

MOTHER TERESA

An angel of the Poor.



Mother Teresa, the angel of the poor is no more with us. The beacon light and hope to millions of poor has gone, yet mother is living in the hearts of the poor. The destitutes and the homeless are weeping. She carried the message of Jesus Christ in the midst of people. As a true devotee she served the poor. She did not hate anybody. She looked at everybody equally. Service to the poor was her aim in life. Through her humanitarian service she proved to the millions the need of love and affection to the poor. For Mother, human life was something very sacred and precious. She was against violence of every kind. She considered every child to be a creation of

God and hence born with the right to live.

She fought abortion by giving unwanted children to be adopted to families who wanted them, who would love them and help them grow like any other children. Among the many heroic virtues which Mother practiced was her total faith in God. She trusted solely on the providence of God and God always rewarded her faith through the benefactors and volunteers who would willingly come forward to help her.

Anna Kerketta
TDC 1st year (Arts)

Mother Teresa was a person who always radiate joy and all who met her, never left without being happy themselves. She could foresee the needs in a particular situation and would not wait to be asked for help. But her thoughtfulness and tender concern made her reach out to the needy. She was simple and humble and it was this quality, which attracted crowds to her. Her talks always sprang from the depths of her heart, and she spoke with deep conviction that touched people so much that many times they could not restrain their tears.

The presences of the sisters and their services have brought about considerable changes in the heart

of people. Since the initial days the sisters were actively involved in not only caring for the physical needs of the people but also in trying to mould them in faith, morals and values. The free dispensary meets the medical needs of the tribals and villagers. The slum schools for those who cannot afford to go other schools impart primary education. Visiting hospitals, picking up the dying and the abandoned ones from the streets and railway station, and thus helping the really neglected are needy ones, are others activities that the sisters are engaged in.

Following the example of Mother, today the missionaries of charity in the North East serve the poorest of the poor selflessly and with dedication.

Mother used to say
"what matter is not
how much we do.
but how much love
put into what we do".

As true disciple of Jesus Christ she carried His message of peace and brotherhood. She was affectionately called as "Maa". At her funeral more than 70 nations paid last homage. There was the sea of human being on the street. It was an unique incident in the history of mandind. Yes, she was Mother of all.

The question is, what is the secret of her call? Definitely it is her love and affection to the poorest of the poor. She knew that it was the message of Jesus Christ. She said "By washing a lepers wound I feel that I wash the feet of Jesus". Her dream of world peace and non-violence definitely will come true. The people of the world will remember as a great soul walked on this planet. She left a message "If we love poor then God will love us."

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Success does not mean the absence of failures, it means the attainment of ultimate objective, it means winning the war not every battle.

— Edwin Bliss.

Heritage of North East Games

Bhrigumoni Boro,
TDC 1st Year (Arts)

The entire north eastern region of India is rich in natural and cultural heritage. Since time immemorial the people of this region are maintaining their traditions with true spirit. Like other cultural activities, sports are also given priority by the people of different society of different localities.

As far as indigenous sports of this region are concerned Manipur is certainly the premier state as it has numerous games which are popular among their men and women. It is also a matter of pride that polo was invented in Manipur long back which was learned by the British in the 19th century which finally became popular worldwide. The game was known as Sagol Kangjei in Manipur and with some modification the game was introduced in the international arena which is now recognised as one of the most aristocratic game played all over the world. Like polo Manipur has some other games which have been able to draw the attention of the mass people there. Khong Kangjei (Manipuri Hockey). Mukna (Manipuri Wrestling) Yub Lakpi (Manipuri style rugly) Kang, Hiyang Tannaba (Boat race) Thang Ta and Sarit Sarak (Manipuri Martial Arts) are some of the indigenious sporting events which very

popular in Manipur. Among these events kang, with an age old origin, is recognised as the state Games of Manipur.

