. Such a motor constitutes a simple single-phase shunt motor; but the main drawback of this type of machine is that it has no starting torque.

Repulsion motors, which are improved on Single Phase Shunt Motors, operate by the reaction between a magnetic flux, created by current in the stator winding, and induced current in the rotor conductors. The repulsion motors are suitable for refrigerators, compressors and other drives.

VII

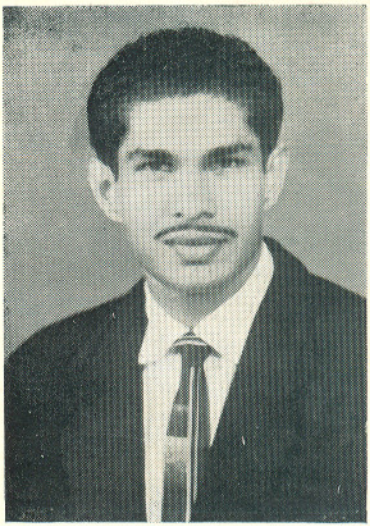
The Three Phase Commutator Motor has a three-phase stator winding like that of an ordinary induction motor. The rotor carries a winding similar to that of a direct-current armature; its commutator is provided with three brushes per pole pair and these are spaced 120 electrical degrees apart. The supply is fed to the stator, which is connected in series with the primary of a transformer whose secondary is joined to the brushes. The phase relationship of the electro-motive forces induced in the stator and the rotor depends upon the position of the brushes, any movement of which alters the phase of the rotor electro-motive force without changing its magnitude. To increase the speed of the motor, the brush gear is moved backwards. The regulation of speed by brush displacement makes external resistance unnecessary and avoids the losses consequent upon their use, so that the efficiency of the motor remains high over the whole working range. The power factor is also high, approaching unity for speeds near and above synchronous speeds.

The rotor-fed three phase Commutator motor, invented by H. K. Schrage of the Swedish Company ASEA, and known as the "SCHRAGE MOTOR" has its primary windings on the rotor and fed from the alternating current mains through slip rings. These windings create a magnetic flux of constant strength which rotates at synchronous speed with respect to the rotor, or at slip frequency in space. A second direct current type winding on the rotor is connected to a commutator. The three phases of the stator windings are supplied from the commutator by three pairs of brush sets. The centres of each pair are symmetrically disposed round the commutator, but the distance between the two sets of a pair can be varied. Since the direct current winding rotates with the primary winding, it will act as a transformer and will have induced in it an electro-motive force of synchronous frequency, converted to slip frequency at the brushes; the electro-motive force induced in the stator windings by the rotating field will also have slip frequency. Torque is created by the reaction between the currents in the stator windings and the flux created by the primary windings. The advantage of Schrage motor is that the speed can be controlled by injecting voltage from the brushes on the commutator into the stator windings. Since this voltage can be controlled by separation of brushes, the speed is

controlled by the same means. The motor can operate at above or below synchronous speed or at synchronous speed. There are many industrial applications of the Schrage motor: (1) An extensive field of application has been found in the printing industry, in which variable speed is essential. The motor has proved equally suitable for driving the smallest press as for driving the large rotary presses used in newspaper production. (2) In the paper industry, this motor was early employed for paper-machine drives. (3) In rubber factories, The Schrage motor is extensively employed for driving rubber calenders for which an ample horse power rating chosen, since it is difficult to predetermine with accuracy what class of material is likely to be dealt with. (4) In steam boiler installations, the auxiliaries often represent a power consumption reaching 5 per cent of the station output. High efficiency and variable speeds are necessary and these motors are commonly employed for boiler fans and stoker drives.

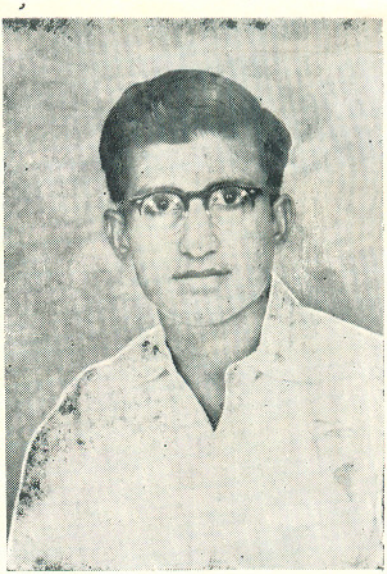
Thus the three phase commutator motors and in these the Schrage motors are superior in many respects to all other types of motors.

Sri Pundalika Padiyar
First in the University in
F. E. Examination 1959-60

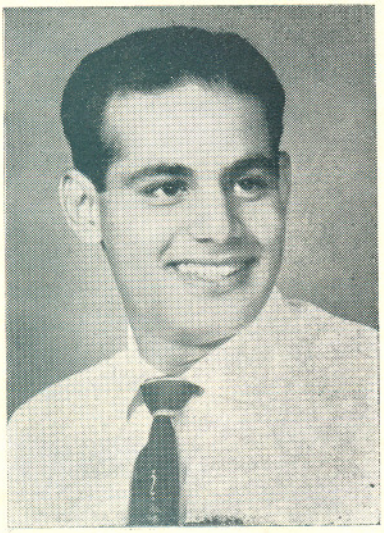


Sri P. V. Varkey
Prize Winner
Cover page design Competition

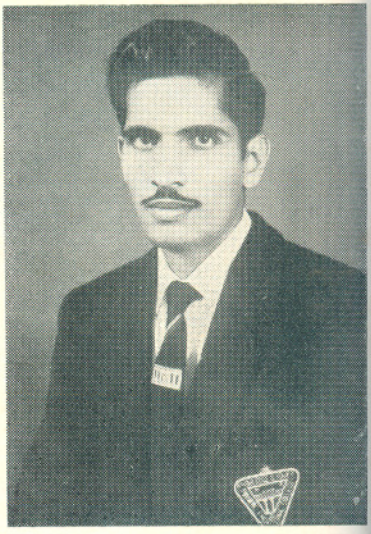
Sri K. A. Thomas
Adjudged No. 1 Athlete



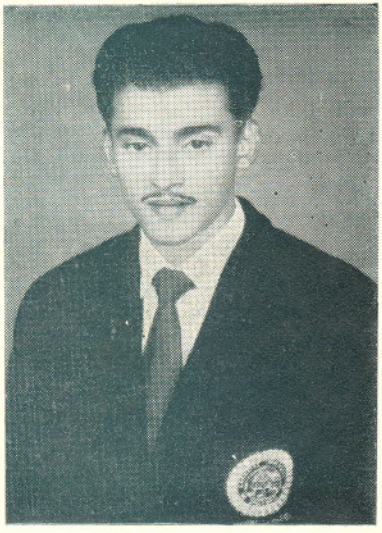
V. Padmanabhan
Prize Winner of the Essay Competition
on "The life and achievements of
Dr. M. Visveswaraya"



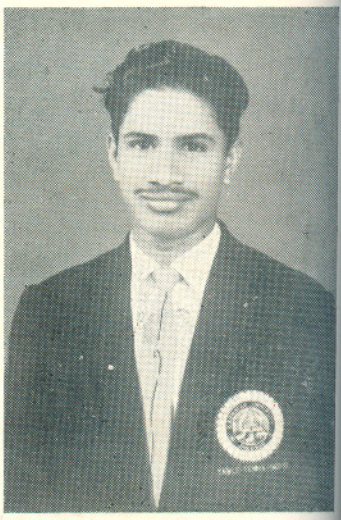
Sri P. N Bhandari
"Outstanding Cricketer"
Represented the University XI



Sri B. Parandhamayya
Athletic Captain
Represented Udipi Kabhadi team in Dasara Sports Meet at Mysore



Sri George Mathew
Represented Inter 'Versity Foot-ball 1960-61



Sri G. K. S Raghavan
Represented
the University Table-Tennis Team

On going Abroad for Higher Studies and Training

Prof. R. K. BALIGA, B.E., (HONS.)
D.I.I.SC., (P. E.)

MOST of the students passing out of Engineering Colleges are desirous of going abroad if they get a chance to do so. It is very natural and good to improve ones knowledge. In their anxiety to go abroad they go on applying to various foreign Universities or Institutions. On securing admission they do go to these Universities and study various subjects. Some of them specialise and get their Ph. D. or D. Sc. Then only the thought of returning to India and taking up some vocation comes up in the minds of some of them and the rest still try and continue to stay in the foreign countries. Most of those who stay back say either that they have a good job in the foreign country against the possibility of unemployment in India, or that they are married to ladies in that country, so they have to settle down there. Of course there is the case of those who returned to India just to find that the job they could find is either not very remunerative or not the one, where they could utilise their advanced knowledge. On finding this they do go back to the countries where they were offered good jobs. This reminds me of the case of Mr. X, a young Engineer who had specialised in Petrolium Refining. He was one among the very few Engineers in India, who had specialised in this line. The Government of India claimed acute shortage of Petrolium Engineers and at the same time his application was kept pending for over a year. Result—this young Engineer went to Canada and settled down there. He could not even get a job getting him a salary of Rs. 350/- because the Government has to go through certain procedure to hire Engineers for their refinery. All this happened because he had specialised in a line where there was no diversity and limited scope for employment.

Most of the students who go abroad, do not think anything beyond the question of going abroad for further qualifications. It is very necessary that any body who is going abroad should think on the following problems before he actually goes abroad :—

1) Is this the right time to go abroad for further studies or Training ?
2) What is the subject which one wants to study (or have Training)
3) What are the possibilities of utilising the knowledge gathered abroad.
4) Can the money spent on specialising be spent in a better way ?

1. Right time to go abroad :

The first thing an Engineering Student should do is to find out his aptitude and possibility of finding suitable employment in the line of specialisation. To do this it is felt that one should work for one or two years after graduation because during this period one gains practical experience by application of the knowledge he has gathered in the College, and also assess the future

prospects of getting a job where the specialised knowledge can be put to use and holds promise for the future.

Of course the period of training or practical experience required will vary from person to person. The estimate of one or two years is only meant as a general average.

2. Field of Specialisation:

The best method to select the field of specialisation is to study individual cases, discuss the problem with their professors and parents before a final decision is taken.

In this connection, the procedure adopted in American Universities is worth mentioning. "The Student Advising Bureau and Placement Office" is generally a part of the institution. This consists of Professors who are in contact with Industry and knowing the student, are in a position to guide the student. It is desired that various technical Colleges have a "Student Advising Bureau and Placement Office".

3. Utilising Specialised knowledge gained:

Most of the students who get their Ph.D. or D. Sc., degrees from foreign Universities return to India to find that they cannot utilise their knowledge. It is desirable that one should study Indian conditions and find out what line of specialisation and research going to be done will be useful on his return. It is quite understandable that professors and men in teaching or research work do take up research in foreign Universities. But having done research and got a Ph. D. abroad it is not easy to expect a suitable opening in research organisations or educational institutions. So it is most desirable in the case of these who have a flare for research and teaching, that they should go either deputed by research or/and educational Institutions or on study leave. Only a small fraction of the Engineering Graduates are desirous of taking up teaching and research work. For Engineers specially it is more desirable to get into the profession because of great future they have ahead of them.

The following two cases, which are of interest are given below: Mr. Y, who was desirous of taking up Sales Engineer's job and knowing this fully well, went to Canada for taking training in various factories. He did get training for two years and on his return tried for sales Engineer's jobs. Since very little Canadian equipment was sold at that time and the European manufacturers who had men trained in their own factories, were not interested in employing Mr. Y. Mr. Y had to wait for six months before he could get a job and now he is working in one of the factories. Mr. Y, was very well qualified and connected and had good contacts in the Government Circles in spite of that he was unemployed for more than six months. This is just to indicate that proper planning is very essential.

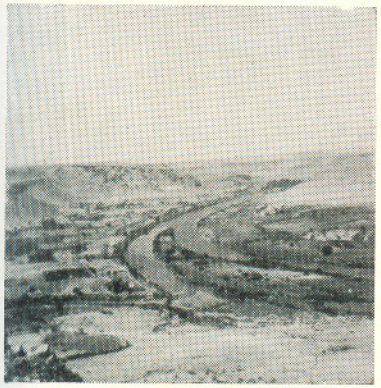
Mr. Z., went to U. S. A. in 1954 as one of the representatives from India. He was to retire within a year after his return. To top it all he was more worried about what nylon saries he could buy for his daughter or why he has not received a letter from his wife who was having one of her teeth pulled. He never even once talked about the purpose of his visit.

This case is illustrated just to indicate that the main purpose of ones visit should not get lost and undue importance given to minor things.

Justification of Money Spent:

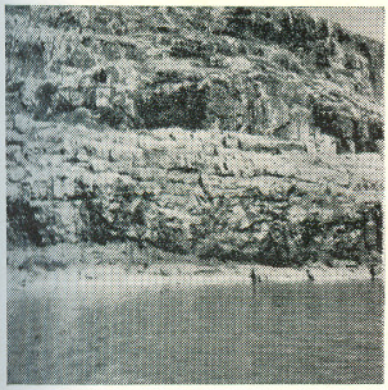
Last but not the least this aspect plays a vital role in making the final decision. The importance of this need not be explained nor stressed or explained because it is self explanatory.

Do consult somebody who has been abroad and has had specialised in the line in which one proposes to specialise.

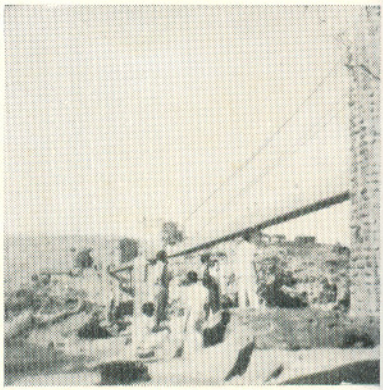


Meandering of a river

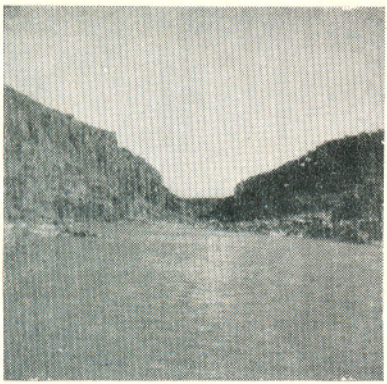
At the Gorge



Side view of the Peacock Gorge



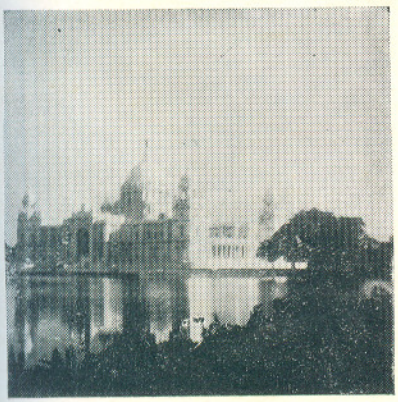
Suspension Bridge Near Gokak Falls



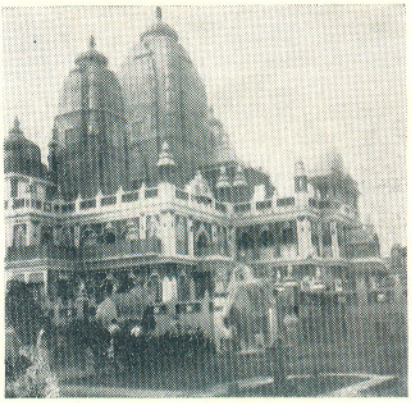
A view of Naval Thirth Gorge, Soundatti

A Study Team

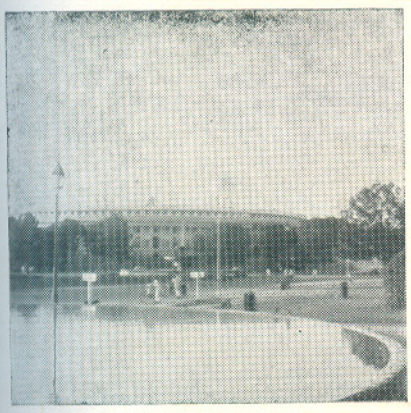
Photos by Vinta Seetharami Reddi



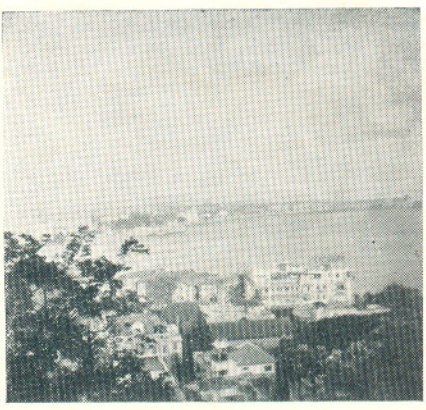
VICTORIA MEMORIAL HALL
CALCUTTTA



BIRLA MANDIR



PARLIAMENT HOUSE
DELHI



MARINE DRIVE
BOMBAY

Photos by T. Haridasan

SUNSET VIEW—MALPE

SALCTE

A SEA-VIEW

A VIEW OF MALPE PORT

Photo by Siva Shankar Ganduri

Some of the essential qualities required for the Success of an Engineer

Sri P. VENKATARAMANA BHAT, B. E.

