



# Civinnovate

Discover, Learn, and Innovate in Civil Engineering

# KNOWLEDGE AND WISDOM

## NOTES

1. No correlative increase in wisdom as in our age
2. Several factors for wisdom
3. A sense of proportion
4. Pursuit of knowledge with wisdom
5. Wisdom not necessarily present in specialists
6. Essence of wisdom: Emancipation from the sense
7. Gradual increase of wisdom
8. No possibility of complete impartiality
9. Continual approach towards impartiality: Growth in wisdom
10. Teaching of wisdom with moral instructions
11. No good results of hatred and narrow mindedness in the course of giving knowledge
12. Big role of morals in knowledge with wisdom
13. Best technicians vs. good citizens

Note: Don't write full sentence, i.e. S+Verb+O in note making

### 1. What do you mean by a sense of proportion?

A sense of proportion means the capacity to consider all the important factors equally in a problem and to give due importance to each. For example, suppose someone is engaged in research in scientific medicine, but he has no time to consider its outside effect.

As a result of the research, he succeeds in lowering the infant death rate everywhere in the world. But its indirect effect is that it lowers the standard of life in the most populous part of the world. Another example is that someone studies the composition of the atom and incidentally places it in the hands of the insane. These two examples clearly show that knowledge is

harmful until and unless it is combined with wisdom. And to increase wisdom one should be fully prepared to treat all the factors of an occurrence in a very balanced way. Only then he is said to have a sense of proportion.

SUMMARY

LITERARY SECTION

## 1. OF STUDIES

**Francis Bacon**

“Of Studies” is the first essay of the first collection of ten essays by Bacon, published in 1597. In this essay Bacon has forcefully made comments on value and usefulness of reading and learning. While examining the benefits and effects of studies Bacon tells that studying alone is insufficient, learning must be balanced by experiences. Diverse study may help counteract personal imperfection.

Bacon proposes that study may be done for three purposes: - Firstly, it may be done for our own entertainment or just to get pleasure, such as reading books on favourite author, country, scene etc. Secondly, it may be done just for ornament, it means just to impress other or bring attention in hope of gaining our friend’s admiration. Lastly it may be done to gain competency and proficiency.

Study has several benefits and effects. It provides us valuable knowledge, reading and learning experiences, logical ideas and creative skills. It develops our discourse, intelligent capacity. Reading makes us full, conference makes us ready man, and writing makes us exact. Therefore reading, writing and learning must go together. University scholars read and learn varieties of books which provide them multiple careers.

-reading history makes us wise.

-reading poetry makes us witty/intelligence.

-reading mathematics makes us subtle and creative.

-reading moral makes us sober and profound.

- reading natural philosophy makes us deep, wise and profound.

-reading logic makes us argumentative.

Bacon suggests basically three kinds of books, studied differently. There are some books which are to be tasted (read not wholly but in parts). There are some books which are to be swallowed (books read to be hurriedly). There are some books which are to be chewed (books read with great care and attention). Thus reading alone is not sufficient enough, It must be followed by learning just as two sides of a coin to place the value of perfect study.

### Questions:

1. "Studies serve for delight, for ornament and for ability" .Explain it.
2. What are three purposes, study may be done for? Discuss with appropriate examples.
3. "Some books are to be tasted, others to be swallowed, and some few to be chewed and digested" How and why?
4. What are the benefits we achieve from proper study?
5. What is study? What are its benefits and creative effects? Do you agree with bacon? Write your own view on study with specific conclusion.

## 2.HOW MUCH LAND DOES A MAN NEED

### LEO TOLSTOY

The story, How Much Land Does A Man Need? Consists of nine units contains separate ideas with full of moral teaching. It has explained author's religious experience. It deals with moral problems in the country life because of spiritual crisis created by human greed and temptation. It suggests us that human desire has no limitation. Men desire to take possession of more than they need in benefits of themselves. Thus greed has no specific boundaries that ultimately leads life to death.

The protagonist of the story is a peasant named Pahom, who at the beginning can be heard complaining that he does not own enough land to satisfy him. He states that "If I had plenty of land, I shouldn't fear the Devil himself!". Unbeknownst to him, Satan is present sitting behind the stove and listening, A short amount of time later, a landlady in the village decides to sell her estate, and the peasants of the village buy as much of that land as they can.Pahom himself purchases some land , and by working off the extra land is able to repay his debts and live a

more comfortable life. However, Pahom then becomes very possessive of his land and this causes arguments with his neighbours. Threats to Pahom his building began to uttered." Later, he moves to a larger area of land at another Commune. Here we can grow even more crops and a mass a small fortune, but he has to grow the crops on rented land, which irritates him.