Along with Manipur the states of Assam, Arunachal Pradesh, Mizoram, Tripura Nagaland aslo have their own indigenous games which are played with pomp and gaiety, particularly in the rural areas. In Assam 'Dhop Khel' is recorded as an ancient game which requiries absolute speed, stamina along with acrobatic skills. Dhop Khel is played by both men and women with teams consisting of Members in an area 125m. of lenght and 80m. of breadth. The game

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which is now modified by using scientific techniques was orginally flowered under the royal patronage of Ahom Kings. Not only the Dhop Khel but also there were several games which were patronized during the Ahom era. Moh-Juj (Buffalo fight), Sen Juj (Kite fight) were some of the events which were found in the history of Assam dynasty. Even the Rangghar one of the oldest amphitheatres in the entire Asia was set up during the reign of Swargadeo Sunenpha alias Pramatta Singha (1744-1751 AD). This rare historic monument bears ample testimony

of the great sports hegory of the entire North Eastern region.

In Mizoram Insuknawer (Rod - Pushing) Inbuan (Combat Wrestling) are some of the events which are popular in that state. Insuknawer is declared as the Mizo National Game, which is played only by men in a circle of 16 to 18 ft. diameter and the instrument used is a wooden rod or pole. The aim of the game is to push the opponent out of the circle. Inbuan resembles combat wrestling. In this sport one has to lift his opponent off the ground within 60 seconds. It is played in a grass carpeted circle with a 15 to 16 ft. diameter.

Arunachal Pradesh has some interesting indigenous games like Hole Taso Dukanaram. Hinam Tumam, Porok. Pamin Sinam (Cock Fight) etc. which have immense popularity among the Arunachali people . Hole Taso Dukanaram is particular is a peculiar game which involves the imitation of an animal called Hole Taso. This cat like animal runs around beating its chest alternatively with both front paws. Another remarkable feature of this animal is its ability to hold a third leg in the air while scampering

around. Imitating the animal one has to display ample balance, strength and coordination.

In Nagaland games like wrestling, cock fighting etc are quite popular among all tribes like Angami, Chakhesong , Zeliang, Rengma and Malo. The wrestling is played almost all over the state where the competitors have to hold the opponents waist girdles and try to throw off each other. In the cock fighting the players have to kick with the legs. The game is similar to the taekwon-do.

Tripura has another indigenous games which called Gella Chutt. This team game is played between two sides consisting of 7 or 10 players. Here one group select a king who takes his position 20-25 meter away from his team members. All his players are confined to a specified marked area called Ghar (House). The members of the other group spill over the entire area to foil the king in his attempt to reach the Ghar without being touched by any member of the opponent group. □□□

Source : North-East Game 2006-07

●●● Whatever you do will be insignificant, but it is very important that you do it.

- Mahatma Gandhi.

The end of the king of Pop

with the sudden demise of “Michael Jackson” popularly known as “MJ” an era of “Pop music” comes to an end.

Michael was born on 2nd August 1958 in Gary Indiana (USA). He was the seventh son of his parents of the total 9 children. His mother's name was Katherine and his father's name was Joseph Walter. He started performing on stage along with his brother at the tender age of 5. He wanted to become famous from his childhood. He was a member of the band named “The Jackson-5” from the age 5 until his death at the age of 50. He used to practise his singing and dancing steps 18 hours a day, with great labour.

Anuk Sunar
TDC 3rd Year (Arts)

He started his career with his album “Off the Wall” which was a mega hit. He became a superstar and was positioned as the sexiest entertainer after Elvis Presley “THE KING OF ROCK AND ROLL”. Three years later came “Thriller”-the legendary 1982 collection which continues to stand as Jackson's finest work and is one of the highest selling records of all time, with 41 million sales till date. “Thriller” established him as the “King of Pop” and he ruled the music industry through the 1980's

His other hits were Beat it, Billie Jean, I will be there, We are the world, I want u back etc.

Michael worked on every thing for a cause and there was always a strong motive behind it. He



composed songs on various issues like Environmental Degradation, Fight against vagaries of men, Racial discrimination etc. His Earth song, was composed to bring awareness among the people regarding environmental issues, his song “We are the World” was composed to bring unity among the people and his song “Black and White” was composed to unite the people of various races who fight for racial discrimination.