WHEN we first enter the Engineering Profession either as Junior Engineers in the P. W.D. or as Engineers in a private firm were faced with several practical problems both technical and administrative for which no ready made solutions can be found in any text book or reference book. We have therefore to tackle such problems by the application of the theoretical knowledge that we have gained in our College, by our own commonsense developed by our power of observation of the details in the existing work, by the study of codes of procedure and by getting the advise from seniors in service when such assistance is available.

It is thus clear that if we are to be cent per cent efficient in our profession we have to be cent per cent efficient in our theoretical knowledge also. A deep study and an intelligent understanding of the fundamentals of Engineering are quite necessary, if we are to design and execute works efficiently.

Before we can finalise a most economical and suitable design we have to work out a number of alternatives. This requires not only sound theoretical knowledge but also patience.

A keen power of observation of details in the existing structures is also necessary when designing new structures. We can avoid many defects and mistakes in new structures by observing the details in an existing structure and finding out the defects and disadvantages. This want of power of observation and thinking and attention to details may lead to serious mistakes in our designs. These mistakes may become a permanent blot on our reputation. For example a mistake committed in the location of design of a bath-room or a mistake in design and location of doors and windows in a dwelling house causes permanent inconvenience to residents and they will be frequently cursing the Engineers that are responsible for these mistakes. I am specially mentioning about bath-rooms because it is here that Engineers frequently fail to give satisfaction to the occupants. After all, the mistakes may have been done by the workmen but it is up-to the Engineer to give fool-proof instructions and details in the plans and specifications. He should therefore have a keen eye on supervision of works during construction and organise the work in such a way that no mistakes are committed.

Last but not least the Engineers to be successful should possess a sound character. We must be very honest and have a high sense of duty and responsibility. We must have a genial temperament and must move very tactfully with the public, subordinates

and labourers. We must understand the other man's point of view and hear him patiently before we give any decision. Especially with labourers we have to be very patient, sympathetic and tactful. Otherwise we will find that our subordinates and labour will either try to leave us or avoid us or try to bring us into trouble. Thus the progress and efficiency of works will suffer for which we are answerable ultimately.

The Engineer has not only to design the work but also has to execute it quickly, economically and efficiently. The work may be carried at either by contract system or by engaging labour directly. Either way the Engineer has to be very business-like and efficient.

The students of Engineering should not run away with the impression that once they get their degrees they get their job and can manage some how later on. They can get their jobs, alright, thanks, to the Five Year Plans. But if they want to be successful and aspire to get up to the top of the profession, they must study hard and acquire a sound knowledge of the fundamentals when there is opportunity to do so in the College. They should not be satisfied with mere passing with 40% marks as this will bring in them an inferiority complex when they enter the profession and it will be very difficult to get over this complex later on.

Thus to be a successful Engineer, a hard and intelligent study of fundamentals of Engineering subjects, patience, keen power of observation, attention to details, possession of a sound character and tactful behaviour are the essential requirements.

Bhakra Dam—The Pride of Inida

K. P. VARKEY

India with the sylvan splendour of a monsoon land is a lovely country with sparkling streams and mighty rivers. During monsoons the rivers overflow their banks submerging millions of acres of land taking a heavy toll of human lives and bringing in its wake petilence, poverty and famine. If this wanton force of these mighty rivers could be controlled and utilised for the benefit of mankind India would be a richer and more prosperous country. It is an irony of our fate that though our country possesses rivers with great potentialities for irrigation and generation of power, still there should be lack of food and lack of power. This state of affairs was to a large extent due to the fact that we were under the yoke of foreign rule. But since independence things have changed. The Indian Engineers have been making great efforts to blot out poverty from the country by the construction of huge dams. We can justly be proud that they have met with remarkable success in their efforts. We have already begun to reap the fruits of their labour. Among the numerous achievements of the builders of young India, the Bhakra-Nangal Dam will stand out as a massive and eternal monument to the skill, and ingenuity of these determined band of people who wage a constant and ceaseless battle against poverty and whose wits are pitted against the mighty forces of Nature.

The Bhakra-Nangal project was envisaged with a view to utilising the perennial flow of the River Sutlej. The Project consists of the main dam built across a narrow gorge in the Sutlej, ten miles from the township of Nangal. At Nangal the construction of a balancing reservoir has already been completed. The Bhakra-Nangal project is a multi-purpose project aimed chiefly to irrigate the dry and sun-baked soil of the PEPSU Rajastan and Punjab and to produce power. When completed the Bhakra-Dam will rank as the world's tallest straight gravity dam. The dam will reach a height of 740 ft. The width of the dam varies from 1310 ft. at bottom most point to 30 ft. at the top. It spans two gorges one situated in the Himachal Pradesh and the other in the Punjab, the length of the dam varying from 325 ft. at the bottom to 1700 ft. at the top. In short it is a huge massive monolithic wedge of concrete and steel, driven into the bed of the Sutlej. This dam will give rise to the world's largest artificial lake named 'The Gobind Sagar' with a storage capacity of 7.4 million acrefeet of water covering an area of 64 spuare miles. The project is designed to irrigate an area of ten million acres and to produce 400,000 K. W. of power.

The main dam consists of a central spillway of the overflow type with four steel radial gates each 50 ft. long and 37.5 ft. high, which can discharge about four lacks of

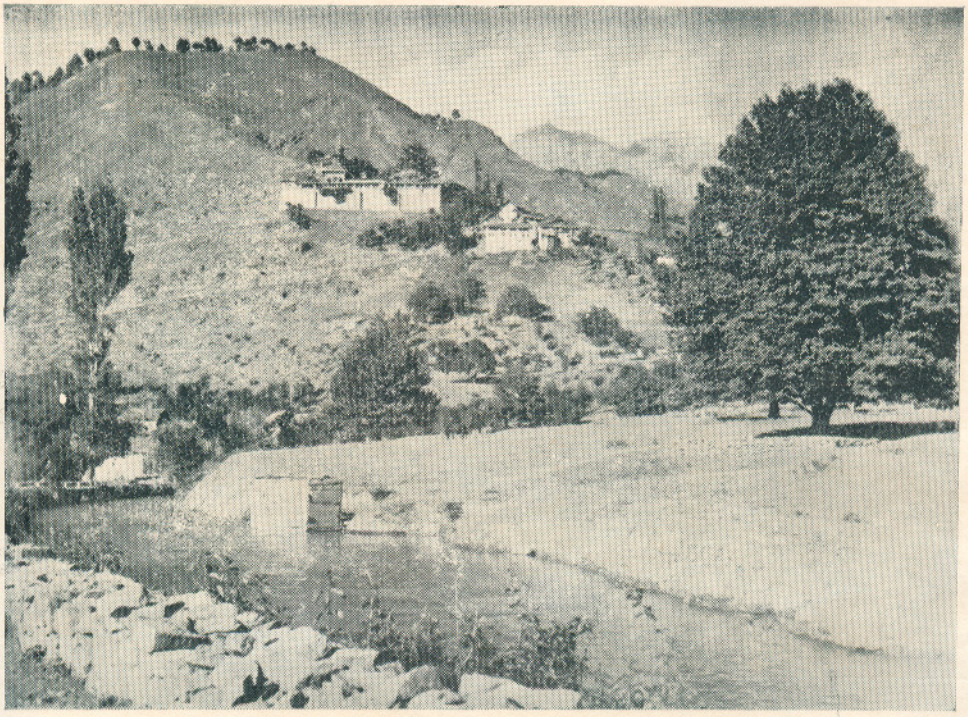
cusecs. The irrigation outlets are constructed in two tiers of ten in each situated at reduced levels of 1320 and 1420 and with a capacity of 106,000 cusecs.

It has a wide network of canals covering a length of 2900 miles. The main canal of 700 miles and distributaries of 2100 miles have already been completed in addition to Nangal dam, the balancing reservoir.

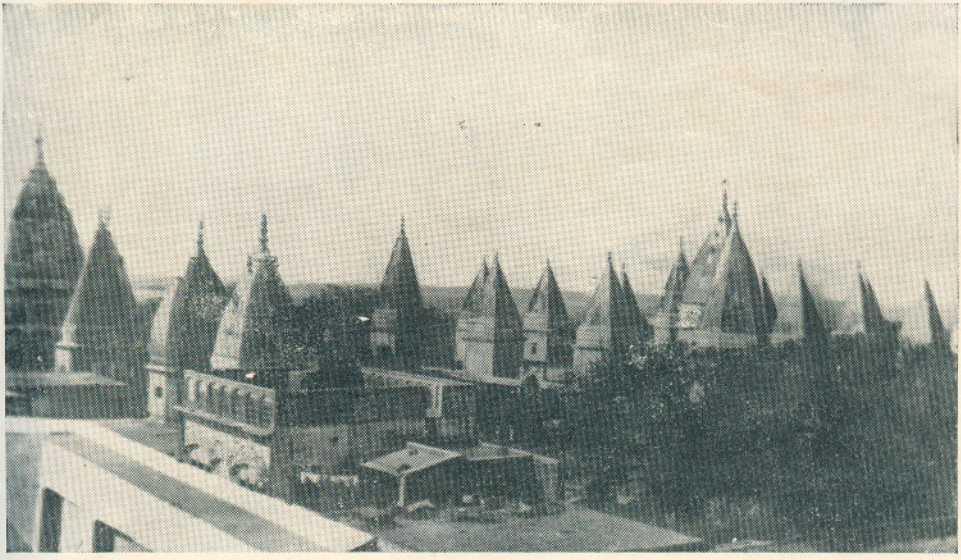
The Project consists of four power houses, two at the dam site, one at a place called Ganguwal and another at Kotla. The total installed capacity will be 400,000 Killo Watts. The two power houses at the damsite are situated one on either bank. Already the tunnels for the penstocks have been completed. It is well known that due to the recent Bhakra mishap one of the power houses was affected resulting in the loss of lives as well as machinery worth lakhs. Though it was feared that due to this mishap the work would not be completed according to schedule, our Engineers have done a really praiseworthy job in not only rectifying the faults but also keeping up the schedule of work. It is expected that the project will be completed in 1960—1961.

An interesting feature of the execution of the project is that benefits could be reaped simultaneously with the progress of work. Another interesting and economically important feature is the use of pozzuolanic material in the construction of the dam resulting in a saving of about 20% of the cement required for the project otherwise. Pozzuolana is nothing but calcine and finely ground shale which is available in abundance at the project site. In order to speed up construction mechanisation has been resorted to. Large capacity concrete batching and mixing plants are installed at different levels. The materials are transported by belt conveyors. Cantilever crane, as well as revolving cranes are also used. Before placing, the concrete is cooled to 43° F. This is done by mixing the concrete with water which has been precooled to 35° F in huge cooling plants. A testing laboratary situated at the dam site conducts tests for the strength and other properties of concrete before it is allowed to be used. In order to expedite the work efficiently and with the minimum of delay, a well equipped workshop has been established at the dam site, where repairs are carried out for the bulldozzers, tractors, the various other earth moving machineries, cranes etc.,

The Bhakra-Nangal project is a mighty undertaking involving an estimated total expenditure of nearly 174 crores of rupees giving employment to thousands of people. The dam which is situated at about 200 miles north of Delhi will transform miles and miles of arid desert zones into arable evergreen fairylands. It is indeed as Sri S. K. Patil called it "one of the marvels of Engineering of all times, a miracle of Engineering."