Finally, he is introduced to the Bashkirs, and is told that they are simple minded people who own a large amount of land. Pahom goes to them to take as much of their land for as low a price as he can negotiate. Their offer is very unusual: for a sum of one thousand rubles, Pahom can walk around average as much as he wants. Starting at daybreak, marking his route with a spade along the way. If he reaches his starting point by sunset that day, the entire area of land his route encloses will be his, but if he does not reach to starting point he will lose his money and receive no land. He is delighted as he believes that he can cover a great distance and has chanced upon the bargain of a lifetime. That night, Pahom experiences a surreal dream in which he sees himself lying dead by the feet of a devil, who is laughing. He stays out as late as possible, marking out land until just before the sun sets. Toward the end, he realizes he is far from the starting point and runs back as fast as he can to the waiting Bashkirs. He finally arrives at the starting point just as the sun sets. The Bashkirs cheer his good fortune, but exhausted from the run, Pahom drops dead. His servant buries him in an ordinary grave only six feet long, thus ironically answering the question posed in the title

## **Analysis of how Much Land Does a Man Need by Leo Tolstoy**

In the short story "How Much Land Does A man Need" by Leo Tolstoy, Pahom is a peasant living on a small plot of land. When his wife brags that a peasant's life is safer than having money, because with money comes temptation, Pahom agrees, adding that he would not be afraid of the devil himself' if he only had more land he gets, he wants more. He becomes greedier and greedier until he can control of his life and, in the end, loses everything. This story shows us that even if we have enough to get by the prospect of becoming wealthier is so alluring it can cause us to risk all the good things we already have.

At the start, Pahom is a content, hardworking men. Unfortunately, he makes the mistake of thinking that more land would make his life better. Pahom says to himself "our only trouble is that we haven't land enough. If I had plenty of land, he jumps at the chance, convinced that more would make him happy. He paid off his debts and had plenty of fertile land to grow his crops and raise his cattle, but he was only satisfied for a short while. "Pahom was well-contented and everything would have been right if the neighbouring peasants would only not have trespassed on as cornfields and meadow', so even when he had the extra land he wanted. His life was far from perfect. Disputes with his neighbours and court battles cause pahom to be disliked by the Commune, so even though he had more land, his position in the town was worse than ever. Pahom's life may have been improved by owning more land, but

human nature prompted him to continue to be greedy, wanting even more than he already had.

One day, Pahom hears word of a place where free land was given to any man who joins the commune. Immediately the many acres of land that he does own seem unbearable and barren compared to the promise of better land. He asks himself, "Why should I suffer in this narrow hole, If one can live so well elsewhere"? so, although he has plenty of good land and a good life. Pahom sells everything he owns to pursue what he thinks will complete his idea of a happy life. With the new land, Pahom was content, but soon he grew accustomed to it and began to want more once again. After renting extra land, Pahom decided it would be an even better idea if he actually owned all his land for he believed he "should be independent, and there would not be any unpleasantness". He planned to buy more land, but along came an opportunity that he would not let pass by.

A tradesman passing through told Pahom of lush land, sold for nearly no money, so Pahom decided that land would be a better deal. "If I take it out there, I can get more than ten times as much for the money" he figured, so he abandoned everything he had worked so hard for and when to check out the land. Just as the tradesman had promised, the land was lush and fertile and farmers promised to give Pahom all the land he could walk around in a day for a very cheap price. Pahom walked the entire day, but greed overtook him and he bit off more than he could chew. Exhausted, he tried to make it back to the designated meeting place before the day was over, but his body was too tired. Defeated, he made one last effort, "there is a plenty of land, but will God let me live on it" he wondered. This journey was to no avail-he had taken too much, and died in the process.

Through the story we are shown that human nature pushes us to want more and more. We are not content with our lives, no matter how well off we may be, and, while trying to better our standard of living, we put ourselves in danger of ending up with nothing

### **3. THE LADY WITH THE PET DOG**

**ANTON CHEKHOV**

Although the story has tried to say "Love as such is not bound by marriage or marital relation" as the theme, it would be misleading to say that the main theme of "The Lady with the pet Dog" is one of moral corruption or sin. In fact, it is through this adulterous affair that Gurov discovers his humanity and even his moral center. Gurov has always taken women for granted and has treated them without compassion or respect. During the course of his affair with Anna, however, he becomes more and more concerned about the consequences of his actions.

Chekhov's treatment of morality is complex; he is not conventionally moralistic, yet his story suggests a strong personal morality. Gurov and Anna truly love each other, and their bad marriages are unfortunate aspects of their lives. Little sympathy or consideration is offered to the respective spouses of the adulterous couple. But Chekhov enters into individual character and judges in moral ground.

Dmitri Dmitritch Gurov has been on vacation at Yalta, the seaside vacation town, for a fortnight when he hears of a new arrival. The young, fair-haired woman of medium height wears a beret and has a white Pomeranian dog with her. She is often alone, and the other vacationers refer to her as "the lady with the dog."

Gurov rationalizes that if she is here alone, without her husband, then he should make her acquaintance. Dmitri Gurov is under forty, but he already has three children: twelve year -old daughter and two school age boys. He also has a wife whom he despises, describing her as "unintelligent, narrow, inelegant, was afraid of her and did not like to be at home. He is often unfaithful to her and almost always speaks ill of women in general, referring to them as "the lower race."