Michael could write lyrics, compose and then perform as a lead singer. Michael could adopt himself quite comfortably to the constantly changing demands of the American Music Industry. His inimitable choice of costumes and a fetish for facial changeovers created an enigmatic person that the masses found impossible to resist.

Talking about his videos we cannot forget his epic album Thriller. Thriller released in 1982 became a history not only for being the best selling album of all time, but it created a popular culture that would influence the emerging pattern of contemporary dance and music and dance patterns in every nook and corner of the world including Bollywood.

The lead number from the album "Dangerous" (1991) titled "Black and White" used the morphing technique elaborately in the music world for the first time. Morphing is a special effect in motion and animations that changes one's image into another through a seamless transition. His next mesmerising number "Remember the time" from the same album was an elaborate production and became one of his longest videos of over 9 minutes set in ancient Egypt.

The acclaimed video for scream from the album "History". Past, present and future Book I (1995) was shot primarily in black and white. It gained 11 MTV video music award nominations, more than any other music video and won "Best dance video, Best choreography and Best art direction". It even won the Grammy award for best music and it also entered the Guinness world records for being the most expensive videos ever made at an expense of \$7 million. Earth song from the same album was his third single which also gained him Grammy

nominations for best music video in 1997. The video had an environmental theme showing images of animal cruelty, deforestation, pollution and war.

Throughout his solo career Jackson's versatility allowed him to experiment with various themes and genres. His album "Off the World" was crafted from funk disco pop-soul, soft rock and popular ballads with Thriller Jackson developed his long association with the subliminal theme of paranoiac and darker imagery that are evident on the songs "Billie Jean and Wanna Be Starlin". Something after "We are the World" in 1985 humanitarian theme became a central component of his life and music.

As far as his dancing style is concerned, he revolutionized hip-hop dancing and had skills in every other field from classical to Jazz. He popularized the "Moonwalk" or the "Back Side" during the performance of his song Billie Jean of March 25 1983. Michael Jackson performed two moon walks during a live performance of Billie Jean at the 1995 MTV video music awards. It has since become one of the best dance moves in the world.

Though Michael was an all rounder in his musical career, his married life however was not a peaceful one. He first married Lisa Marie Priestley the daughter of "The King of Rock and Roll" Sir Elvis Priestley but it lasted for only 2 years. Then while undergoing a plastic surgery he met a nurse named Debbie Rowe and he married her. He had two children from Rowe Paris Michael Katherine and Prince Michael but they got divorced later. However his third child Prince Michael II was born to an unknown woman till date.

Michael's fall from grace began in 1993 when he was first accused of child molestation but it was not proved. In 2005 he was again charged of further sexual molestation charges. He had bizzare lifestyle full of sexual scandals and numerous plastic surgeries and there are plenty of rumours regarding his nose. He had altogether 6 or 9 collection of noses of various shapes and designs which he got it done by surgeries.

Besides scandals Michael was a passionate supporter of charity and was honoured by many organisation for the work he did and the compassion he showed. The millenium issue of Guinness book of world records names Michael as the popstar who support the most charity organisations. Besides his charitable contribution to many organisations liked United Negro College Fund, Michael Jackson burn centre for children, children's defence fund among others he was instrumental in organizing a charity single, "We are the world" recorded by a supergroup of 45 popular musicians billed by the USA (United Support of Artist) for Africa. He co-wrote the songs "With Lionel Richiqe". The efford raised over 63 million and it was Osent to Africa which had experienced unusual drough in 1984-85.

Michael also exquiotely designed his world tours, profits of which he mostly donated to charity. In 1996 he performed in Mumbai to raised money for a foundation called "Shivyog Sena" that wanted to provide jobs to 27 lakhs Marathi Youths. He

donated millions of dollar in charity funds such was the heart of Michael the legend of an era.

Dogged with bout of warsening health and rumours of skin Cancer, besides a reported lung failure. Michael was diclared death by his personal doctor- Dr. Cornad Murray of cardiac arrest on 25th June, 2009 at his Bel Air Mansion in Los Angeles, such came death suddenly to the Popstar.

Michael was an woner of a very huge property and according to his wish his property was devided between his three sons, a part of it was given to his mother Katherine and the rest was donated to charity funds.