GULMARG—KASHMIR (Altitude—7000′)

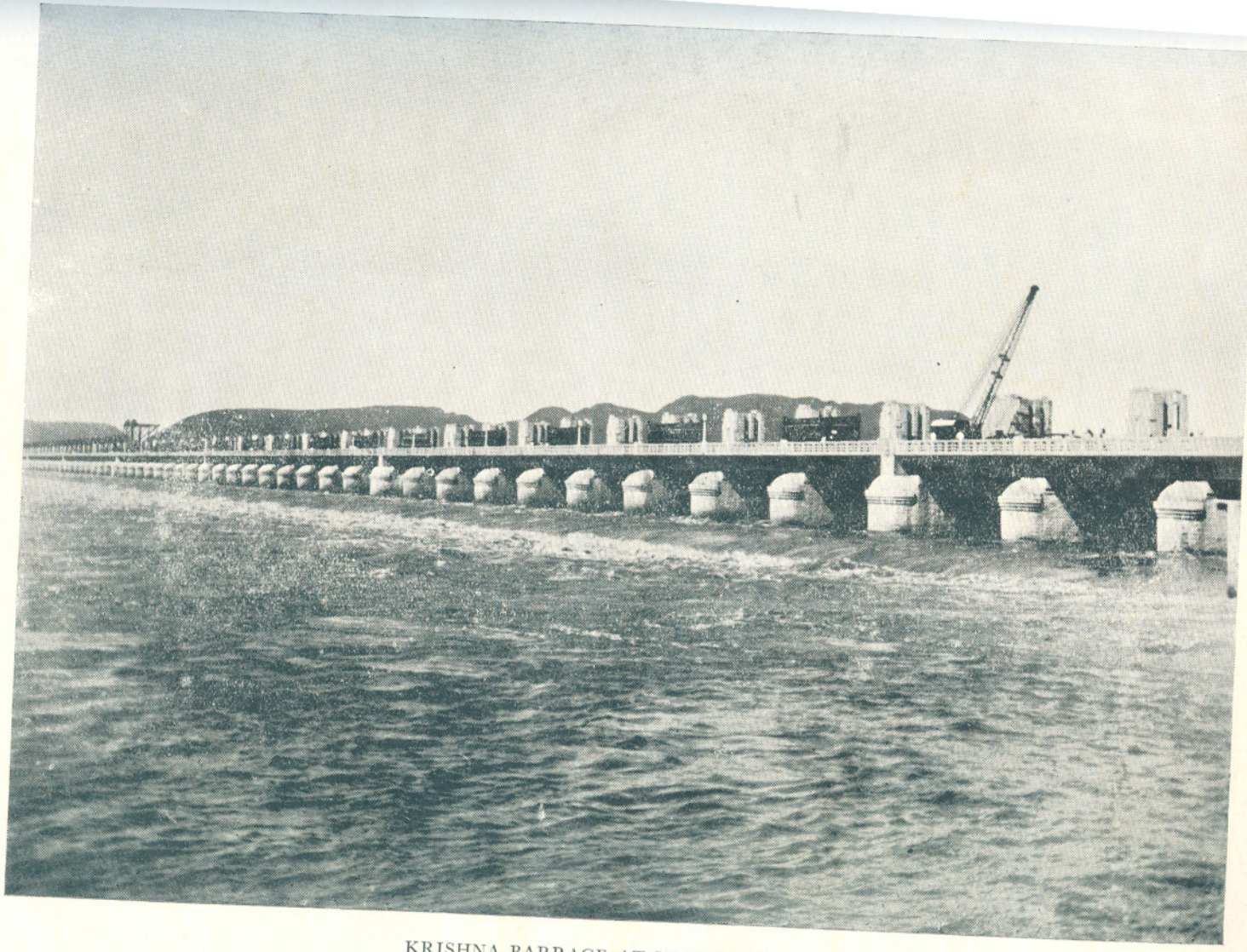


RAGHUNATH'S TEMPLE AT JAMMU

Photo by R. S. Gupta

LORD VISHNU

LORD SHIVA



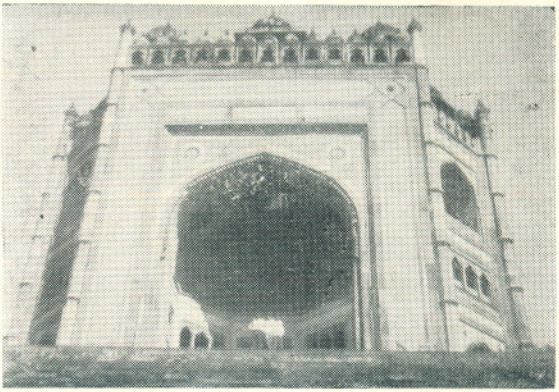
KRISHNA BARRAGE AT VIJAYAWADA

Photo by Vinta Seetharami Reddy

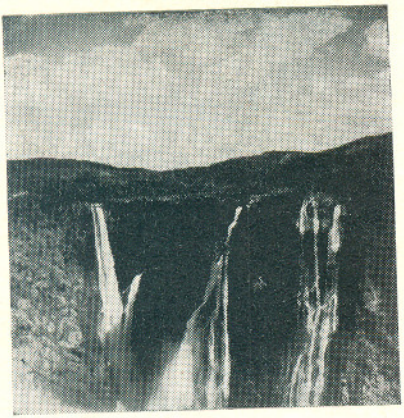
A VIEW OF THE COLLEGE CONSTRUCTION IN PROGRESS

LORD KRISHNA

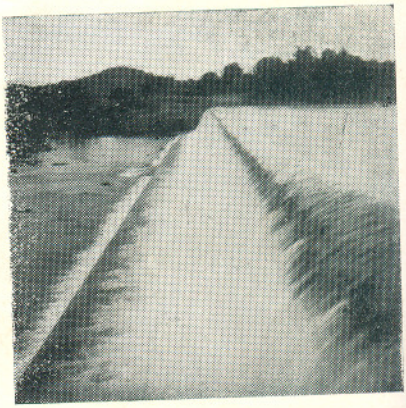
A LEAFLESS TREE



BULAN DHARWAZA OF PHATHEPUR SIKRI

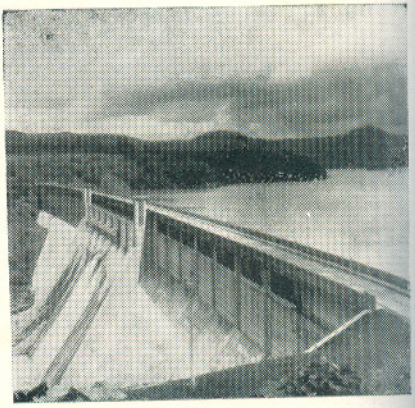


JOG-FALLS



TUNGA-ANICUT

MAHATMA GANDHI POWER HOUSE



VAITHARNA-DAM

Photo by K. K. George

The Poet and We

BALDEV RAHEJA

One of the Indian poets wrote that on full moon day, a young man's fancy turns gradually to thoughts of love, but if he comes to our colleges he will be shocked by a pleasant shock. For in our colleges every-day is a full-moon day and the fancies of young boys and girls are always turning gradually and these fancies are so light, that they almost seem to fly.

The poet will of course find that times have changed and, the seasons, too, have changed or lost their special characteristics and have merged into one long season. The fancies of young men seem to fly from object to object and like a bee, try to seek all the honey from all the flowers. The result is that, diminishing returns set in as soon as the seeker of honey wants to take it from so many flowers. The beauty of the flower, the sweetness of its scent and the quality of its honey all exhibit their discouraging trend. Yet the bees are satisfied! Indeed they sacrifice everything for love, for, they are in a state of mind where every Jack is a Romeo and every Jill a Juliet. The supply of Romeos and Juliets never dries up. The demand is so great that the supply has to be large if the demand is to be met.

So, our Indian poet will be overjoyed to see such a full-moon festival of love in our colleges. And yet the festival functions well. After all, we learn by experience and the wider and more varied our experience is, the surer and finer our taste is likely to become in the long run. This dress-rehearsal of the real love drama to come later on, is necessasy if the latter is to be beautiful one. Of course, care has to be taken to see that the bees and the flowers retain their freshness, for otherwise the quality of honey is bound to suffer. Let us therefore admire these flowers, displaying their cheer and the bees, humming with music in their heart and wish them all success as long as they remember that the real full moon day is yet to come.

I remember one of the stories told to me. A landlord couldn't control the waters of the river with his repeated efforts. He told his assistant to build a bridge. The assistant was disgusted and said "Dam the river and hang the bridge." The landlord got an idea. He ordered his assistant to dam the river and hang the bridge. A young man in our college, on discouraging would say "Dam the love and hang the life," but a wise man would think "Dam the love and bank the life". Am I right?

Shear and Bond in the Design of Reinforced Concrete Structures

Sri K. P. JACOB

IN the design of Reinforced-Concrete Structures, it is assumed that concrete is an elastic material. For concrete of good quality, this assumption is safe and practical; but it is found to be fundamentally incorrect because concrete has to be recognised as an extremely rigid plastic, which is subject to progressive and cumulative deformation under the load. This property termed the plastic flow, i.e., the flow without fracture of a plastic material during loading; is neglig ble in most instances; but its existence should be recognised and considered in the design of unusual structures.

Shearing Strength of Concrete :—

Pure or punching shear is the sliding of one plane upon an adjacent plane. It is difficult to determine, the resistance of concrete to this condition of failure. Concrete is not a homogeneous material and the interlocking and bridging action of the coarse aggregate particles within the mass, is a complicating factor, which tends to distribute the shearing load, as a combination of tension, compression and shear, throughout the mass.

In a beam, there are two types of shearing forces.

(1) Transverse Shearing Forces, which tend to break off the member at rightangles to its longitudinal axis and (2) The longitudinal Shearing Forces, which are due to, the internal bending action of the beam, which act in a dissection, parallel to its longitudinal axis.

Let us consider an R. C. beam, which is loaded such that it causes Shearing and Bending Stresses. Let the beam get curved, producing compression at the top and tension in the bottom part of the member. The compressive zone will not crack open, prior to the real failure. But, in the lower regions cracks will form as the concrete is unable to elongate sufficiently, to equal the deformation of the rods. There are two kinds of tensile cracks to be considered.

(1) Those which occur in regions of large bending moments; but where the Shear is Zero and (2) cracks caused by the diagonal tension. Prior to the formation of cracks, the diagonal-tension, which is due to the Shearing Forces can exist within the concrete. However, when a crack has formed, shearing and diagonal stresses, can not be transmitted across the opening. Thus, the solid part of the beam above the crack only, prevents the failure of the member, and the resistance to Transverse Shearing Forces must be confined to this region only. Hence, after the cracks have been opened up, the Transverse Shearing Forces are uniformly distributed over the portion, above the neutral axis of the beam.

Longitudinal Shear in 'T' beams:—

The projection of the Flange of a 'T' beam on each side of the stem, are subject

to compressive stresses. The compression stresses, in the projections of the flange, must be transferred from section to section by the resistance to shear at the Junctions of the Flange projection and the stem. When the Shearing Stresses are larger than the resistance to Shear, the Flanges become separated from the stem, the compression area becomes reduced and, the beam Fails by crushing of the stem. The unit increment Producing Shear, is proportional to the compression unit stress and therefore, the longitudinal Shear will be a maximum at the top and minimum at the bottom of the flange. But ordinarily, Shearing Stresses are so small, that concrete alone can resist them. Excessive Shear may be developed, in the case of beams with heavy loads.

Shear Reinforcement :—

As concrete is weak intension, reinforcements have to be used in the tensile planes, to strengthen the beam, against Shear failure, and the reinforcements so used are known as Shear Reinforcements, or the diagonal or inclined tension reinforcement. In the absence of Shear reinforcements, a Shear failure of an R. C. beam, is characterised by Suddenness and noise, similar to the breakdown of a plain unreinforced concrete beam.

Types of Shear Reinforcement :—

There are, three kinds of Shear-reinforcements.

(1) Vertical Stirrups.

(2) Tensile reinforcing bars, which are bent over to the top, provide inclined bar reinforcement in Shear.

(3) A combination of inclined bars and vertical stirrups.

In each case, the spacing has to be calculated separately and they must be kept in position by tying them to the longitudinal bars.

Bond:.

In general terms, Adhesion or Board, is the sticking together of structural parts by mechanical or chemical bonding, using cement or glue. Timber parts are stuck with glue, bricks are bonded in mortar and steel is bonded to concrete, by its adhesion with cement. Thus, Bond is the resistance to withdrawal of steel imbedded in concrete and it is effected in two ways

(1) Due to the grip caused by the shrinkage of concrete and (2) Due to the frictional resistance caused by the unevenness of the surface or indentations in the reinforcing bars.

Both these elements one and two, act together, until the bar begins to slit. Then, the grip is destroyed and the frictional resistance alone can resist the full.

The Bond Stresses in beams are caused by change from point to point, i.e., the in crease; in stresses in the longitudinal steel. This increase in steel as computed is proportional to the amount of increase in the bending moment and therefore, equal to the vertical Shear. But the increment of the Shear; the bond stresses which are caused by that increment are therefore, not proportional to the Shear.

Since the Shear between the support and the point of application of the load is constant, the computed bond stresses are therefore, constant. The observed bond stresses, however, near the support are smaller than just outside of point of application of the load, until the steel reaches the elastic limit; after which a re adjustment takes place and the bond stresses become equalised.

Bond is the agency which causes co-operation between concrete and steel; and the resistance of steel to tension, can be utilised through the bond between the concrete and steel. The function of bond in re-inforced concrete, analogous to the function of

rivets in built-up structural beams. It would be just as illogical, in designing a reinforced-concrete beam to supply tensile reinforcement; as it would be in steel construction to supply plates and angles for a built-up section without sufficient number of rivets to make the component parts to act as a single unit.

The Safe Bond Resitance, is that unit stress at which the bar begins to slip, divided by the factor of safety If Bond Stresses exceed safe-working values, the factor of safety being lowered, there is the danger of separation of concrete and steel and consequent failure of the construction due to the pulling out of steel.

It is to be noted that "Bond Stresses" do not always receive proper consideration. Many designers, consider them of secondary importance, and as a result, one often finds, designs with adequate areas of cross-sections of longitudinal steel; but with no means of bringing the reinforcement into action, if bond between concrete and steel cannot develop the required stress in the rods, they will be ineffective and failure may ensure. Hooking of reinforcement is ordinarily helpful: The deformed bars are apparantly better than the other types of rods, in developing bond and it is believed, that they do not need to be hooked. However, as the consequence of slippage are likely to be serious, one should be serious in dispensing with hooks, in important structures. It is desirable to use small bars close together, rather than big rods at arge spacing, in order to obtain a large surface for the bond."

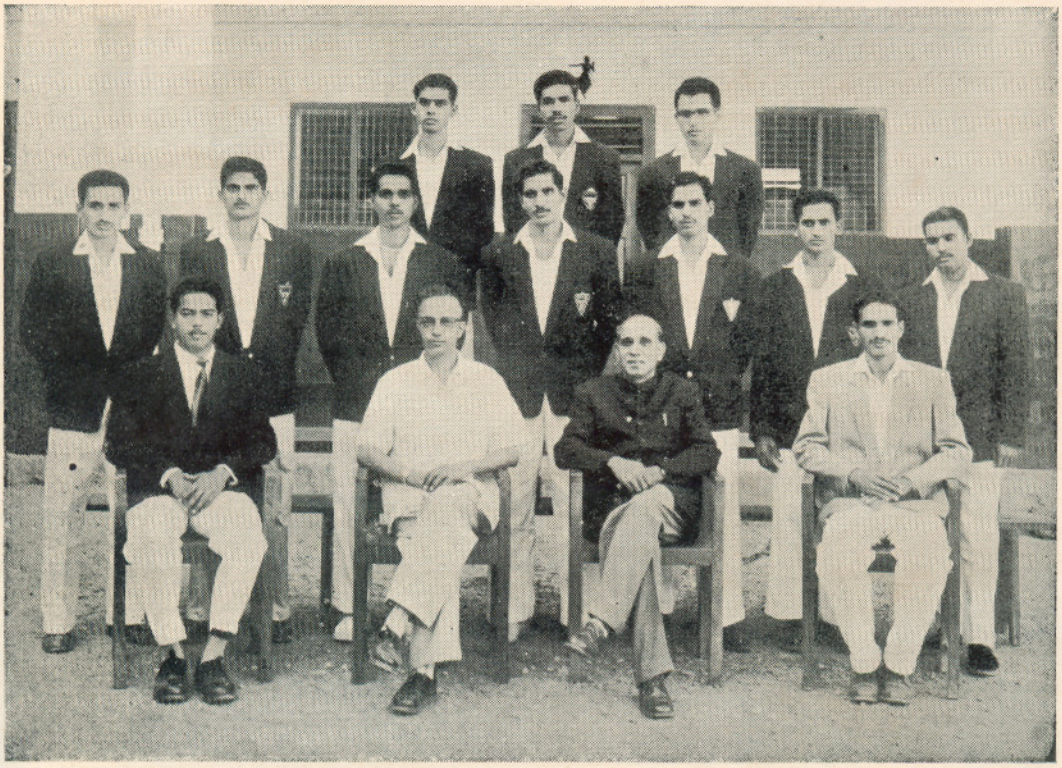
References:—

(1) Reinforced Cement Concrete By Dr. K. L. Rao
(2) Plain and Reinforced concrete Vol I By Taylor, Thompson and Smulski
(3) Principles of Reinforced concrete By Turneaure and Maurer
(4) Theory and Practise of Reinforced Concrete By Dunham