However, while Gurov does not enjoy his wife's company. A week has passed since Gurov and the lady with the pet dog have become acquainted. One evening, they go to the groyne together, the harbor, to watch the evening steamer come in. They watch the new arrivals disembark, and as the crowd begins to disperse, he puts his arms around her and kisses her passionately. They disengage, breathless, and walk quickly toward her hotel. When they reach her hotel room, Gurov looks at her and begins to remember the women he has had in the past. There are some that are good-natured and cheerful lovers, and some like his wife who are hysterical and without passion in their love.

Anna is different from these women. She is still extremely young and inexperienced. As a result, she agonizes over her fall from her role as dutiful, faithful wife to "the woman who was a sinner." Her first words after they have. Gurov returns to Moscow and again embraces his elite Moscow and again embraces his elite Moscow existence. He is certain that the image of Anna Sergeyevna will be gone within a month, relegated to a little-used part of his memory with his other lady friends. Surprisingly, Anna's touching smile has only grown more vivid in his mind's eye after a month. She is with him everywhere, and her image becomes clearer and more lovely than it had been the day after they had separated.

Gurov is tormented with the need to confide these new feelings in someone. One evening, after supper at the doctors' club with a friend, he remarks suddenly, "If only you knew what a fascinating woman I made the acquaintance of in Yalta!" The friend says nothing. He gets into his sledge and is driving away, Anna complains. Her husband believes her. It does not matter much to Anna.

One day Gurov takes his daughter to school on his way to see Anna. It occurs to him that he has two lives. One is open, seen and known, and the other is secret. He realizes that he does everything deceitfully in his unconcealed "true" life to conceal the truth that his secret life is the real him.

Gurov reaches Anna's hotel, and when she lets him in she is crying. He sits down in an armchair to wait out her emotional outburst. He tings for tea as she cries bitterly from "the miserable consciousness that their life was so hard for them." He begs her to stop, realizing perhaps for the.

#### **QUESTIONS:**

1. What important things do we learn about love in the story 'The Lady with The Pet Dog'?
2. Write the character of Dmitri Dmitritch Gurov in about 150 words.
3. Write in two paragraphs how did Mr Gurov meet the lady and what did the basic differences he notice in her?
4. Describe Mr Gurov's attitude to "marriage".

## **4. FREEDOM**

### **GEORGE BERNAD SHAW**

G.B. Shaw's freedom actually belongs to one of the series of radio talks delivered by him in 1935 on the BBC. As it was intended for the larger circles in their capacity as listeners, the lecture seems to be free from theoretical jargons. But Shaw can be very much deceptive in what he says. For behind his humour lies the satire of the contemporary social condition. Not only that, his simple talk was actually a denunciation of the conventional and capitalist view of freedom. Politically Shaw conformed to democratic socialism, a variant of Marxism, according to which the society should try to reach the socialist political condition gradually by the democratic means. The concept of freedom, which Shaw satirizes, was the fundamental principle of Enlightenment, and he does so because in a capitalist society, according to the

Marxian view, can be called completely free in such a condition, in which he will be able to “do what he likes, when he likes, and where he likes, or do nothing at all if he prefers it”. He firmly denies the possibility of the existence of such a person as human beings are all slaves to nature: “...we must all sleep for one third of our lifetime-wash and dress and undress-we must spend a couple of hours eating and drinking-we must spend nearly as much in getting about from one place to place .” From this funny yet inexorable condition of human life, Shaw very clearly moves on to the fact that some of the “natural jobs” can be placed on others’ shoulders: “What you do to a horse or a bee, you can do to a man or woman or child....sort”. With this Shaw, however, comes to the immediate social and political condition of the time, in which the concept of freedom derived from the grand idealistic project of the Enlightenment, and nationalistic bias produced by the First World War was being glorified and used by the upper class as a means to achieving their self- interests. According to Shaw the farce of the democratic system in a capitalistic state lies in the fact that “most actual governments... enforce your slavery and call it freedom”. But the citizens of the state continue to be duped by the system instead of rising to protest. Shaw terms this unequal relationship “the unnatural slavery of man to man.

Shaw points out an important difference between the “natural slavery of man to Nature and the unnatural slavery of man to man”. According to him, the first, though unavoidable, provides pleasure after its fulfillment; for instance, if nature forces us to drink. She makes drinking pleasant. The same is true of eating, drinking, sleeping and other activities. Shaw introduces this difference and sites examples more importantly to explain the evils of the former in more accurate terms. He refers to few thinkers like Karl Marx and Thomas Moore, who denounced this slavery and tried to abolish it. At this point his explanation of the capitalist mechanism, that is, the means by which the system tries to dupe people and establish, legitimize and perpetuate itself approaches the ideological theories of Althusser and Gramsci. “ideology represents”, Althusser tells us, “the imaginary relationship of individuals to their real condition of existence.”