Michael's sudden and mysterious death has sharen the world of entertainment and created a void that would be impossible to filup.

At the shocking death of the Popstar many persons relating to Music have expressed grief shocked "Queen of Pop Medona", Lisa Marie Priestley, Elizabeth Toylar, Britney Spears, Quincy Jones, Whitney houston, R & B Star usher, and the rising star Akon have expressed deep mourn over the "King of Pop"s demise and they believed that a big gap is created in the world of music and to full it we will have to wait a thousands of years.

Michael's sudden death and that also too early is a matter of great grief but Michael will always be with us as a shinning star in the sky and in our hearts.

Adieu to you Michael and may your soul rest in peace. □□□

Source : "The Assam Tribune" and "The Telegraph".

SOUND

Kankana Dutta Banuah
H.S. First Year (Arts)

We are living in a world of sounds. Some sounds are pleasing, like the purr of a cat, the hum of a bee or the notes of a koel, while some are frightening, like the roar of a lion, the growl of a panther or the burst of an explosive.

Sound, in essence, is vibration. If we happen to stand near a field of paddy, the stalks appear to be swinging and dancing in the wind. The air carries the vibrations of the stalks.

We can produce sounds, if we can create vibrations. If we pull down the branch of a tree and let it go, the branch swings up and down cutting through the air. The air vibrates, we hear a 'swish'.

There are many objects which vibrate and give us sounds.

Tie a long string to a peg and stretch it taut. Tie the other end to another peg. Then tug at the string. It vibrates as it moves back and forth. The vibrations reduce in range, slowly. Finally, the string ceases to vibrate. It does not produce any sound. We notice the sound which is louder when the string vibrates more. The sound becomes softer when the vibrations become less intense. It is this principle which is used in many musical instruments. In the veena the metal strings are plucked by fingers. The violinist makes the strings vibrate with the help of the bow and his fingers. A guitarist presses the strings with one hand and plucks them with the other.

Pressing the strings changes the notes by making the vibrating parts shorter or longer.

The mridangam, the tabla, the drum are called percussion instruments. They are cylinders or bowls with one or both ends closed by a stretched 'skin'. Calf-skin is generally used. The vibrations or sounds made by the drum depends on the size of the skin, and how taut the skin is.

Insects, animals, birds know how to produce sounds. The cricket is an insect that hides in nooks and corners in the kitchen during the day. At night, once the lights are off, it comes out. It produces grating notes. One of the fore wings of the cricket has a vein on the other side. This vein looks like a toothed file. The edge of the other wing has a ridge. This acts as a scraper. When the wing with the ridge rubs against the other wing (which has grooves or teeth), occur the vibrations. These vibrations produce the grating sound. Often, the insect finds its mate by showing its skill in producing such notes.

Birds have a vocal organ called syrinx. It is made of a bony band. The band is attached to a membrane. The membrane is fully stretched. It is attached to muscles. The bird forces air through the lungs. The air rushes out, playing on the membrane. It vibrates according to the pressure of the wind. These vibrations become the notes of the bird. Each bird produces a different note. This depend on the nature of the membrane and its capacity to vibrate.

Musical instruments like the flute, the nadaswaram and the shehnai use the principle of vibration. Animals produce sounds by forcing air through the voice box.

Man alone is capable making wide-ranging sounds. He can talk, shout, scream, cry, sing or whisper.

There is an organ in our body called Adam's

apple. We can feel it as we run our fingers from the chin downwards. It is in the middle of the neck. It is a bone-like structure, rather firm. If we put our finger on the Adam's apple and make soft notes as well as louder notes, we will find the Adam's apple vibrating differently, according to the sounds we produce. The Adam's apple vibrates as air rushes over it. Vocal cords in our throat vibrates and make sounds as the air from the lungs is pushed over them. The mouth and lips form these sounds into words.

Vibrations move through different mediums and directions. If we are in their path, they reach our ears.