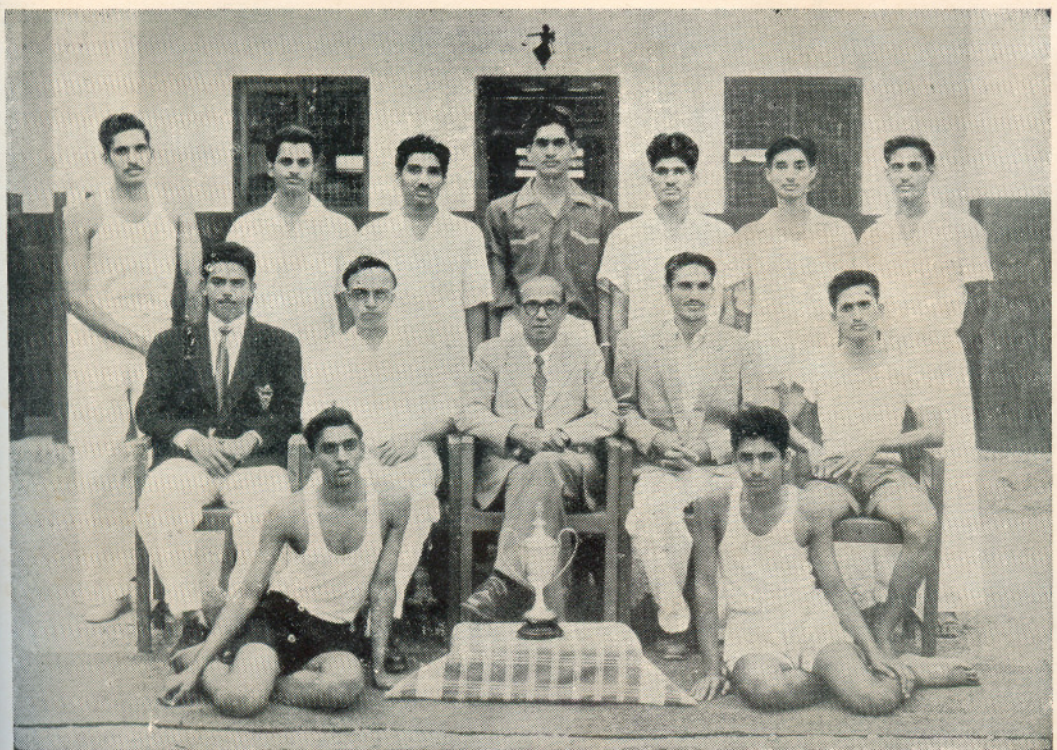
SMILE A WHILE.

An irate gentleman carrying an ivory-headed cane stormed upto the Manager of a jewelery shop and said "The jewels I bought as a present are not satisfactory and your sales person claims he can do nothing about it". "He is quite right" said the Manager. "But here a sign in your store, Sir, that reads 'Money cheerfully refunded if not satisfactory. In accordance with that claim I demand my money back."

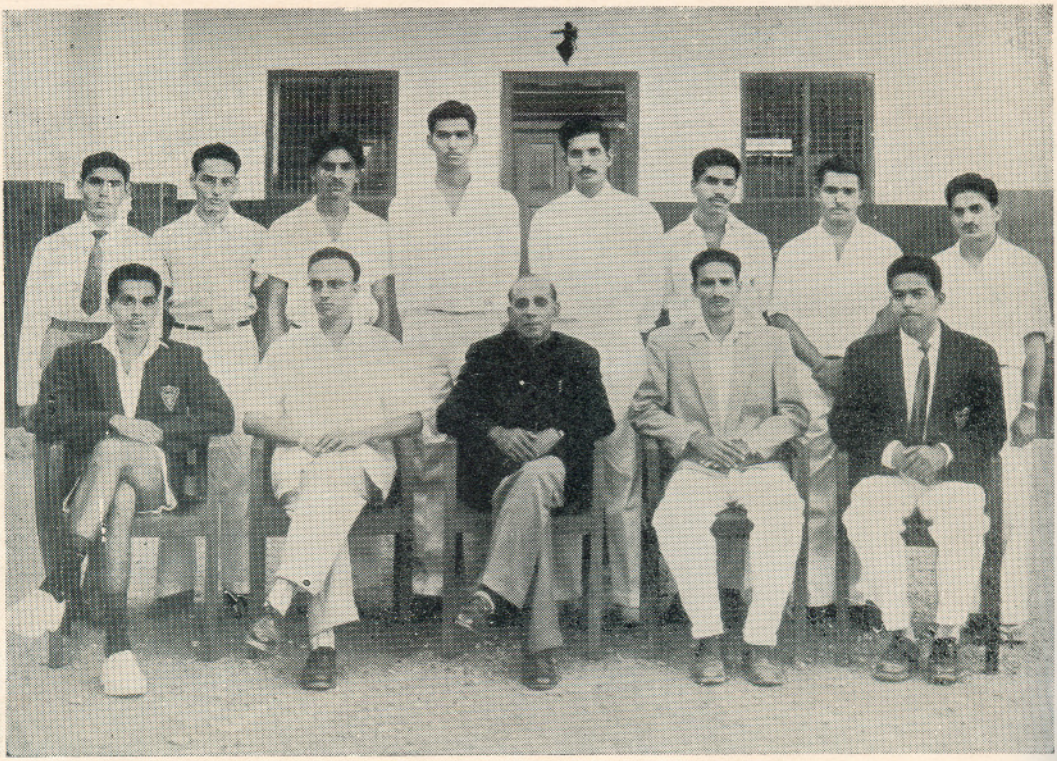
"I am afraid you have misinterpreted our sign" the Manager said, "we found nothing wrong with your money!"



CAPTAINS OF VARIOUS TEAMS 1960 61



M. E. C. KABADDI TEAM 1960 61



M. E. C. VOLLEY-BALL TEAM 1960—61

M. E. C. BALL-BADMINTON TEAM 1960-61

Poor Man's Cheap Silk

Sri M. Subramanya mugaraya

THE progress of production of Rayon fabrics is a notable social contribution. And the Rayon is a luxury article within the reach of families of middle class income group. These articles were previously available only for the rich, but now-a-days Rayon Fabrics satisfy the fashions of common people and also prove to be a good and cheap substitute for the costlieropure silk fabrics.

The factories previously established have adopted the "viscose process". In this Process the wood pulp sheets are dipped in caustic soda. By the time the caustic soda solution absorbs all the impurities in the pulp, the purified sheets are strained in steeping press and passed into shrudders. In shrudders they are crushed into pieces and agitated with carbon-di-sulphide in churns. The mixture thus obtained is again mixed with caustic soda solution and certain chemicals. Then a thick syrupy orange coloured liquid is formed. This highly viscose liquid is known as "viscose". This is filtered and stored in big ripening tanks. When it is ready for spinning, it is forced through spinnerettes having microscopic holes through running spin bath of sulphuric acid. The hair like threads coming through about forty holes combine together to form a single thread. The yarn is drawn on two wheels and passed through glass funnels into spinning pots which are revolving with a high speed and thus cakes are formed. The yarn in the from of cake, washed, desulphurised and bleached. Also they are dehydrated, dried and reconditioned to uniform moisture condition. The skeins of thread are sent to the weaving section. Coloured fibre and staple fibre can also be produced. Colouring is achieved by adding various pigments and chemicals to viscose before sending it to the spinning section. Staple fibre is also manfactured by the same process, but bigger spinnerettes having several microscopic holes are used. Through these holes viscose is drawn and fibre of required size is formed. This is washed, bleached and baled for sale.

The raw materials required for the manufacture of viscose Rayon are caustic soda, sulphur and wood pulp. At present all these have to be imported to this country. These are imported mainly from U. S. A. and Scandinavian countries. Almost all the requirements of caustic soda are met from imports. Few factories are already in operation for the manufacture of Rayon Grade caustic soda; but their production is not considerable as far as the requirement is considered. Meanwhile a few factories are progressing and this will go a long way to meet the substantial portion of the country's deficit of this raw material for the Rayon Industry. So, much more imporance is given to the plants for the production of caustic soda in the Second Five Year Plan.

Another requirement for the industry is sulphur. Carbon-di-sulphide and sulphuric

acid required are manufactured from sulphur. There is a scarcity for sulphur also in this country. It is universally acknowledged that the country rich in sulphur should have a good stand in industries. U. S. A. is rich in sulphur and at present it is meeting the bulk of India's requirements of this raw material. In India sulphur is obtained from Gvpsum salt, Iron pyrites and Sodium Sulphate, which is a fraction of the country,s demand for the manufacture of sulphuric acid.

Lastly, wood pulp is the most important raw material for the production of Rayon or artificial silk In India the production of wood pulp is also intricate. But a small part of wood pulp is manufactured by soft wood like Chir, Fir etc., which are available in Himalayan regions. Eucalyptus is considered suitable for pulp manufacture. This is found in Nilgiri Hills; but the supply is found Limited for a sizeable economical pulp unit. In order to stabilise the Rayon Industry, to save foreign exchange, and to meet all the emergencies it is very essential to establish Rayon pulp plants in this country. It seems that the Government have given attention to the manufacture of wood pulp and well aim at a good target in the Second Five Year Plan. However, it is a long term project and it should be emphasised that the lack of indigenous sources of wood pulp should not be considered as a drawback to the progress of the Rayon Industry as the cost of pulp forms about fifteen per cent of the cost of Rayon, which is not considerable.

To avoid all these difficulties a differnt process, namely the "Acetate Process" can be adopted for the manufacture of Rayon fabrics In this process cellulose pulp, acetic anhydride, glacial acetic acid, sulphuric acid, acetone and water are the necessaries. Almost all these are available in India and to this extent this process has an advantage over the "viscose process" for which the raw materials for some time will have to be imported.

Rayon manufacture was considered to be one of the most difficult industries in the post. Also Rayon was considered to be a luxury article meant only for rich people. But the present technicians have mastered it and the country has gained an excellent prosperity in it. And now it has become a household necessity and is termed "poor mans cheap silk".

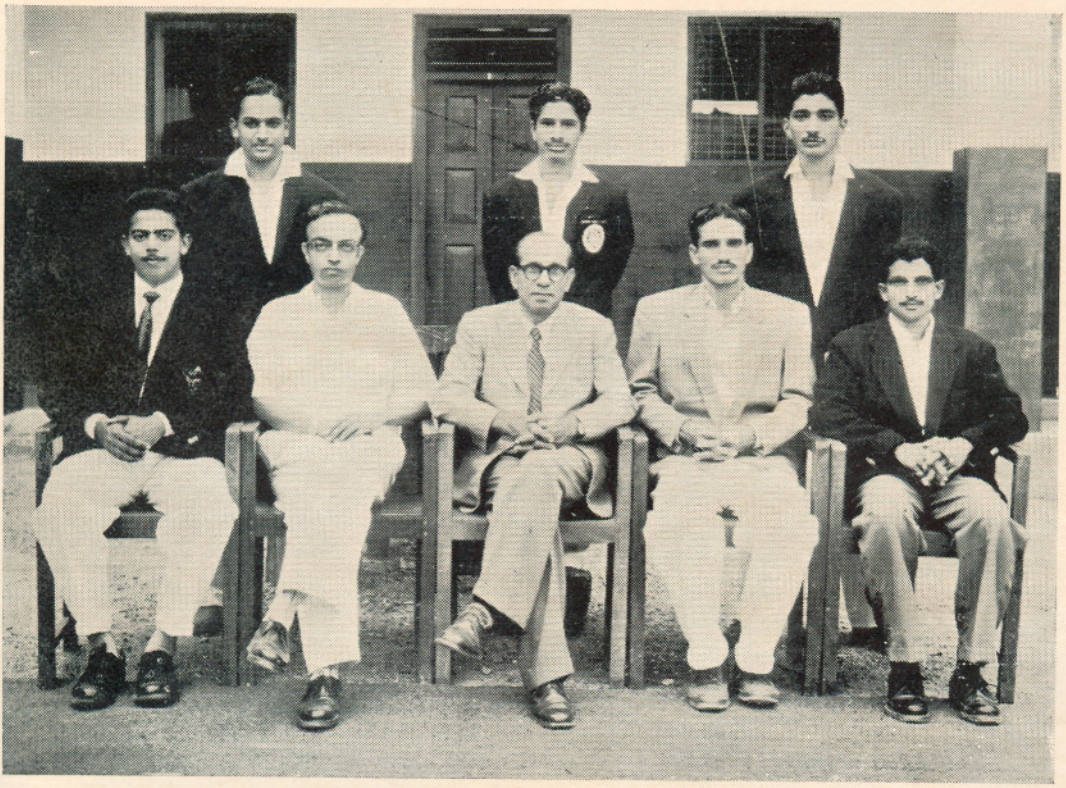
It will not be difficult to stabilise the industry and do away with dependence on foreign countries for imports.

It is sure that within a few years, in the manufacture of artificial silk, India will be one of the most advanced countries of the world

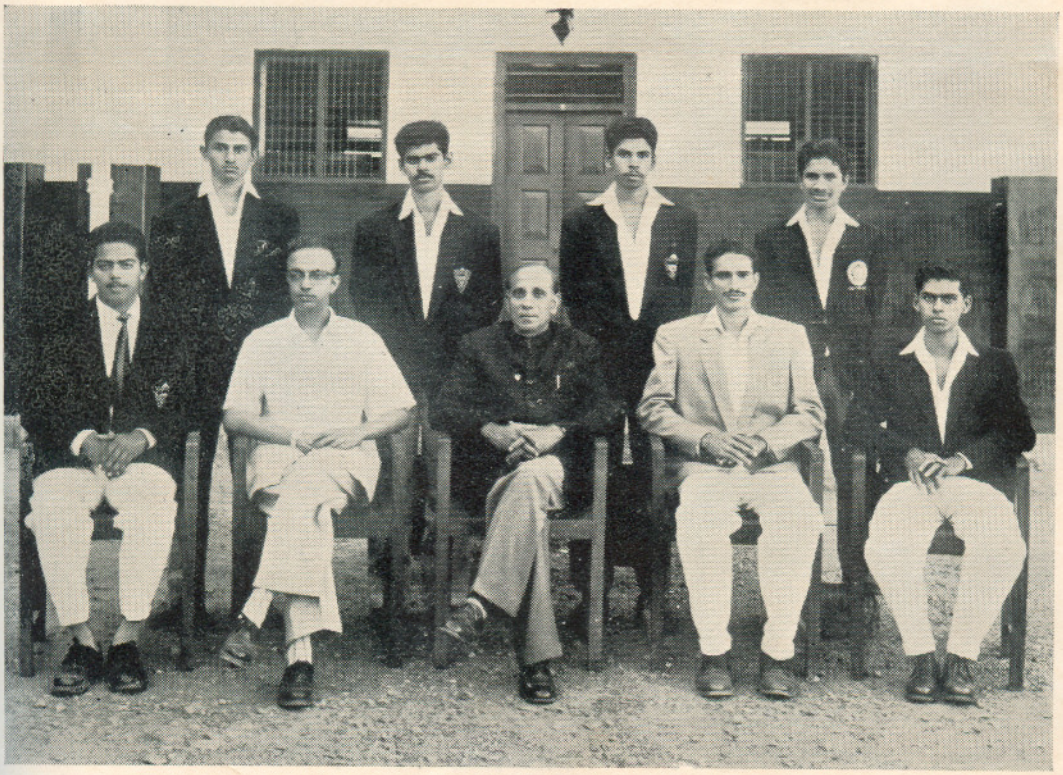
ABOUT CHARACTER

Character is perfectly educated will.