He points out that there are found a number of ideologies \_namely, religious ideology,ethical ideology, legal ideology, political ideology\_all of which operate invisibly in the superstructure. Shaw strikes at the very root when he says, “Naturally the master class,through its parliaments and schools and newspapers, makes the most desperate efforts to prevent us from realizing our slavery.” He explains historically how the British capitalist system has established itself by propagating the so –called glorious events as the Magna carta, the defeat of the Spanish Armadas and Napoleon. Then he explains how “ideological apparatuses”, to quote Althusser, manipulate the common mass to cast votes in favor of the capitalist leaders. What is more alarmingly effective, according to him, is the educational system, which operates in the superstructure and ends in deluding the master class much more completely”. Thus Shaw

explains the difference between two kinds of slavery and conclusively tells the listeners/readers: "Wipe out from your dreams of freedom the hope of being able to do as you please all the time." For, according to him, people have to remain occupied doing the natural slavery for at least twelve hours a day, while their unnatural slavery is controlled and regulated by the legal and administrative system of the country.

#### **QUESTIONS:**

1. Who according to Shaw, is Perfectly Free Person?
2. Do all social and governmental regulations aim at regulating man's slavery ?
3. What are the basic differences between natural slavery and unnatural slavery according to Shaw?
4. What means does the master class use to maintain the upper hand of the slave class?
5. Why do most workers or women vote for their social superiors?
6. How does a civilized society protect its citizens?
7. What are Shaw's views on working hours and retirement?

## **5. CIVIL PEACE**

### **CHINUA ACHEBE**

'Civil Peace' takes place in the year after the Nigerian civil war has ended. Nigerians such as Jonathan feel fortunate simply to still be alive, as evidenced by the "current fashion" of greeting people with the words "Happy Survival!". Now they face the monumental task of rebuilding both their country and their lives. Their difficulties are described throughout the story, both through the plight of Jonathan's family and that of his neighbours and acquaintances. A wealthy neighbour's home has been reduced to a mountain of this story is about an optimist man called Happy Survival. He and his wife and his three children out of four survived from the war. His bicycle and his houses were saved too. He finds a way to earn money and pass his life. His family also found jobs like selling mangoes or making breakfast to earn money. By the bicycle he went to villages and bought wine and mixed it with water and sold it to military soldiers. By this job he opened a bar and sold wine instead of going to mine. At that time most neighbours were so poor and had nothing to eat or nowhere to sleep. One day he earned 20 pounds as an egg-rasher. The other person who had that much money was killed by thieves. He was so scared and felt insecure till he went home. At night he was awakened by noise of the knocking in

the door. He and his family after some time understood they were thieves and they called police but no one came to help them and the thieves were the neighbours. They wanted his money and family were so scared. At last after a long argue he accepted to give them 20 pounds instead of 100 pounds they want and he was happy again because he could live safe without that money.

Civil peace presents the condition immediately after Civil war. It is an interesting and touching comment on quick and easy recovery from hardship. Most people are damaged by the aftereffects of the war but Jonathan Iwegbu thinks himself very lucky to have survived although he has lost his youngest son. He had come out of the war with five inestimable blessing his head, his wife Maria's head and the heads of three out of four children as an extra bonus he has his bicycle which he digs up almost as good as new after the fighting has stopped. This bicycle was almost seized by the military officer but he got it by spending two pounds. Then he finds his little house in Enugu is still standing, despite the absence of minor details like doors windows and a roof. For someone who sees everything in a positive terms, this is another miracle. And now the family starts its journey back to normality and prosperity. The children sell masngoes and his wife sells akara balls and he sells his palm wine. For one point of view it is a meager thing material with which to start a new life but to yhe very optimistic Jonathannit is, after the horrors of war, blessing upon blessing. The final wind fall is the ex-gratia payment he receives. It confirms his belief in a generous god. 'Nothing Puzzles God" is his catchphrase.

That same night there occurs a further return to normality when thieves pay the long suffering Jonathan visit. But this too has changed its nature because of the war. First of all, the thieves knock on the door and politely announces themselves. 'No tief man and his people',when the family screams for help the thieves offer their assistance knowing no one will come to help and that the soldiers are more to be feared than themselves.

Once that has been settled they are prepared to be reasonable. They say that they are not bad thieves to trouble the people that war as well as trouble has finished, and that it is the time of civil peace. After the uneasy negotiation Jonathan comes to accept the new conditions of civil peace and hands over his egg-rasher. Although the great mass protest, the leader as a god ties' promises a fair business. "We just take our small money and go" when his neighbours appear in the early morning to express their sympathy, the family is at work again. And Jonathan has written off his egg-rasher: Did I depend on it last week? Or is it greater than other things that went the war?....

Nothing puzzles God! Once again his optimistic fatalism enables him to rise above the difficulty. Everything that life provides is a bonus. In this fine story Achebe carefully maintains the balance between realistic reportage and the firm shape of the fable so that the result tells us more about the war and its after-effects than any account of detailed documentation.