The human ear is consists of three parts. They are the outer ear, the middle ear and the inner ear. The vibrations are collected by the outer ear. They pass through a canal which widens towards the middle ear or the ear drum. The vibration make waves in the fluid. They plug the organ of corti a miniature harp like organ with about 20,000 strings. Each string is short, hardly a few hundred of an inch in length. This note is its pitch. The pitch is decided by the number of vibrations per second. The brain gets each sound distinctly and gathers the sound which come in successively, hears and understands the sounds.

Air is not the only medium through which sound moves. There are different mediums. Vibrations need a medium to travel, it could be air or string or a block of wood or a piece of metal or even water.

Sound travels better through liquids and solids than gasses. Light travels faster than the sound. On rainy days, when there is thunder and lightning we see the lightning first much before the thunder.

Pollution : The pitch or frequency of a sound refers to the rate of vibrations per second. The intensity or loudness is measured in decibels. At 130 decibels, the sound hurts the ears. That is why we

plug our ears when a jet aircraft takes off, for it produces notes of about 150 decibels.

A wag defined noise thus :

'Noise is wrong sound, in the wrong place, at the wrong time.'

The world has become far too noisy now. Noise causes headache, nervous damage and depression. There are many sources of noise pollution.

Noise pollution is caused by the constant honking of horns, also when people donot turn off their engines when they wait at traffic crossings. The loudspeaker which is played at the time of marriages, festivals or during elections is yet another source of noise pollution in India.

In factories old machines produce very loud sounds, much above the tolerable limit of 70 to 90 decibles, sooner or later, the workers in such factories are bound to acquire one or the other disease.

Paul leug, a German scientist came up with a machine in 1933. He showed that noise, which moves in waves, has its crests the highest points - and through-the lowest points. Leug used this knowledge to produce silence.

Sound waves are very powerful. When there is thunder, windopanes rattle. The sound waves released by thunder have enough force. Anything that is loose or not firmly held in place quivers with the sound. Sound waves may be very destructive, too. Much of the damage which a bomb causes comes from sound waves.

Sound waves can also be very useful. Sound waves in the form of music gives us much delight. In 1985, Larry Dossey of Dallas Diagnostic Association, said "A music is medicine". He used music to cure his patients of headaches, stress and strain. Music has a soothing effect on human nerves.

Returning sounds are called echoes. An echo

is the reflection and repetition of a sound from a wall or inside and enclosed space. We get to hear this effect when we are in the valley of a hill.

Bats have poor eye sights. Yet they can fly because they are good at understanding echos. The bat while flying, lets out high-pitched sounds. The notes vibrate about 30,000 to 70,000 times per second. We cannot hear these notes. These vibrations spread out in all directions. Some of them run into obstacles and bounce back. The bat judges the echos and it knows where the obstacles are located. It adjust its flight path accordingly.

Echos are exploited to map the bottom of the sea. A ship sails out in to the sea. It sends out sound waves. These waves move thorough the water. They hit the sea bed and come back as echos to the ship. The time taken by the sound waves for the two way journey is recorded and the speed at which sound travels through water is known. So, it is possible to calculate the depth of the sea at a given point.

Sound helps us in many ways. There are machines which emit sounds. These sounds are not audible to us. We can hear sound that ranges from 20 to 20,000 Hz. Any sound caused by higher range of vibration, called supersonic sound, is not audible to us. When a machine creates sounds of higer notes, the sound becomes intolerable for some pests and they run away from the zone where the high-pitched sounds prevail, sound is used, thus, to keep pests

away.

In 1846, Christian Doppler an Austrian physicist, discovered a peculiar property of sound. The whistle of a railway engine, when the engine moves towards us, is very shrill, yet, when it moves away from us, it sounds much less sharp. Doppler found that the sound waves from the source that approaches us get closer together as they reach us. These waves arrive at shorter intervals. So they turn shrill. When the source of sound reach us, these waves arrive at shorter interval. So they turn shrill.

Man has been exploiting sound intelligently for several centuries. The Golconda Fort near Hyderabad is a good example. The Fort was very cleverly built so that the ruler got to know about a visitor even before he entered the gate. The moment a visitor opened his mouth even to whisper, it was heard on top. This was indeed a security precaution made by the architect.