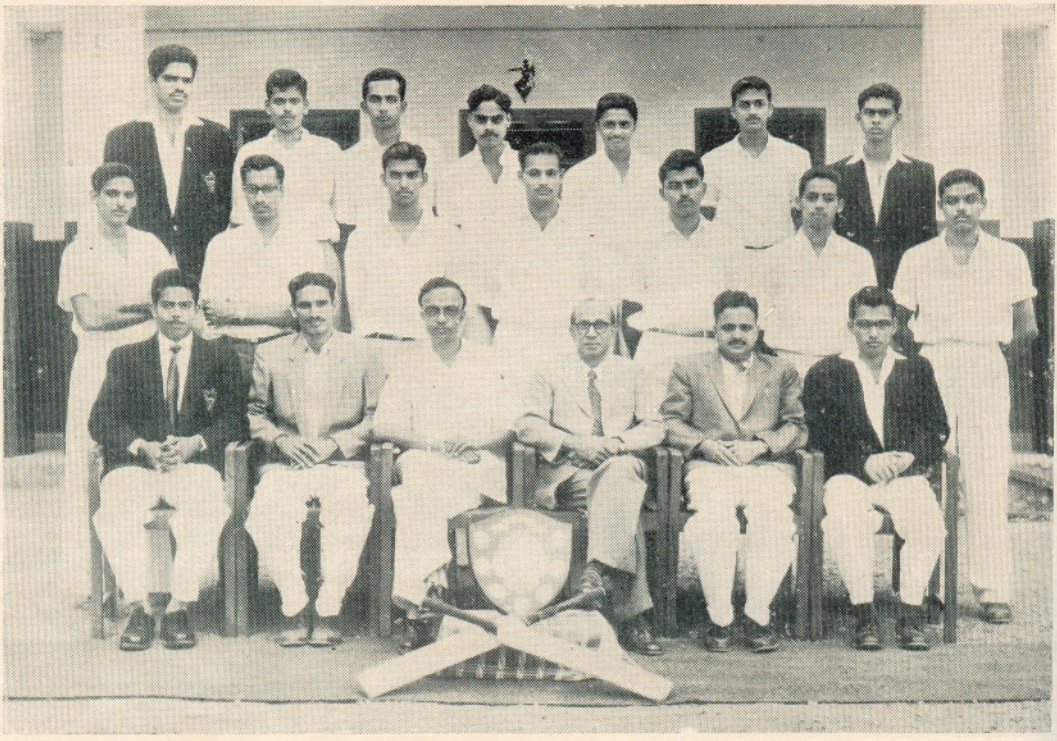
—Novalin



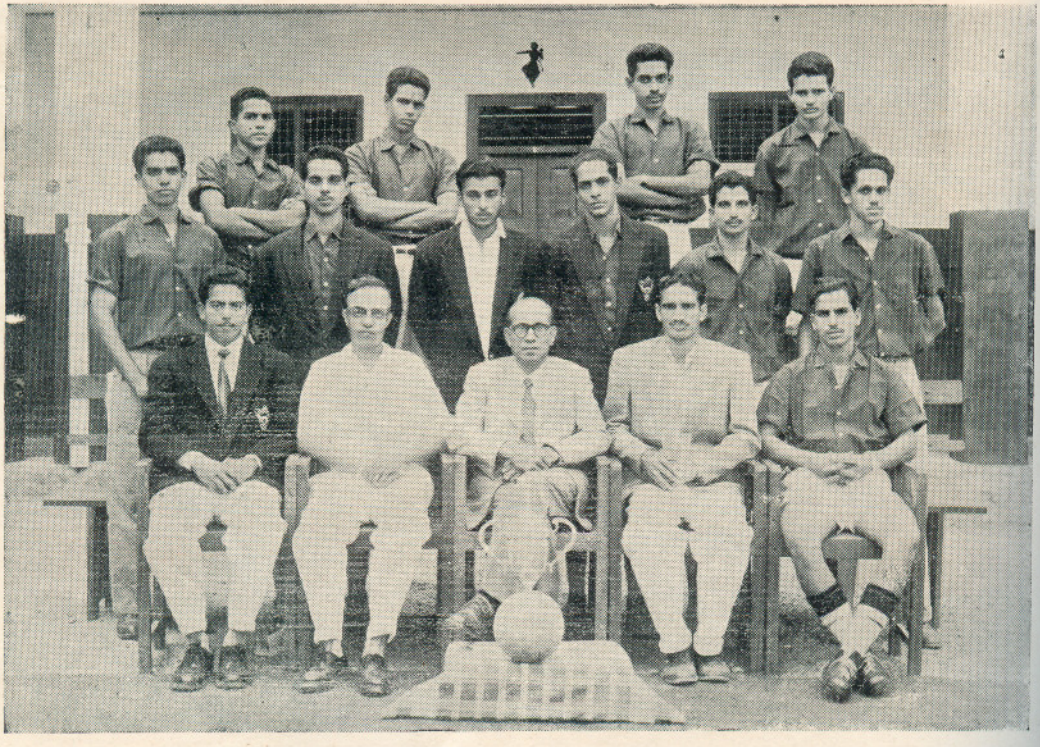
M. E. C. TENNIS TEAM 1960—61



M. E. C. TABLE-TENNIS TEAM 1960—61



M. E. C. CRICKET TEAM 1960—61



M. E. C. FOOT-BALL TEAM 1960—61

Indian Population and Its Trends

Sri B. Ananthakrishna Pai Kochikar

Many engineering advances are chiefly based upon a thorough study of a country's population and the way in which it increases. India now being busy towards industrialization a rough study of its population and its trends of increase or decrease would be an important matter to be studied and discussed. India stands as the second thickly populated country in the world with a total population of over 356,879,400 according to the 1957 census. This would indirectly mean that India is having highest population per square mile, when compared with all other countries, taking into consideration the area available for food supplies, industrial raw materials etc.

Of the 357 million people, about 17.3% live in urban places, and 82.7% reside in villages and towns. About 70% of the population depends solely on agriculture, to make a living.

The birth rate in India is the highest in the world, about 35% compared to other countries. The death rate is also equally high, but has shown considerable signs of decline during the recent years.

The increase or decrease i. e. the trend of population, depends on many factors:

(1) It will be seen that drought and famine are responsible for a thinning out of both old and adolescent groups. (2) The pressure on the soil and unemployment of all classes have increased and in the coming decade the present piling up of the minor and adolescent groups will add a good number of people. (3) Upto the age of 30 the age distribution of married women in India is distinctly more favourable for a rapid growth of population as the age group of 15 to 25 years being most fertile period assisting to add many months to feed and employ. (4) The age of marriage is of great significance and the early marriages in India has considerably increased the population. (5) The remarkable increase in widowhood due to varied aged marriages has considerably diminished the increase in growth of population. (6) Mortality and Longevity of women though it helps in one way is steadily decreasing because of improved midwifery conditions and equipments and poses a question of arresting growth of population though indirect means of family planning. (7) Increased fertility rate the birth rate in India per thousand is about 36, where as the death rate is only about 24 or so.

The above mentioned seven factors considerably influence the population and either decreases the increase or accelrates the increase of population of India.

The net reproduction rate for India is calculated from Kuezyiski's formula,

$$N.R.R. = \frac{\text{Total fertility x Female births}}{\text{total number of births.}}$$

after proper adjustments.

Regarding the use of the net reproduction rate for forecasting the future populaton

Dr. Enid Charles observes "The most important point to note is that the net reproduction rate represents to a high degree of approximation a rate of growth to which the present populations is tending. The length of time before a population begins to behave in the way indicated by the net reproduction rate depends on the extent to which its age compositions differ from that of a stable population compatible with the net reproduction rate"—with these limitations. India will have to face yet severe economic crisis.

Characteristics of Indian population:—

The movement of population in India is peculiar to its environments, its fertility and mortality depending on its agriculture and puplic health. Drought and famine which are so common to India because of the most uncertain rainfall condtions and non-ingenious methods of agriculture often drastically cut down the population as well as population growth. The lower expectation of life in India also helps in arresting the growth of population. The malnutrition of the individual in India, considering a common man produces a pathetically poorly built up child which does not see the light of this world even for a second when it comes to this world or lives only for a matter of days. Thishas made infant death common in India. Lack of adequate and prompt medical attention has often spread epidamies in large circle of Indian population and thereby has reduced the population considerably. The inerease in living index and rapid rise in prices of day today commodities has fore-warned a considerably good number of educated people to excercise family planning which has stopped the increase in population quite siginificantly. A considerable disproportion of sexes i. e. paucity of females also indirectly has assisted in reducing fertility in India as there are only 947 women for every 1000 males.

For every country there is a limit to the maximum population based upon the potentiality and resources of the community. So the population has exceeded this unemployment and wastage which could have been avoided otherwise would be inevitable and would lead the whole country to distruction.

SOME FIGURES:—

(i) Indian population according to religion:

Hindus	84.99%	Muslims	9.9ɔ%
Sikhs	1.74%	Jains	00,45%
Buddhists	0.06%	Christians	2.30%
Zorastrian	0.03%	Tribal	0.47%
	Non tribal	0.03%	

(ii) Growth of population of India:—(past three census)

Year	Populationi n Millions	Increase	P. C. of increase.
1931	275.52		
1941	314 77	39.25	+14.3
1951	356.88	42.11	+1ɔ.4

(The estimated mid year population has gone up to 402.8 millions)

(iii) Birthrate s & Death rates:—per 1000:—

Year	Birth rate	Death rate	Infant mortality
1954	24.4	12.5	113
1155	27.0	11.7	100
1956	27.4	11.4	108

Some facts:—

(i) Every seventh man in the world is an Indian.

(ii) Density of population per sq. mile is 312

(iii) There are 3,018 towns and 5,58,089 villages and about 83% of total population reside here.

Many surprises have yet to come after 1961 census are over.

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Forgive Me Asha

Sri S. D. KUMAR

Rajesh was sitting in his aram Chair by the window. It was night. A cool breeze was blowing through the window. Rajesh sat motionless, gazing at the rustling curtains like a statue. He seemed to be in a revery. His mind wandered into the past and unfolded before him the most important event of his life.

It was Rajesh's first day in the college. He arrived late and panting. He walked upto the lecturer and said, "May I come in Sir," The lecturer replied, "please do." By now all eyes were fixed upon the new-comer. His face was flushed red with the recent exertion. He was attired in attractive blue slacks, and a pair of spotlessly white trousers. His black shoes were polished to a glossy shine. In quick and nervous steps he walked up to the back row and took a seat. By this time the lecturer had succeeded in drawing back the attention of the students to the board. But one pair of eyes still continued to steal glances backwards at the newcomer. This pair of eyes belonged to the young and fair Asha, who was sitting in the front row along with the other girls.

By a curious coincidence Rajesh also was looking at Asha. More than once during the period their gazes met. Rajesh felt a throb in his heart, and seemed to read a hidden message in those pair of eyes. He was pining to talk to her. He yearned for the hour to come to an end.

At last the bell rang, and the students rushed up. Rajesh slowly walked out and stood in the Verandah. He was like a man in a dream. The last to come out were the girls. Rajesh's eyes picked up one among them. It was Asha. She also was looking at Rajesh, and this time when their eyes met, there flickered a smile across Asha's face To Rajash it was a heaven-sent gift He blushed to the roots of his hair. In his excitement he somehow managed to smile back.

When the class reassembled after the recess, Rajesh took his seat just behind Asha. During the course of the lectures they exchanged glances and smiles many times. This continued for a number of days. Even then neither Rajesh nor Asha could muster enough courage to speak to each-other.

It was a couple of weeks since Rajesh joined the college. The mute intimacy between Asha and Rajesh continued. It was Monday. Rajesh was standing in the porch, intently reading a newly put up notice. Suddenly he was aware of a sweet voice addressing him. It was un-mistakably that of a lady. Rajesh suddenly turned back, and was astonished to find himself face to face with Asha. There stood Asha with a white envelope in her out-stretched hand, and a smile on her lips. "Mr. Rajesh—tomorrow is my birthday, Please do come, she said handing over the envelope to him Rajesh's hand trembled as he accepted the invitation. He managed to

express his thanks and muttered, "I will be delighed to attend."

It was Asha's birthday. Rajesh dressed in his best and with a huge gift packet, tucked under his arms, hurried towards Asha's home. Asha and her mother were standing at the entrance to receive the guests. Rajesh was the last to arrive. Rajesh, wishing her a happy Birthday, presented her the gift. Asha thanked him and introduced her mother and the guests. Soon the feast and the merry making got under way. There were songs by many of Asha's friends. Late in the evening the guests began to disperse one by one. Finally all the guests had left excepting Rajesh. Now Rajesh also reluctantly stood up to take his leave. But suddenly Asha's mother bade him sit down for some more time.

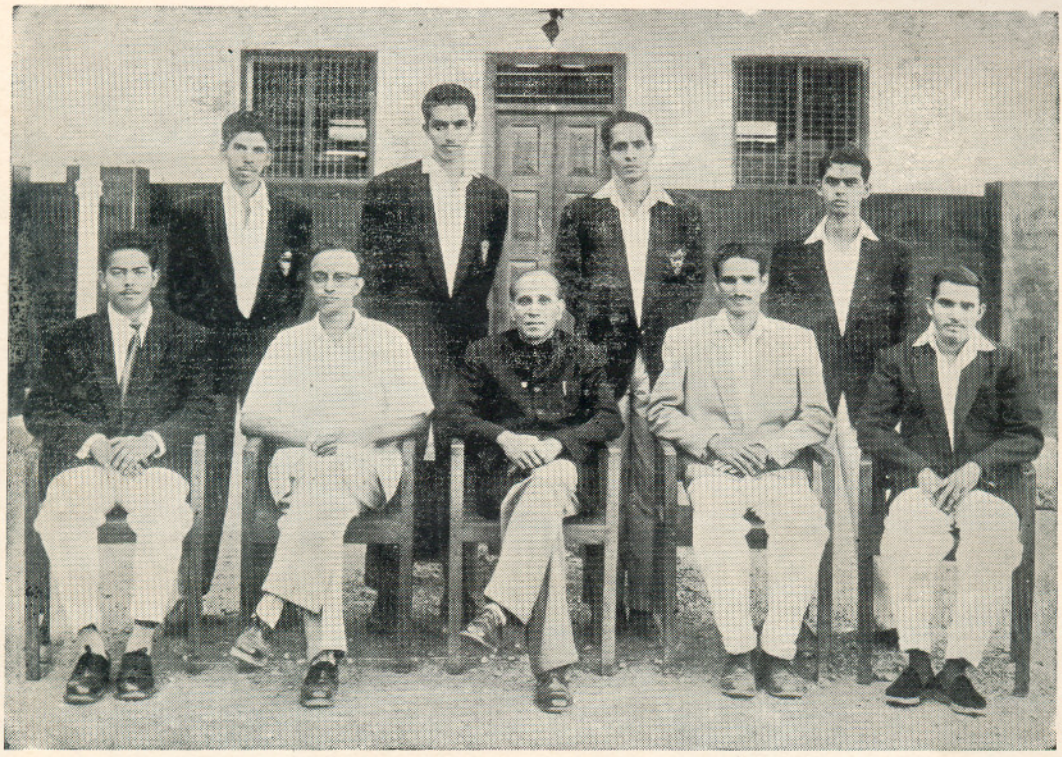
Rajesh was only too happy to yield to her request. Asha's mother silently went to the adjoining room and came back with a photo in her hands. She placed the photo into the hands of Rajesh and told him, "Son! Do you know who he is? My beloved Ramesh whom I lost—he is no more."...Her eyes were filled with tears. Rajesh looked at the photo. Suddenly his expression. changed. His mouth was wide openwith amazement. He could not believe his eyes, for there sure enough, was his profile in the photo. For a full minute he could not take his eyes off the photo. Suddenly as if realization came to him. He cried aloud, "Asha Bahen.....Maa.....