**QUESTIONS:**

- 1.What is the significance of the term “Civil Peace”? What does it imply?
- 2.What is meant by “Happy Survival” in the story?
- 3.How does the leader of the thieves distinguish good thieves from bad thieves? Why do you think he makes this distinction?
- 4.What is Mr.Jonathan Iwegbu’s philosophy of life? How does he approach and deal with good situations and bad situations?
- 5.Write the character of Jonathan Iwegbu in about sixty words.

## 6.The mother of a traitor

### Maxim Gorky

"The mother of a traitor" by Maxim Gorky is a short story which deals with dual love: love for the country and love for the son. Monna Marinna's son has become enemical towards his own country. He doesn't have any real grudge (Complaint) against the country. However, he wants' to destroy the whole city and thus become popular amount the citizens. He wants that each citizen and each and every object of the country should know his name and get afraid of him. He is now the head of the troops who have surrounded the city from all sides and are ready to set fire into it. There is restlessness everywhere in the city. No one is happy. All the people are crying bitterly out of pain. The enemies are giving utmost tortures to the citizens. They have been deprived of all kinds of facilities. The enemies have brown dead bodies into all the streams that supply water to the city. The citizens have lost all kind of hope of life. Everything spoke to them of death, and not a star was there in the sky to give them consolation. They were also afraid to light the lamp son the houses at night. Monna Marinna herself is not happy with what her son has become. She thinks of her son and her country as a mother and citizen respectively. She had thought previously that her son would become a great leader of the country and would do something for the nation. But, to her great dismay, she has found her son as different and heartless citizen to all the people. He has betrayed his own country and also his own mother. Marinna has equal love for her son and for her native city. But, as a mother her heart is weeping as her son has given suffering to all the citizens. Every citizen calls her "The mother of the traitor" which gives unbearable pain to her heart. So, she decides to leave the city and goes to her son. She finds her son crazed with the thirst for more glory. She tries to convince her son by telling him that a hero is he who creates life by conquering death. But he answers very arrogantly that the destroyer is as glorious as the builder of the city. He has become so blind for the glory that he remains totally unaffected by her persuasion. Finally, Marinna makes her so take rest in her lap and immediately covers him with her black cloak and

then kills him by pushing a knife into his heart. Thus by killing her son, she fulfills her duty as a citizen. But she is also a mother and a mother cannot live her life comfortably by killing her own son. So, she also kills herself with the same knife and fulfills the duty of the mother.

### Questions :

1. Write the theme of the story " the mother of traitor by Maxim Gorky"
2. What lesson do you learn from this story?
3. What was the conflict in the mothers mind and how did she resolve it?
4. Assume yourself as the traitor and express your feelings towards your mother.

Scientific section

## 7.KNOWLEDGE AND WISDOM

### Bertrand Russell

Knowledge and Wisdom is written by popular philosopher Bertrand Russell. In this text he has tried to make essential distinction between knowledge and wisdom. The Latin word "scientium" from which we get the English word "science" means knowledge in the sense of knowing about things(called facts) and the causes of things. In this sense knowledge is something we acquire through effort. So a knowledgeable person knows not only for example: that fire is hot but also why and how fire is hot.

But wisdom is different. It is a part of inner mind that is inaccessible to us if the highest state of consciousness we are in the second state of consciousness. Wisdom only

appears when we are in the third state. A wise person will employ that knowledge not only for his own benefit but also for the benefit of others. Perhaps he'll invent a more efficient furnace. Perhaps he'll help develop a cleaner burning more fuel efficient automobile. A foolish person, by contrast, who is the exact opposite of a wise person, knows exactly the same thing (fire is hot and why), but will not use that knowledge wisely. For example he may burn his house "down" and himself "up" because he fell asleep in bed while smoking a slow burning cigarette or cigar. Russell makes the same point in his essay when talking about SCIENTISTS, learning about "atomic energy" and obtaining the KNOWLEDGE of how to "split the atom". But those same scientists were UNWISE because they temporarily "forgot" (or didn't think about) who would use that knowledge to make atomic bombs and do harm.

Russell thinks that wisdom should be the aim of education, when he says the essence of wisdom is emancipation as far as possible, from the tyranny of the here and now (knowledge is largely of the here and now" of things). We cannot help the egoism of our senses. Sight sound touch and emotions are bound up with our own bodies and cannot be made impersonal. An infant feels hunger or discomfort and is unaffected except by his own physical condition. But gradually as his thoughts and feelings become less personal and he achieves growing wisdom. No one can view world with complete impartiality. But it is possible to make a continual approach towards impartiality, which constitutes growth in wisdom. Can wisdom in this sense be taught? And if it can. Should the teaching of it be one of the aims of education? I should answer both these questions in the affirmative.