We have today mastered the technique of recording sounds on discs, tape-recorders and film tracks. A world minus sound is an unimaginable as it would be uninteresting. Thank god for sound! □□□

SOURCE

1. Marvels of science.
2. From Atom to Nano Tech – CBT Publication
3. Murthi, R.K.- Sound.

Work without faith is like an attempt to reach the bottom of a bottomless pit.

— M.K. Gandhi.

OPERATIONS RESEARCH AND LINEAR PROGRAMMING

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Operations Research [O.R.] is an interdisciplinary branch of mathematics that uses methods such as mathematical modeling, statistics and algorithms to arrive at optimal or near optimal solutions to complex problems. It is used to determine the maxima in the case of profit, performance, crop yield etc to determine minima in case of loss, risk etc. Literally, the word 'operation' may be defined as some action that we apply to some problems or hypotheses and the word 'research' is an organized process of seeking out facts about the same. So O.R. can be described as the 'science of use', 'quantitative common sense', 'scientific approach to decision making problems' etc. We can see to some quotations:

"OR is a scientific method of providing executive departments with a quantitative basis for decision under their control."- P.M. Morse and G.E. Kimble.

"OR is a scientific approach to problem solving for executive management"- H.M. Wagner.

"OR is applied decision theory. It uses many scientific, mathematical, or logical means to attempt to cope with the problems that confront the executive when he tries to achieve a through going rationality in

dealing with his decision problems."- D.W. Miller and M.K. Starr.

The field of OR is closely related to industrial engineering. Industrial engineers typically consider operations research technique to be a major part of their toolset. Some of the primary tools used by the operations researchers are statics, Optimization, probability theory, game theory, graph theory, decision analysis simulation etc.

We have various stories about the use of the operations research in the past. Some says that Charles Babbage [1791-1871] is the father of O.R. because he completed his research in the cost of transportation. But actual use of OR starts during the world war-II. During the war II, O.R. was used in management of the British army. Military management called on scientists from various disciplines and organized them into teams to assist in solving strategic and tactical problems. Since then the subject has been gaining more and more importance for students of Economics, Management, Public Administration, Behavioural Sciences, Social Works. Mathematics, Commerce, Engineering etc. In India, Operations Research came into existence in 1949 with the opening of an Operations Research Unit at

the Regional Research Laboratory at Hyderabad. Operations Research Society of India was formed in 1957. It becomes a member of the International Federation of Operations Research Society in 1959.

A main significance of O.R. is that it is always decision making. Moreover it is important for its scientific approach. It employs scientific methods for the purpose of solving problems. It is a formalize process of reasoning.

Modeling takes a very important role in operations research. A model in OR is a simplified representation of an operation or a process in which only the basic aspects or the more important features of a typical problem under investigation are considered. The objective of a model is to provide a means for analyzing the behaviour of the system for the purpose improving its performance. Assumptions made in the model should be as small as possible. It should be simple and coherent. Number of variables used should be less. It should not take much time in its construction.

The systematic methodology of O R deals with problems involving with multiple objectives, policies and alternatives. Some steps are necessary in the systematic solution process. These are

- Formulation of the problem
- Construction of a mathematical model
- Deriving the solution from the model
- Examining the validity of the model
- Establishing control over solution
- Implementation of the final result

We have so much applications of O.R. in various fields. It has successfully entered in different areas of research and services. Some of these are

- Finance, budgeting and investment
- Marketing

- Physical distribution
- Purchasing, procurement and exploration
- Production
- Research and development
- Transportations

There are various techniques in the operations process. Among these, linear programming is a very useful technique in the solution of the cases of constrained optimization. It is a technique for determining an optimum schedule of independent activities in view of the available resources. Programming is another form of planning which is a process of determining a particular plan of action from several alternatives. 'Linear' stands for linear equations. That is the equations involving variables with single power. The geometrical representation of such an equation is a straight line and for this they are called linear equations. All of the conditions and objectives of a model in this technique are expressed as linear equations. A linear programming problem with only two variables presents a simple case for which the solution can be obtained by using a rather elementary graphical method.

The first step in this technique is mathematical formulation of the problem. It consists of the following steps.