Rajesh woke up with a start. There were large beads of perspiration on his fore-head. Two large tears were trickling down his cheecks.

SMILE A WHILE

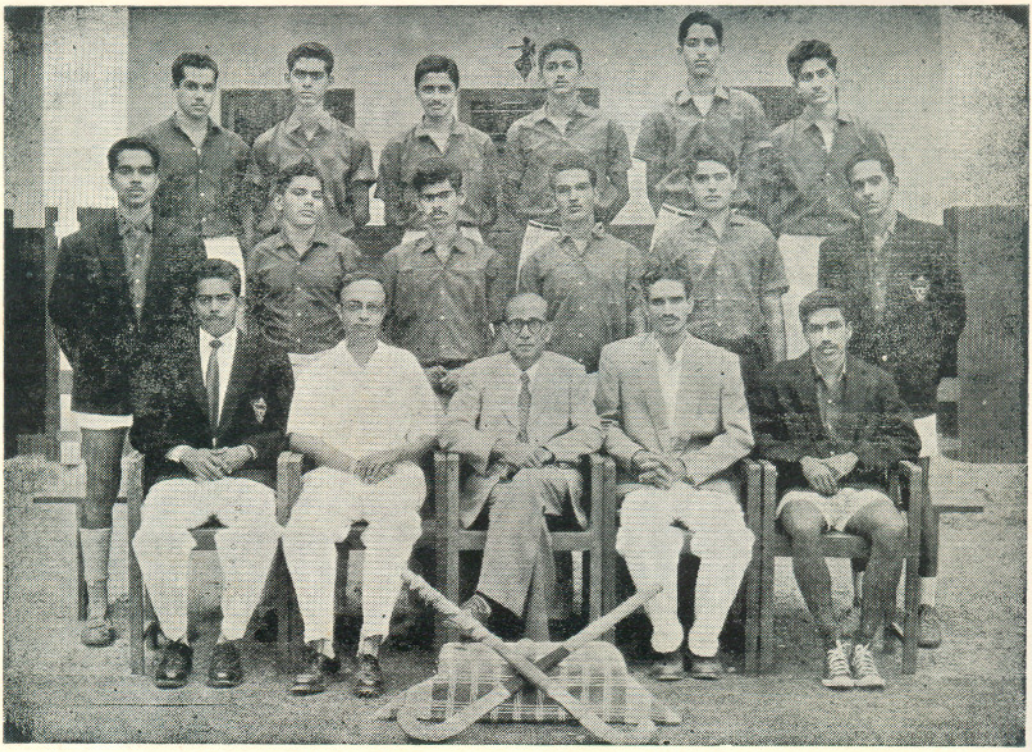
"Sir, my wife....er....told me I must ask you for an increase?"

Manager: So? well, I will ask my wife if I can give you one".

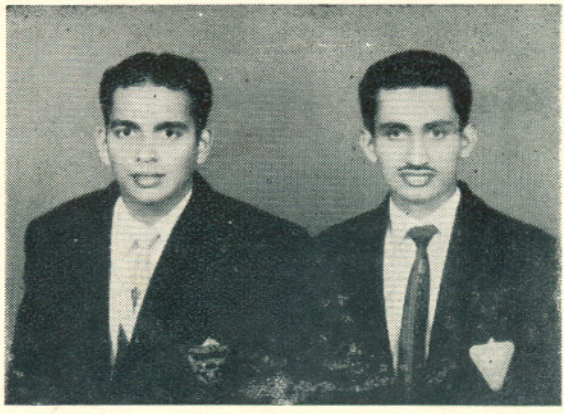


M. E. C. SHUTTLE-BADMINTON TEAM 1960—61

M. E. C. BASKET-BALL TEAM 1960 –61



M. E. C. HOCKEY TEAM 1960-61



Sri K. L. Jose & Sri Joseph Alexander
Represented District Basket Ball team

Sewerage Scheme For a Town

Sri VALAPPA KUMAR

The Sanitary Engineer has solved the problem of good water supplies for cities or other large consumers by treatment of water. It might be well to note that water supply system should not be introduced into towns untill arrangements have been made to care for the necessarily increased volume of sewage thereby produced; otherwise the old vaults may become overloaded and carry pollution to greater distances than it went before. To obtain the comprehensive idea of planning and the execution of an efficient sewerage scheme, we ought to be thoroughly grounded in many subjects like Mathematics, Mechanics, Hydraulics, Light and Heat, Magnetism and Electricity, Chemistry, Geology, including Construction, Mechanical Engineering etc. of these subjects, Geology plays an important role in Sanitary Engineering, the compostion of earth has much to do with the schemes that is to be carried out. One of the first works is to sink trial holes in order to ascertain the nature of ground. Being a Geologist it is easy to overcome the Constructive difficulties arising from the physical features of the district.

The preliminary investigations that are required for a sewrerage scheme in a town. may be classfied into three catagories, namely, 1. Statistical 2. Engineering 3. Scientific or Bio-chemical Data.

Statistical the probable increase in population in any community determines the future requirements for sewers, in the same respect that it determines the requirements for reservoir and distribution lines for domestic water consumption. In many cases the population is likely to increase, and it is wise to make provision for the future Population; since the fulfilment of a sewerage project of any considerable size requires much time and the large expenditure of public funds and the construction often causes inconvenience to the public, so that in general it will prove economical to so design the main stuctures, that they will be capable of serving the community adequately, when its development and population shall have equalled those estimated for some decades after the completion of the works. The number of years from the date of design, to the estimated design when the condition of design will be reached, is the period of design, called the "Economic period of Design"

If a water supply is already installed, the water consumption can be determined from the records of the local water works or Municipal water works by investigation. The principal factors that determines the total amount of water consumed at the pressure in the mains, character of the population, the types of industries and their number, the extent which the services are metered, and the special regulations of the local water department. Although conditions vary greatly, it is not unusual to find that about 90% of the public water supply re-appears as domestic Sewage. The volume of domestic sewage

that results from household uses of water from private wells and springs is usually negligible. However, water that is obtained from private supplies for use in industries often may contirbute materially to the volume of sewage flow. There is always some infiltration of ground water into the sewers. The amount depends primarily on the care with which the sewers are constructed, but it also depends on the nature of the soil, ground water level, the size of sewers, the proportion or amount of sewer line that is below ground water level. The next thing which affects the quantity of sewage, is the, seasonal variations.

Then in finding the quantity of sewage, the area would be divided into Residential Mercantile and industrial districts and a study would be made of the discharge of sewage from each district. The sub-soil conditions also would require examination in order to obtain data for determinig the probable ground water infiltration when all the available information has been complied, the flow of sewage is estimated in gallons per person per day, in the case of residential portion. For the portion of the Mercantile and Industrial establishments, it is estimated on population equivalent basis.

The nest important statistical data to be known is about Rain fall. But the rate must be, the mean of a series of averages over a reasonable maximum period and for this purpose Rain Gauge observation are to be collected. An Engineer with a record of a number of year's hourly rate of rainfall would be able to obtain a fairly accurate idea of what capacity his sewer should be designed to take.

Thus from all these statistical data collected it is possible to arrive at the quantity of sewage to be disposed off and hence the size of the combined or seperate system of sewer can be determined.

Engineering data:— It is desirable to make comprehensive preliminary investigation of the district to be sewered, not only to obtain the data need by the designer but also the place and local condition prior to the construction of the system, which may be affected by it. Such information will be helpful in meeting future claims for damages.

The arrangement of the sewer will depend on the topography of the area to be sewered and the distribution of population. Unless satisfactory map of the town is available surveys must be made. It is desirable to establish a preliminary triangulation system. The survey should furnish the precise location of street, property lines, railways, roads, puplic parks, water works etc. An accurate system of bench levels should be established throughout the area to be covered by the proposed sewerage system while surveys are in progress, full notes of existing structures are to be taken. All available informations regarding the location of water and gas mains, electric condiuts and other underground structures should be obtained. The character of the soil in which sewers must be constructed should be ascertained; in order to enable the cost to be estimated with fair accuracy.

A detailed contour map of the whole town, and future extention, showing 5 Feet vertical contours is quite necessary to lay down the line of sewers A topo-sheet of the neighbourhood to a distance of about 10 miles will indicate the site for the disposal works. A longitudinal section from the town to the disposal works will enable to design the out fall sewer and the disposal works. As far as possible crossing of road by sewers should be avoided and the sewer should be laid on the upstream side of the road.

Scientific or Bio-chemical Data:—

The physical, chemical and Bacteriological analysis of the sewage, which will show the amount of suspended and colloidal matter, chemical and orgnic matter in sewage,

colour, odour etc. are very important, in the prepartion of sewage project, in view of the purification to be devised which will appropriate to the conditons. If the sewage is to be thrown to the sea, the level of low and high tides should be noted If to be discharged into a river the flow at various times of the year must be measured. If it is to be disposed off on land, the value per acre and suitablity of land should be ascertained.

After obtaining all necessary data the sewer can be designed. While desiging it is better to know something about the material of the sewer. The pipes which are ganerally used are vitrified-clay pipe, concrete pipe, corrugated iron pipe, steel pipe and wood-stave pipe. Vitrified-clay pipes are cheap and can be used for small sewers. It is impervous and also resistant to acids and chemicals. But it should not be used for carrying sewerage under pressure. Concrete pipes are available with or without reinforcement. The concrete used for the manufacture of sewer pipe should be of first class quality as strength and impermeability are essential. When the required size of a sewer is greater than that commonly available as ready made pipe, the sewer may be directly built in place concrete and break are generally used for such sewers. The use of brick for sewers has materially declined in recent years. This is due chiefly to the great increase in the general knowledge of the use of concrete, and to the economy of concrete for the construction of large sewers. Also it is rather difficnlt to build a smooth curve of brick where it is necessary to change the direction of sewer.

With regard to the design of sewers and matters relating thereto, there is yet much scope for imporvement and if more time could be devoted to the study by cxperiments, the present theories might be very greatly altered. The results that have now been attained are the outcome of great industry on the part of a multitude of Engineers who are so deeply interested in a subject with so many possibilities.

ABOUT CHARACTER

The great hope of Society is in individual Character—Changing. Character do not change—Opinions alter but characters are only developed. —Disraeli.

The Role of Formwork In R. C. C. Constructions

By SHIVA SHANKER GUNDURI

THE role played by form work has got such an important bearing on the design of the structure that it can affect the very economy of it even deeply some times. As a matter of fact the form work is an integral part of concrete construction and it is the temporary staging erected to support the concrete till it gets hard. Forms act as a mould for concrete whilst it is being placed and consolidated. They give concrete the design shape and retain it in position until it can support at least its own weight. The forms must be strong enough to bear the dead load of concrete and occurs, the liquid pressure of concrete and the impact effect of ramming and vibrating.

Material for forms :—Forms of concrete construction are generally built up of two materials, timber and steel each having their own advantages. The former is the natural and original material which is in general use at the present time. Steel has come in to popular favour for special feature of construction such as round columns tanks, tunnels etc. Timber for forms should be partially seasoned as kiln dried timber will absorb water from fluid concrete and swell and bulge. The kind of timber to be used for the various parts of the form work depends to a great extent on the cost and availability of the material.

Some times even the use of precast concrete elements is not unusual as forms for concrete construction even though they are found very rarely. For instance dove-tailed pre-cast panals were used as form work for the Claunie dam, a large concrete gravity dam in Scotland and also former instances are available from Turkey and France where pre-cast elements are used as formwork.

Factors affecting the design of Formwork :—The most important factors effecting the design of a form work are economy, strength, simplicity and efficiency.

Economy is one of the most important factors which has got a good bearing on the design of from work. Approximately the cost of form work is estimated between a third and quarter of total cost of concrete structure. It has been determined as a result of experience that the cost of form work in dams and power plants may amount to 30 to 40 per cent of the cost of concrete for low dams, whereas for high dams it may be about 15 to 20 per cent. Hence a good economical design of form work can bringout a good amount of saving in the very cost of the concrete structure In the past form design has been left largely to the carpenter foreman. However, on recent work of any magnitude it has become the practice to prepare detailed plans for form work under the supervision of the chief design engineer. This method, nowadays is strongly recommended for economy and accuracy of design.

Forms are to be designed on the basis of the greatest practicable amount of re-use. The present day increase in material and labour costs warrants the maximum re-use of the forms and their material. The rapid placing of concrete in large dams and power plants necessitates streamlined procedure for the assembly erection and striping of the forms in order that concrete costs remain within reasonable limits.

Strength is another important factor which will effect the design of form work. A weak form work may at any time collapse thus causing a great loss to the very cost of the concrete structure. The weak form work if collapsed may cause the lives of workmen and others to a great extent. Hence the components of form work such as boards pists etc., must be examined both for strength and stiffness so as to limit the deflection of form work under load wthin the allowable value of $\frac{1}{600}$ Span. For teakwood centres the load should not be greater than $\frac{180\,BD^2}{l}$ or $\frac{160\,BD^3}{l^2}$ where B and D are dimensions of the members in inches and l in the length of span in feet. In the case of beams especially when it is deep enough the sides must be supported more strongly by special rakes.

Simplicity is also one of the important factors effecting the design of formwork of the concrete structure. The simpler the formwork the more easier will be the erection of it.

To secure the most efficient and economical form design some important factors such as the sizes and lengths of timber readily obtainable in the local market, the location of timber yard and mill with relation to the structure at the site and the size. character and location of concrete must be considered.

Loads on forms:—The various loads coming over the form are the important things to be determined before the design work is started. The loads on the form consist of the construction loads as the weight of runaways, workmen etc. The impact of the falling concrete should be considered in column and high wall design when the con crete is to be discharged from barrors or cars. The final load is simply the weight of concrete and of reinforcement if any.