Russell says the "end" of all human endeavors should be wisdom, since the capacity for wisdom defines human beings and distinguishes them from all other forms of animal life. But Russell thinks, with every increase of knowledge and skill, wisdom becomes more necessary, for every such increase augments our capacity of realizing our purposes, and therefore augments our capacity for evil, if our purposes are unwise. The world needs wisdom as it has never needed it before, and if knowledge continues to increase the world will need wisdom in the future even more than it does now. That Russellian description of "increasing knowledge" and "increasing capacity to do evil" If our purposes are "unwise" indicates that gaining wisdom is a "process", just as gaining knowledge is a process. But Russell also indicates that the process involves becoming less centered on ourselves and the "here and now" and more "impartial and intellectually broadminded". So that we may become wise citizens of the world, rather than merely good citizens (patriots) of this or that smaller country or faction.

Russell says "It is not only in public ways but in private life equally, that wisdom is needed. It is needed in the choice of ends to be pursued and in emancipation from

personal prejudice. So, once again according to Russell, there is not only public responsibility for leaders and governments to make wise decisions (because foolish decisions may have disastrous consequences upon public life). But also wisdom is “needed” in private life as well. In short, Russell seems to think that our own “choice of ends” (what we are RESPONSIBLE for desiring and attempting to obtain) requires wisdom, for which we are personally responsible.

### **QUESTIONS:**

1. Write the differences between knowledge and wisdom?
2. Explain ‘the egoism of our senses’. What is impartiality?
3. Can wisdom be taught? Can the teaching of it be one of the aims of education?
4. Russell says ‘with the increase of knowledge and skill, wisdom becomes more necessary’. Do you agree with him? Give your own argument.

## **8. THE SCIENTIFIC ATTITUDE**

In this passage author has delightfully examined the issues about the nature of scientific attitude, two major roles of science developing society and scientist’s methods of thinking and acting which can also be applied by higher to common people for their better perspectives. Physics, biology, chemistry, geology, engineering, medicine etc are different. Sciences taught at different institutes. The nature of science is based upon the keen observation, creativity and experiment for finding the facts. So the nature of scientific attitude is characterized by objectivity, open mindedness, skepticism and willingness to suspend judgement if there is insufficient evidence. Through the process of creativity, observation and experiment scientists develop knowledge which we apply for the betterment of society.

Without any hesitation we can say that science plays important role in the social development. There are two ways in which science often helps to develop our society. The first is the application of modern machines, products and systems of applied

knowledge that modern technologies develop. Modern technology has improved the structures of societies. It has made our life comfortable , extended life span and longevity. The second way is its application by all members of society in a special methods of thought and action that scientists use in their work: By shaping our views on life, men and society, nature and reality and providing the meaning of our existence, science directs our thought and action and sets the norms and modes of our conduct.

A successful scientist is often with full of curiosity. Through the process of creativity and keen observation he is able to cast a situation, challenge and problem in a new light and thereby opens up possibilities. He often thinks out of box and throws light in new probability. He wants to know not only about the universe but also wants to find how and why the universe works. He often directs his attention toward problems. His curiosity leads him to look underlying relationship even if the data available seem to be unconnected. He applies logical thought while making observations and utilizes facts he observes to the fullest extent.

The successful scientist or technologist thinks and acts in such ways which characterized him or her as good observer,accurate,skeptical,objective,critical as well as imaginative. He or she applies facts to observe things, does not accept statements which are not based on the most complete evidence, thinks everything critically and becomes imaginative while looking relationships in data that are complex and incomplete. Furthermore he or she is not only critical of how processes work and how events take place.

#### **QUESTIONS:**

- 1.What are two ways in which science can help society to develop?
- 2.Give some examples of the ways in which science influences everyday life.
- 3.What elements of science can the ordinary citizen use in order to help his society to develop/
- 4.How can you describe a person who wants to find out how and why universe works?
- 5.What is the role of curiosity in the work of a scientist?
- 6.What are the qualities of good server? How they utilize the facts?
- 7.How do skeptical persons act?
- 8.For what other purposes does a scientist need imagination?

## 9.STRAIGHT AND CROOKED THINKING

R.H AND C.R THULLS

The short passage is taken from the book 'Straight and Crooked Thinking' written by R.H Thulls and C.R Thulls. This book is fundamentally about the ways that people often deceive others and themselves as well by their use of language. By straight thinking we mean using language to manipulate people dishonestly or to observe the true meaning of one's words. That may result from confusion about how one is using language without proper reasoning.

People often fall into avoidable errors because of a failure to reason correctly. There are many reasons of doing such mistakes. But authors have observed some few reasons of such errors which are seriously to be taken. They have summed up the reasons of these errors as follows:

People often fall into such error because of their use of words. It frequently happens that what one person means when he uses a certain word is different from what others mean. In such situation the properly used words cannot identify the proper sense for others that creates difficulties because people do not differentiate clearly enough between clearly enough between several varieties of the same things. For examples: the words 'intelligence', 'oxygen', 'accurate' and 'average'. Use of the word 'intelligence' sometimes creates problem because it has more than one meaning. In such situation a very complicated. Both research chemist and are even less understood by layman. In 'oxygen' the problem is even more complicated. Both research chemist and chemical manufacturer identify the word theoretically with the element 'O', but in practice they have different concepts about it.