- Study and finding key decisions
- Identify the variables x_j , $j=1, 2, 3, \dots$
- State the feasible alternatives, e.g. $x_j \geq 0$ for all j
- Identify the constraints and express them as linear inequalities with the decision variables.

- Identify the objective function and to form it as a linear expression with the decision variables.

We now take two problems and discuss them to solve.

Example 1. A factory uses three different resources A, B, C for the manufacture of two different sweets Kalakan and Sandesh. 20 units of the resource A, 12 units of B and 16 units of C are available. 1 unit of Kalakan requires 2, 2 and 4 units of the respective resources and 1 unit of Sandesh requires 4, 2 and 0 units of the respective resources. It is known that the first sweet gives a profit of 2 monetary units per unit of 1000 and the second gives 3. We are to solve it for maximum profit.

We first determine the mathematical formulation of the problem.

Step-1. The key decision is to determine the number of units of the two sweets.

Step-2. Let x_1 units of Kalakan and x_2 units of Sandesh be manufactured for maximizing the profit.

Step-3. Feasible alternatives are the sets of values of x_1 and x_2 , satisfying $x_1 \geq 0$ and $x_2 \geq 0$, as negative number of productions are meaningless.

Step-4. The objective is to maximize the profit from both the sweets. i.e. to maximize

$$z = 2x_1 + 3x_2.$$

Step 5. Given that one unit of Kalakan requires 2, 2, 4 and one unit of Sandesh requires 4,

2, 0 units of the respective resources and the units available of the three resources are 20, 12, 16 respectively. So the constraints are

$$2x_1 + 4x_2 \leq 20$$

$$2x_1 + 2x_2 \leq 12$$

$$4x_1 + 0x_2 \leq 16$$

Hence the given problem can be formulized mathematically as

$$\text{Maximize } z = 2x_1 + 3x_2$$

subject to the constraints

$$x_1 + 2x_2 \leq 10 \quad \dots\dots\dots(1)$$

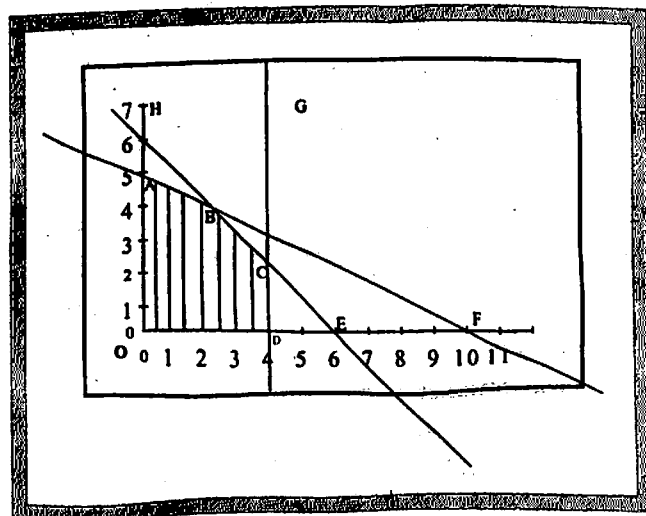
$$x_1 + x_2 \leq 6 \quad \dots\dots\dots(2)$$

$$x_1 \leq 4 \quad \dots\dots\dots(3)$$

$$x_1, x_2 \geq 0$$

As we have mentioned above, we can solve this problem graphically since the problem is with two variables.

Step 1. Since the problem has two variables we construct a graph in xy-plane and according to the last constraint, we are restricted in the first quadrant only



Step 2. Considering the constraints as equations, we draw the graph for each of three. First constraint gives the line AF, second constraint gives the line HE and the third gives the line GD. Since all of the constraints has the sign ' \leq ', so the intersection area OABCD of the left and lower parts of each of the lines gives the feasible area for the solution of our problem. The area OABCD is a convex area and each point of this area gives us a feasible solution.