Some special featured forms:—Sliding form is one of the most interesting one of all the special featured forms. The use of continuously moving forms is economical where the structure is not less than about 50 ft. high and has the same shape on plan throughout its height. As the concrete is placed the forms are raised continuously by means of screwjacks fixed to timber yokes from which the forms are suspended. A working platform is providcd at the level of the top of the forms. It is sometimes used where a good surface finish is required and has two principal advantages in that it enables a high speed of construction to be achieved and enables the horizontal construction joints.

An interesting featured form is the inclined form work for surfaces where the ratio of the horizontal to the vertical components of the slope is flattered at 2:1. wooden sliced forms are used.

Precautionery measures:—The most important precautionery measures to be taken in erecting a form work are as follows. First of all the timber must be free from knots, twists, shakes, decay etc., which would effect the strength and the finished surface of the concrete. Face timber should be dressed all four sides, sheeting dressed, the edges and one facing while braces supports and ties may be of un dressed material. Architectural

concrete requires absorptive forms such as those made of wood or wood faced steel.

Removal and re-use of forms:

Economy in striping is very important. For maximum economy the unit or panel construction should be so planed and built that they can be used and re used again. The period which must elapse before a form is striped is to be decided by the engineer depending upon the climatic conditions present The setting qualities of cement, the span of the member and whether it is subjected to compression or tension also effect the time to be allowed before the forms can be striped.

Period after which formwork can be striped when ordinary concrete is used:

Type of member	Retension Period of forms (days).	
	Cold weather	Normal weather
Beam sides, walls and columns (unloaded)	8	3
Slabs with probs left under	10	5 to 6
Slabs after removal of probs	14	10
Beam soffits with probs left under	12	8
Beams after the removal of probs	28	21

The form should be kept rigidly in place until they can be removed by careful and experienced workmen without clipping, spalling or defacing the concrete surface. Then all forms should either be removed to the place where they are to be re-used or taken to the mill for remaking.

The forms should be thoroughly cleaned and re-oiled before stacking for erection in a new location. All rough surfaces should be smoothed and repairs made to put the section in first class condition.

The material available and the costs involved determine the size and type of the form to be used. Sometimes more expensive or more durable form materials may be preferred depending upon the anticipated amount of the re-use of the job. The most economical size of forms should be determined taking into account the maximum possible repetition of re-usage.

The type of forms used for a specific project will depend upon careful analysis of the conditions and requirements of the job and there should be perfect co-ordination between the rate at which forms are prepared and the concrete placed. The degree of care and the precision required for the construction and handling of the form works depends upon the class of finished concrete surface required.

Photo Copying Process

Sri TARANATH, L.C.E.
Sri P. VARAMBALLY, Draughtsman(Mech.)

A single drawing is of very limited use to the Engineer. Often the different component parts of a machinery or structure are fabricated in points removed miles apart. Hence it is essential to have a number of copies of the original drawing. It is obvious that the reproduction of a drawing by manual means would be tedious and time consuming. Fortunately science has provided us with some quick means of reproducing drawings. Enumerated below are some of the widely used processes of duplication.

1. The ferro prussiate process.
2. Positive cynotype process.
3. Ferro Gallic process.

Of the above processes the first one is the most popular and the most widely used, on account of its simplicity. We will now see how by the above process, copies of drawings are made. The ferro-prussiate process consists in transferring a drawing on to a sensitised paper by passing sunlight and developing the print. It closely resembles the taking of positive photographic prints from the negatives. The prints obtained in this process consists of white lines against a blue background. The copies thus obtained are known popularly as blue-prints and the process is referred to as blue printing.

The following are the main operations and their procedures involving the process.

1. Preparation of the sensitive paper.

100 grains of ammonia citrate of iron dissolved in an ounce of water and 10 grains of pottassium ferro cynide dissolved in an equal amount of water are mixed together immediately before use. The mixture is applied on to one side of any suitable paper by means of a sponge or a flat brush. Good results are obtained by the use of paper No. 50 and No. 57 which are patented and specially prepared for this purpore. The paper should be laid flat and pinned down on to a flat surface. After carefully applying the coat of chemicals, it is hung up to dry in a dark room. The paper should not be used before it is thoroughly dry. In damp weather the paper should be warmed slightly over a charcoal fire before the application of the chemicals and after applying the chemicals it is again dried over a charcoal fire. It may be mentioned here that as patented sensitised papers are available in the market in convenient sizes, sensitising by individuals is rarely resorted to.

2. Printing.

The drawing is prepared on a tracing paper which permits the passage of light. The drawing it affixed to the underside of the glass fixed to a hinged frame. Over this drawing is placed, the sensitised paper with the sensitive side in contact with the tracing paper. All wrinkles and folds should be completely eliminated. Lay a pad of felt over the paper and close down the frame. The felt padding is sandiwiched between the base block and the papers. The padding presses against the arrangement of papers and keeps the drawing and the sensitive paper in

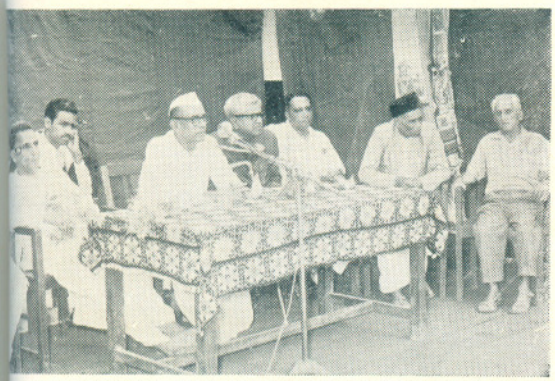
intimate and close contact with each other. This is essential to ensure sharp prints. The arrangement is exposed to the direct rays of the sun, the rays falling in a direction perpendicular to the surface of the glass. The time of exposure depends on the climate and the intensity of light. It is a matter to be decided largely by experience. Usually an exposure of 3 to 6 minutes is adpoted in hot seasons and 6 to 8 minutes in cold seasons.

3. Developing.

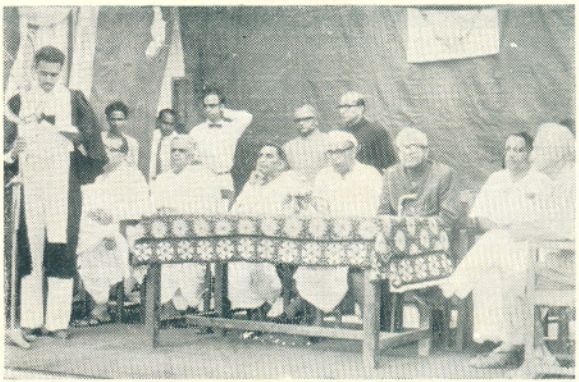
After exposure the exposed paper is taken out of the frame and developed by washing it in a tray of clean water. The paper is moved rapidly from side to side and the water changed several times, washing is continued till clear white lines appear against dark blue black ground. The drawing is hung up to dry. The time for developing varies from 3 to 6 minutes and 10 to 15 minutes in stagnant water.

If the print is under exposed the back ground appear light blue. This defect is remedied by washing it in a weak solution of any one of the following acids. viz. (1) Hydrochloric acid (10 drops of acid in 10 ounces of water.) (2) Citric acid (100 grains to an ounce of water.)

A deep blue background with bluish lines indicate over exposure. If the defect is not marked it can be overcome by washing the print several times in clean water and then keeping it immersed in a bath containing 20 grains of carbonate of soda dissolved in a quart of water, till the disired result is achieved. Finally wash the print throughly in can water and hang it to dry.



Hon'ble Minister for Finance Sri T. Mariappa with Dr. T. M. A. Pai and others



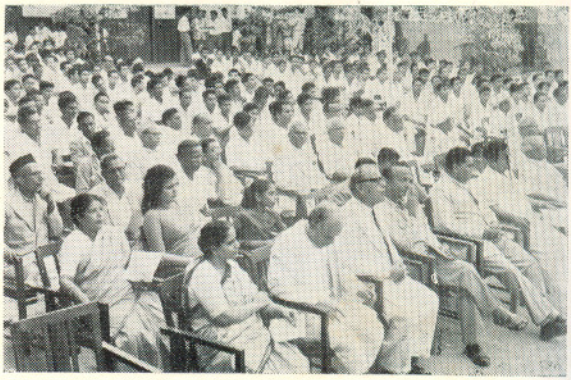
Student President welcoming the Hon'ble Minister

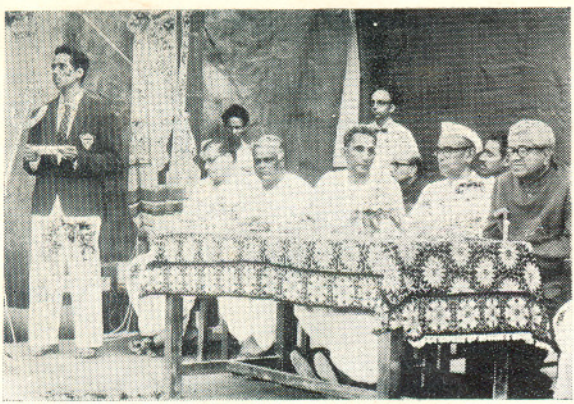
Principal reading the Report

Mr. Filip Markowits addressing the gathering

Toast to outgoing students—by a Junior Student

A Section of the Gathering



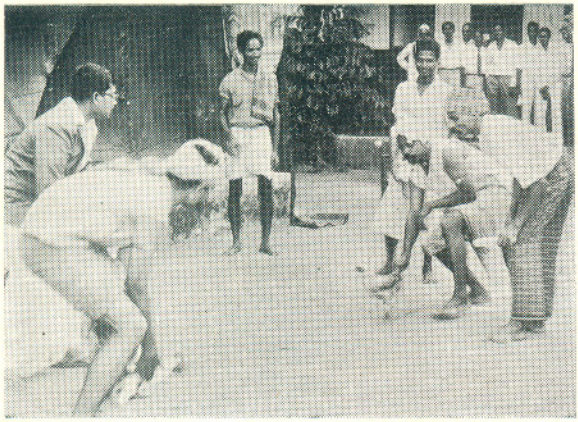


Vote of thanks by the Secretary

Students participating in a Drama

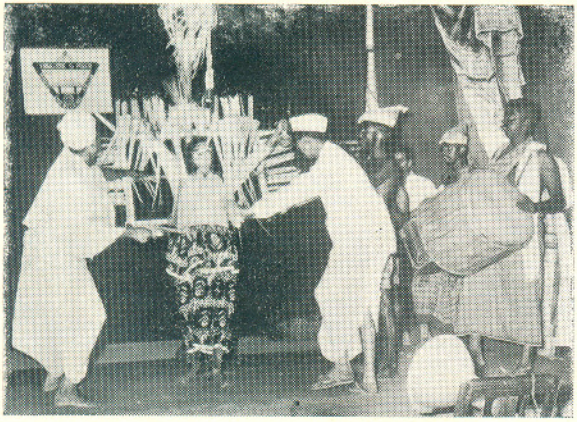
Folk songs by Kerala Students

Photos by Vinta Seetharami Reddi



'Cock Fight'—a typical village sport

Begger (Prize winner)



Goddess solving naughty problems

College Report 1960 -61

PRINCIPAL

Mr. President, Ladies and Gentlemen,

I have great pleasure to present the Annual Report of the College for 1960—61. We are fortunate to have Hon'ble Shri T. Mariappa, Minister for Finance, Government of Mysore, to preside on this occasion. This is the 4th year since the College was started and it is also note-worthy that first batch of the B. E. students passed out of the College this year. The College at present provides only the Civil Engineering Course, but it is proposed to introduce in the next academic year, courses in Mechanical and Electrical Engineering.

Strength:

The strength of the College during the year is as follows:—

Pre-Engineering	.. ..	120
First Year Engineering	.. ..	124
Second Year Engineering	.. ..	88
B. E. (Civil)	.. ..	45

The 5 years integrated course in engineering has been adopted, and admissions are at present made only to the Pre- engineering class. Admissions, are made withhout distinction of caste, creed or community. Students from all over the country, even from as far as Kashmir and Malay States have sought admission into the College.

Staff:

Shri M. N. Kamath continues as Principal of the College.

Shri R. K. Baliga, Professor, Electrical Engineering Department, was selected by the National Productivity Council for overseas training in the field of production management. He is at present undergoing the course of training in France and will be returning by about the end of this year.

Shri V. Chandrashekar, Asst. Prof. joined the All-India Institute of Hygiene and Public Health at Calcutta for M. E. post-graduate degree in Public Health Engineering. He is expected to be back in next July. The following new senior members of staff have joined the College during the year.

1. Shri B. V. Krishna Murthy, B.E., D.I.I.SC.,(I.C.E.) A.M.I.E., as Professor of Mechanical Engineering.

2. Shri P. Venkataramana Bhat, B.E., Retired Superintending Engineer, as Professor of Civil Engineering.

3. Shri P. R. Nayak, M.E. (P.H.) Assistant Professor of Civil Engineering.

4. Shri R. Bhimasena Rao, B.SC., B.E., Assistant Professor in Civil Engineering.

5. Shri K. N. S. Sharma, B.E., M.E., Lecturer in Civil Engineering.

6. Shri I. Achutha Rao, M,A., Lecturer in Mathematics.

7. Shri K. S. Padiyar, B.SC., (Eng.) M. TECH. (I.I.T.) Lecturer in Mechanical Engineering.

Shri K. S. Padiyar who was undergoing a course of post-gr duate study in Mechanical Engineering last year in the Institute of Technology, Kharagpur, returned this year.

Visitors:

The following distinguished and prominent persons visited the College during the year.

1. Dr. K. K. Hegde, the Hon'ble Health Minister, Mysore State.

2. Shri D. C. Pavate, Vice Chancellor, Karnatak University.

3. Professor N. A. Nikam, Vice Chancellor of Mysose University.

4. Shri S. V. Krishnamurti Rao, Deputy Speaker of Rajya Sobha.

5. Mr. & Mrs. Harry Plissner of Miami, Florida, U. S. A.

6. Mr. Filip Markowitz, an eminent Engineer and Architect from U. S. A. has come down to Manipal to serve this Institution in an honorary capacity and is associating himself actively with the College and Courses of study etc.

Laboratories & Equipment:

All the Laboratories are well equipped and they were enlarged during the year by additional equipment. The Laboratories will meet the full needs of the College from the next Academic year.

Excursions:

The F. E. students of the College went round on a tour to Bhadravathi, Shimoga and Jog Falls etc. The students of the S. E. class also went on a Geology tour to Gokak. The B. E. students went to Hubli for Laboratory training and inspected the Railway Yard and Workshops at Hubli.

Library:

The College is provided with a good library and it has a total number of 3500 volumes of Technical books and 3000 Technical Magazines. 27 technical magazines, periodicals, weeklies and monthlies are being received in the College Reading Room.

Mr. Harry Plissner and Mr. John Quillinan of U. S. A. have been good enough to send us Books and Technical Magazines. The Students' Book Bank, Bangalore has also donated about 300 books to the College Library this year. In addition to this, some magazines and books have been donated by the Principal, Shri M. N. Kamath and Professor, Shri R. K. Baliga. We are grateful to all the donors for their generous gifts.