In course of developing hypothesis sometimes scientists use the words with facts create confusion which can be understood as common error. That is because they develop the hypothesis on the basis of assumption and give the name of particular

things which can be least be understood by common people.

Apart from the use of word the error falls on the logics that is known as logical error. Such error occurs in logic in the process of thought for reaching to the conclusion from certain premises or given statements. The logic is a science of valid inference or reasoning. It can also study the argument. A logic is basically made up of three parts, 1.premise (one or more statements to think upon), 2.inference (the process of thinking upon the premise), 3.conclusion (result derived from the process of reasoning or inference). For example a young sociologist investigating literacy in a certain community discovered from official records that over 50% of the population were females. He also observed that 70% of the population were literate. After obtaining data he summed it up and drew conclusion as:

Most of the population are females;

Most of the population are literate;

Therefore, most females are literate.

In this logic the process of thinking upon premise which is reasoning or inference is unreasonable or unacceptable which he himself realized as soon as he re-examined his chain of reasoning very carefully.

The avoidable error often occurs in unverified or insufficient experimentation. This may easily occur at the beginning when there is no properly controlled investigation. Such mistake can confuse cause and effect. For example the inhabitant of a certain community had noted over the ages that whenever one became ill with a fever, the body parasites left him then they made the correlation that parasites kept them healthy. Later on properly controlled scientific investigation showed parasites transmitted several kinds of fever, and then left the sick persons when the later's bodies became too hot to live on.

There are some other factors which influence the reasoning are false analogy, missing control group, and the role of authority as a bar to the re-consideration of a problem. These are known as fallacies in argument that the author considers unreliable thoughts. Scientist's process of analyzing the problem by analoging from another is extremely valuable but it may lead to the adaption of a totally false hypothesis. Thus like scientific investigators ordinary people may fall into errors without careful observation on the problems. We all do mistakes but we need them to correct as a perfect citizen.

## QUESTIONS:

1. Why do people make avoidable errors, and what sort of people make them ?
2. What is the first difficulty connected with the use of words? Give one example.
3. What is logic? How does error occur in logic? Describe it with one example.
4. What evidence did the young sociologist find to support the assumption? What conclusions did he come to as soon as he had re-examined his chain of reasoning?
5. How does error often confuse cause and effect?
6. What are other factors that influence the reasoning? Explain with examples.
7. name a favourable and unfavourable example of the value of analogy in scientific research?

## 10. WATER SUPPLIES-A GROWING PROBLEM

Battise.M.UNESCO.july-August 1964

The extract is an example of a growing type of literature with which scientists all over the world have to deal with. It is commonly considered as a short research on the contemporary big issue about the problem of water supplies which is really challenging for Hydro Engineering at future. In a persuasive way the text has explored certain factors affecting the growing needs for water problems of water resources that may have long term effects not only for us but also for creatures and plants on earth.

Need for water is constantly increasing phenomena still today scientists observed certain factors of these constantly increasing demand for water as follows:

\_It is happening because of

-the growth of population in the world.

- the overall improvement of living standards of the people.
- the fight against the hunger through the irrigation of more land for growing food for increasing population.
- the creation and expansion of new industries.
- growth of urbanization etc.

Statistically, there is difficult to calculate how much water we need but it is estimated that in twenty years time the demand for water will be double. Facing with such situation it is clear that we should search as widely as possible and with every available means for sources for fresh water at the least cost. But where do the source of water exist?

A sustained and co-ordinate programme of scientific observation and research in hydrology are trying to solve the problem thinking it as their major responsibility.

The two water resources,surface water sources and underground water sources are being used. The underground water reserves are larger than those on the surface but they are unseen and unestimated. It is essential to use the underground reserves to solve the growing problem for water but not haphazardly because it is needed to do immense research about the phenomena.For example: where does the water come from? how does it move? How is it renewed? What effect will it have on the discharge and the future level of water table? Are the the different questions still to be fully answered.

Chemist have clearly defined pure water made up of hydrogen and oxygen that cannot be found in nature. The water like, river water and rain water always contain other dissolved or suspended elements. Even they are in small quantities but very important sources of water. In the case of irrigation and farming every drop of water brings with it a little salt. In the processes of evaporation salt remains and gradually poisons soil and plants. We can remove the problem of it with the help of leaching and drainage but concerning the effect of irrigation and drainage on quality of ground water. Some questions are still unanswered. Therefore it is needed to do scientific research that deals with quality of water.

The moisture in the layer of soil is essential for the life of plants. Evaporation from the soil and underground water is limiting the ground-water which falls on the land. Do the trees replace such enormous loss of resources? Answers of these problems will only be found after a great scientific research . That is because scientists and scientific discoveries have created the problems which can also be solved by them.

## QUESTIONS:

- 1.What are the different reasons of constantly increasing needs for water?
- 2.What are the two major sources of water? How they conferred each other/
- 3.What is pure water/ Why river water or rain water is not drinkable?
- 4.How water is extremely essential for all living things?
- 5.Why water supply is ever growing problem? How can we solve the problem of it ?