Step 3. The five vertices of the convex area are $O(0,0)$, $A(0,5)$, $B(2,4)$, $C(4,2)$, $D(4,0)$. Examining the value of the objective function at each of the vertices, we get the maximum value of z is 16 at $B(2,4)$. Since our aim is to get the maximum profit, so this is the required solution of our problem i.e. the factory should make 2000 Kalakans and 4000 of Sandesh.

Example 2. A company makes two kinds of leather belts. Belt A is a high quality belt, and belt is of lower quality. The respective profits are Rs 4.00 and Rs. 3.00 per belt. Each belt of A requires twice as much time as for B. If all belts are of type B, the company could make 1000 per day. The supply of leather is sufficient for only 800 belts per day. Belt requires a fancy buckle and only 400 per day are available. There are only 700 buckles a day available for belt B. Determine the optimum product mix.

To solve this problem, we first give a mathematical formulation for this. The appropriate mathematical formulation is

$$\text{Maximize } z = 4x_1 + 3x_2$$

Subject to the constraint

$$2x_1 + x_2 \leq 1000$$

$$x_1 + x_2 \leq 800$$

$$x_1 \leq 400$$

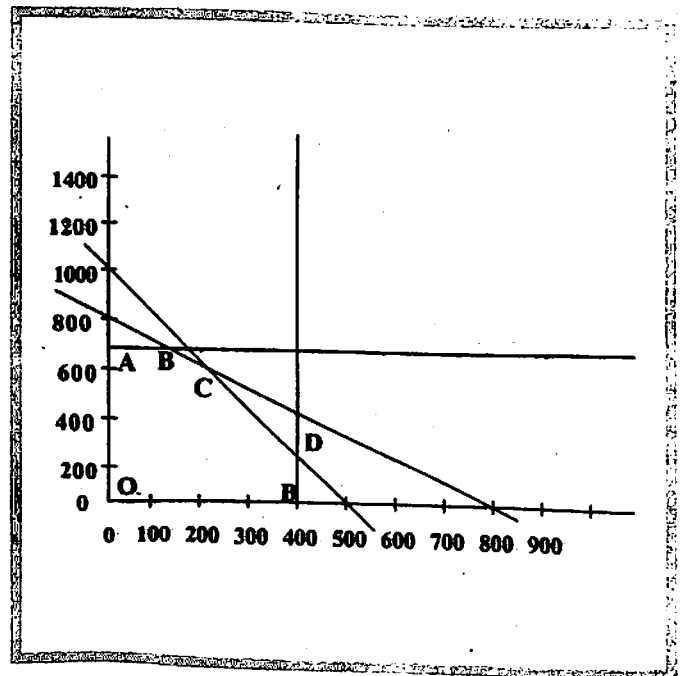
$$x_2 \leq 700$$

$$x_1 \geq 0, x_2 \geq 0$$

where x_1 = number of belts of type A,

x_2 = number of belts of type B.

In the next step, we draw the graph in xy -plane considering the first four constraints as equation. Due to the last condition of the constraints, we are restricted in the first quadrant.



From the above picture, we get the feasible area OABCDE for the solution of the problem. Since our aim is to maximise the value of the objective function, so the vertex C gives the expected value. That is $x_1 = 200$ and $x_2 = 600$ gives us the maximum value of $Z = 4x_1 + 3x_2$, which is 2600. Hence the production of 200 belts of type A and 600 belts of type B gives the maximum profit of Rs. 2600.

In this way we can solve the problems with two variables of linear programming using two-dimensional (planer) graph. If the number of variables is more than two, then we can use the simplex method or the revised simplex method. But the graphical method is so simple and most of our problems can be solved by this method.

It is only an attempt in understanding operations and should never be considered as absolute in any sense. There are some limitations here. Validity of any model with regard to corresponding operation can only be verified by carrying the experiment and relevant data characteristics. Use of

operations research to improve decision-making has become almost universal today. But it is not totally free from some weak points. It is due to mainly from lack of awareness on the part of users about their roles. More over it is due to avoidance of the behavioural and organizational issues, which is a part of every successful application. So only the proper use of proper techniques in proper way gives us the expected result in operations research.

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Learning gives creativity, creativity leads thinking, provides knowledge , Knowledge makes you great.

Dr. APJ Abdul Kalam.