Students' Hostels:

One full block of the new hostel building is now completed. It was inaugurated by Sri D. C. Pavate, Vice-Chancellor of Karnatak University, on 7th August, 1960. The work of a second similar block has been started and the hostels have Vegetarian (South Indian and Bombay) and Non-vegetarian messes. They are being run efficiently by the students themselves on co-operative basis.

Shri B. V. Krishna Murthy, Professor of Mechanical Engineering is Warden of the hostels. To assist him, an Additional Warden and Assistant Wardens have been appointed. The Additional Warden and Assistant Wardens are residing in the new hostel building, with a view to keep close touch with the students in their activities outside the College classes.

Medical Facilities:

The students and staff are efforded medicl facilities, in the Kasturba Medical College Hospital. The students are required to have an annual medical examination, and Dr. M. Krishnaswamy, M.R.C.P., of the Kasturba Hospital has been appointed to

conduct the medical examination He is also the medical attendant for staff members, who are given free medical treatment at the Kasturba Medical College Hospital.

Students' Facilities:

The Students' Association continues to function satisfactorily. Shri D. B. Prasad Rao and Shri M. Keshava Kini were elected Presidents and Shri George Thomas as Secretary. The Students' Association was inaugurated by Shri W. G. Saldanha, Superintending Engineer, P. W. D., South Kanara, on 8-9-1960. They are conducting various activities on the academic as well as cultural sides.

The College participated in the Exhibitions held in connection with the Mysore State Medical Conference and the Sahithya Sammelan held at Manipal and also in the Municipal Exhibition held at Udipi. The stalls of the Manipal Engineering College were well appreciated by the visitors.

"Precursor" the College annual magazine is being got out regulary.

Sports and Athletics:

Shri B. V. Krishna Murthy is Vice-Chairman of the Sports' Association. Shri K. M. Ballal continues as Physical Director. Shri Edwin Goveas of the B. E. Class was elected as Secretary of the Sports' Association. The students are taking keen interest in the several games. As usual, our College teams have taken part in the Municipal Gymkhana Republic Day tournaments, Academy of General Education tournaments and the Inter-Collegiate tournaments conducted by the Karnatak University in Manipal area. Our Cricket, Kabaddi and Table-tennis teams have won cups for this year in the Municipal Gymkhana tournaments, the College team won the Cricket, Foot-ball, Ball-badmintion, Basket-ball matches and were runners up in Tennis.

In the Inter-collegiate tournaments, the College won the Zone finals in Cricket, Hockey, Kabaddi, Badminton shuttle and Table-Tennis.

The College had the privilege of sending the following sportsmen for the University and State teams:

Shri P. N. Bhandari, the veteran batsman, was selected for Karnatak University Cricket team and Bihar State team. He has played for the East-Zone against Pakistan. Shri George Mathew was selected for the Karnatak University Foot-ball team to participate in the Inter-Varsity Foot-ball Champion-ship held at Nagpur.

Shri G. K. S. Raghavan, the promising Table-tennis player is ranked No. II of the Karnatak University Table-tennis team this year. Shri G. Parandhamayya, an outstanding player in kabaddi was selected to represent the Kabaddi team of Udipi, which won the State Championship held at Mysore this year. A tennis court is being run by the staff members and students, who are participating in the game.

Examination:

Results of the Examination held both in April, 1960 and October, 1960 have been very satisfactory. The percentage in the B. E. Examination held in April, 1960 was 84.62 and the two students who took the October Examination passed. The results in other examinations—i. e., F. E. and S. E. have also been encouraging.

Our College topped the list in obtaining two first places and one second place in the F. E., S. E. and B. E. April, 1960 examinations, among the Engineering Colleges of Karnatak University.

The A. T. K. T. system of allowing the students for appearing for the examinations and continuing their studies is in practice.

Scholarships and Prizes:

The Kashmir Government have granted one loan scholarship to Shri T. N. Raina of the B. E. Class. For the Students Aid Fund a sum of Rs. 261/- was collected from the College, and a similar sum was received from the University Grants Commission, and it was distributed equally among selected students for the purchase of books.

I am glad to announce that Shri Pundalika Padiyar of the S. E. Class of this College secured the first place in the F. E. Examination and has been awarded a prize of Rs. 100/- by the University.

N. C. C.:

Steps have been taken to raise a Coy of N. C. C. Rifles for the College. Cadets belonging to the M. G. M. College, Udipi and the Kasturba Medical College, Manipal will be attached to this Coy. Already 97 students of this College have volunteerd to join the Coy. Major M. S. Sandhu of the N. C. C. Rifles had visited the College in connection with the raising of the Coy, and measures in this regard are expected to be finalised soon.

Buildings:

The College was hitherto located in the K. M. C. Hospital building. It has moved to the new building on the 18th January, 1961 when enough accommodation was built to have the classes. The construction of the new building is fast proceeding, and a total sum of Rs. 6,37,000/- has been spent on the construction so far. The basement and the ground floor rooms have been completed, and they have now been occupied by the College and the Pre-Engineering section. The superstructure for the front portion is in progress, and is expected to be completed by the end of the year.

General:

From the next academic year, the College will be having admissions only for the 5 years' integrated course in Engineering, in common with the other Engineering Colleges in the country. There have been a large number of applications for admission in the College, and it is proposed to increase the intake of students. The introduction of the Mechanical and Electrical Engineering Courses will, it is believed, also attract a large number of students to join this College.

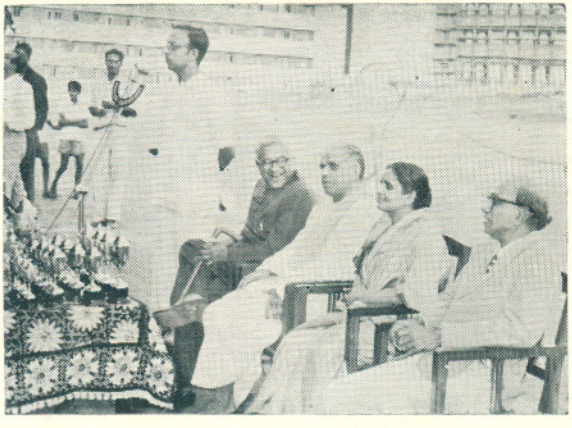
The College has developed from a small beginning to its present position with the aid and co-operation from all quarters. The College owes its origin and development to Dr. T. M. A. Pai, Registrar of the Academy of General Education, who has been the founder and father of this institution. Shri T. Ramesh U. Pai, member of the Trust Board of the College has been a moving spirit in all the affairs of the College, and I am thankful to them both for all the help and guidance they have been extending to us in the working of the Institution. I am also thankful to the President and members of the Trust Board who have been guiding the affairs of the College. Lastly I thank all the members of the staff (teaching as well as non-teaching) for the help and co-operation they have extended to me in attempts to carry on the work of the institution in an efficient manner.

JAI HIND

Principal welcoming the Chief Guest

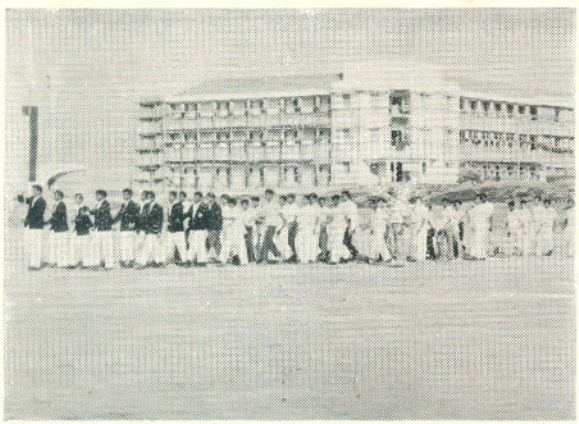
Physical Director Reading the report

Address by Sri T. R. A. Pai



Vote of thanks by the Vice-Chairman

Prize distribution by Mrs. T. R. A. Pai



March-past by the Athlets

Report of the Sports Association 1960–61

SECRETARY

It is indeed with a great sense of pleasure and pride that I am presenting this report of the Sports' Association for the year 1960-61. The year is a memorable one in the sense that the Manipal Engineering College sportsmen dominated the Sports' activities of Udipi. They have given abundant proof to the public of their fine team-spirit and earnestness to rise to great heights and remain there.

Early in July, after the union elections were over, the Sports Committee was constituted. The following are the members of the Sports' Committee for the current year.

President: Professor M. N. Kamath, (Principal)
Vice-President: Professor Krisna Murthy
General Secretary: Shri K. M. Ballal
Sports Secretary: Shri E. G. Goveas
Cricket Captain: Shri Kerala Varma
Hockey Captain: Shri K. J. Mathew
Foot-ball Captain: Shri P. Krishna Murthy
Basket-ball Captain: Shri Joseph Alexander
Volley-ball Captain: Shri George Thomas
Tennis Captain. Shri K. G. B. Nair
Table-Tennis Captain: Shri K. K. George
Athletic Captain: Shri B. Parandhamayya
Kabaddi Captain: Shri Nagabhushanam
Shuttle Badminton Captain: Shri K. A. Abraham
Ball Badminton Captain: Shri U. V. Rao

A good tempo of activities is maintained in all the departments throughout the year. (The College with only four years of its existence has). In point of vigour and enthusiasm the sports and games activities of the year broke last year's record.

CRICKET:—Our Cricket eleven has the proud distinction of winning the inter-collegiate zonal final conducted by the Karnatak University this year which is the result of good team-work and assiduous practice. Shri Kerala Varma, the Captain deserves congratulations. M/s. P. N. Bhandari, Varma and Raghava distinguished themselves in batting while Anand Shiva Sharma and Raja Rao speed merchants and spinners, Ragava, Kerala Varma and P. N. Bhandari are the backbone of our attack. As usual the College Cricket team participated in the following tournaments: Municipal Gymkhana Republic Day Cricket tournament, the Academy tournament and the inter-collegiate Zonal tournament. We are happy to announce that we have won all the above three cups this year. We are happy to announce that one of our Cricketers Shri P. N. Bhandari was selected for the Karnatak University Cricket team to participate in the Inter-University Cricket tournament held at Ahemadabad. He is invited for trials for selecting Inter-University team to meet the Pakistan. A special mention

may be made here of Shri Bhandari who was selected to represent the East Zone in an official match against Pakistan. He is mainly responsible for saving the East Zone team from a possible defeat in the match was highly commendable. He has also played for Bihar in the Ranji trophy matches and had topped the batting average last year. We won a resounding victory in the finals of Academy of General Education tournament in foot-ball by beating the Mahatma Gandhi Memorial College by three goals to nil. Shri Krishna Murthy our energetic Captain deserves hearty congratulations. Shri George Mathew was selected this year to represent the Karnatak University Foot-ball team to participate in the Inter-varsity Foot ball championship held at Nagpur.

HOCKEY:—We have a very good team under the able captain Mr. K. J. Mathew and supported by M/s. K. A. Thomas, K. K. George, K. K. Joseph, S. Kudva and Kande. We have won the inter-collegiate Zone final against Kasturba Medical College. Our great handicap is the want of a ground for practice.

BASKET BALL:—Shri Joseph Alexander should be commended for his fine leadership in bringing up such a good-basket-ball team this year. We have eusured for the Municipal tournament but lost by a narrow margin. Shri C. K. Thomas is the top scorer. In the Academy tournaments, the College won the cup in basket-ball this year.

KABADDI:—This national game although started only two years back is creating lot of interest. Shri B. Parandhamayya who represented the Udipi team in the Dasara Sports held at Mysore was the outstanding player.

TABLE TENNIS:—We have very promissing players in this Department. Messrs. G. K. S. Ragavan and K. K. Joseph. Shri Raghavan was selected to represent the Karnatak University table-tennis team this year. (He is ranked No. 2 of the Karnatak University, Dharwar.) Both represented the college in the recent Municipal tournament and won the prizes. We also won the inter-collegiate Zone final against Kasturba Medical College, Manipal.

In the Academy tournaments, the College won the finals in Cricket, Foot-ball and Ball-Badminton.

Above all it should be understood that this College not only won many laurels but won the good-will and popularity of one and all by exhibiting scientific game and sportsman-ship qualities. As a matter of fact the spirit with which our sportmen played and conducted themselves in and off in field are exemplary.

We have conducted the usual inter-class tournaments and sports and there were keen competitions for all.

Three students of this College were to represent the Karnatak University teams. Shri P. N. Bhandari of Pre-Engineering Class was selected to represent the Karnatak University Cricket team to participate in the inter-varsity tournament held at Poona.

Shri Mathew was selected this year for the Karnatak University Foot-ball team to participate in the inter-university Foot-ball tournament held at Nagpur.

It is needless to say that our students have been taking keen interest in games and sports, porticularly now when the emphasis on the extra-curricular activities of the institutions in general has shot-up. As usual, our College teams have taken part in the Municipal Gymkhana tournaments. Kabaddi and table-tennis teams have won the finals. However, we have not been able to participate in the Inter-Zone finals for reasons

beyond our control. In the Dasara Festivities held at Mysore, one of our Kabaddi players, Shri B. Parandhamayya was selected to represent Udipi Kabaddi team at the State level and his performance was highly commendable. Our Cricket captain Kerala Varma has distinguished himself by scoring a brilliant century and has led the College team to victory. He is very lucky with **the coin and had a rich season with the bat.**

I have to thank in particular Shri M. N. Kamath, our Ex-officio President and Shri B. V. Krishna Murthy, our Vice-President for their able guidance and sound advice.

I hope the Manipal Engineering College Sportsmen will keep up their tradition and keep the flag flying in the years to come, so that the name of the Manipal Engineering College will stand for true sportsmanship.

ABOUT CHARACTER

Charactar is higher than intellect.....
A great soul will be strong to live as to think —Emerson

University Examination Results in Various Classes

			Percentage Pass
1. Pre. Engineering	...	...	38. 6
2. First Engineering	...	...	57
3. Second Engineering (Civil)	...	...	66
4. B. E. (Civil)	...	...	84

B. E. Civil—April 1961

I st Class.

B. J. Upendra Nayak.

II nd Class.

1. Babu A. Paul
2. Achutha Bhat
3. B. Prasada Rao
4. Sivasankar Ganduri
5. Edwin Goveas
6. Sreekanthan H. R.
7. V. V. Holla
8. Jacob K. Mathaw
9. Jacob Koshy
10. K. Balakrishnan Nair
11. K. Narayanan
12. K. A. Thomas
13. K. J. Mathew
14. K. K. George
15. Dayananda Kamath
16. Joseph Alexander
17. K. Raghava
18. Kerala Varma
19. K. P. Jacob
20. R. R. Krishna
21. P. S. Kudva
22. Nayak, Vishvanath Ramachandra
23. M. M. Thomas
24. N. H. V. Raghava Rao
25. P. H. Narayana Swany
26. Ananthakrishna Pai
27. P. J. Krishna Murthi
28. T. N. Raina
29. Vedavyas Rao
30. V. S. Savur
31. Narasimha Shenoy
32. Ratnakar Shenoy
33. Krishna Shetty
34. S. R. Srinivas
35. T. Haridas Menon
36. Velappa Kumar
37. Prabhakara Rao

Out-going Students with Members of the Staff

MANIPAL POWER PRESS, MANIPAL