## 11. WHAT EINSTEIN DID

The text is taken from 'The History of knowledge' a general survey of twentieth century. Science and technology. As the title suggests us the text gives the general survey on the great deeds of popular scientist, 'Albert Einstein'. Furthermore it tells a short history of Einstein presenting him as both scientist and peacemaker.

Albert Einstein was born in the cathedral city of Ulm, Germany, in 1879. From his earlier age he was so creative that made him the greatest scientist of the world. Unfortunately he didn't do it and left the school. However anyway he managed his study again and got degree in mathematics from the university in 1900. Then he returned back to what he had already been interested to solve the riddle of the world. He proposed four papers published in 1905 which are interrelated.

In the first paper Einstein explained 'Brownian Motion' which was previously existed phenomenon. In 1827 the biologist 'Robert Brown' noticed that if you looked at pollen grains in water through a microscope the pollen jiggles about. He called his jiggling 'Brownian motion', but Brown couldn't work out what was causing it. Everything around us is made up off atoms and molecules; the chair you're sitting on, the food you eat, the air you're breathing. The idea of atoms has been around since the time of the ancient Greeks, and a century before Einstein, the great chemist John Dalton had suggested that

all chemicals were made of tiny invisible molecules, which in turn were made of even tinier atoms. The problem was that there was no proof of their existence, until Einstein looked into the problem of Brownian motion.

Einstein explained the small particles suspended in liquid. He realized that the giggling of the pollen grains seen in Brownian motion was due to molecules of water hitting the tiny pollen grains, like players kicking the ball in a game of football. The pollen grains were visible but the water molecules weren't, so it looked like the grains were bouncing around on their own. Einstein also showed that it was possible to work out how many molecules were hitting a single pollen grain and how fast the water molecules were moving and by looking at the pollen grains. Importantly, Einstein's paper also made predictions about the properties atoms that could be tasted. In the second paper Einstein resolved the three centuries old dispute about the composition of light. He proposed that light is composed of photons that sometimes exhibit wavelike characteristics and other times act like particles.

The theories of relativity are the most distinguished contribution proposed by Einstein in third and fourth papers. Einstein stated that the theory of relativity belongs to the class of "principle-theories". As such it employs an analytical method. This means that the elements which comprise this theory are not based on hypothesis but on empirical discovery. The empirical discovery leads to understanding the general Characteristics of natural processes into theoretical-mathematical descriptions. Therefore by analytical means the necessary conditions that have to be satisfied are deduced. Separate events must satisfy these conditions. Experience should then match the conclusions. The special theory of relativity and the general theory of relativity are connected.

His third paper which he called 'Special relativity theory' was more revolutionary because it was applied in different fields. Special relativity is a theory of the structure of spacetime. It was introduced in Einstein's 1905 paper "on the Electrodynamics of Moving Bodies". It is based on the principle relativity if we can assume that the speed of light is always the same and the laws of nature are constant then both time and motion are relative to observer. For example; passengers on two speeding trains are not aware of their overall speed as one going just a little faster than the other. The laws of physics are the same for all observers regardless of their relative to one another. The speed of light in a vacuum is the same for all observers regardless of their relative motion or of the motion of the source of the light. It has many surprising consequences. Some of these are;

Relativity of simultaneity: Two events, simultaneous for one observer, may not be simultaneous for another observer if the observers are in relative motion.

Time dilation :Moving clocks are measured to tick more slowly than an observer's "stationary" clock. Length contraction: Objects are measured to be shortened in the direction that they are moving with respect to the observer.

Among these papers proposed by Einstein Then fourth paper which he called General relativity theory' is the most important because it asked the question whether the inertia of the body depends on its energy content.He concluded with positive answer that 'inertia had been held to be depended on the mass alone. Such equivalence is expressed in the formula  $E=mc^2$  which is considered the most important piece of knowledge of advanced physics. He says 'E' the energy of quantity of matter with mass 'm' is equal to the product of mass and the square of the (constant) velocity of light 'c'. The velocity which is also the speed of propagation of electrodynamic wave in space is very great: 300,000 kilometres per second squared the number is enormous. Therefore in a tiny unit of matter a huge amount of energy is embedded. It is a theory of gravitation developed by Einstein In the years 1907-1915. The development of general relativity began with the equivalence principle, under which the states of accelerated motion and being at rest in a gravitational field ( for example when standing on the surface of the earth ) are physically identical. The upshot of this is that free fall is inertial motion ; an object in free fall is falling because that is how objects move when there is no force being exerted on them, instead of this being due to the force of gravity as is the case in classical mechanics. This is incompatible with classical mechanics and special relativity because in those theories inertially moving objects cannot accelerate with respect to each other but objects in free fall do so. Some of the consequences of general relativity are:

Glocks run more slowly in deeper gravitational wells. This is called gravitational time dilation. Orbits process in a way unexpected in Newton's theory of gravity. (This has been observed in the orbit of Mercury and in binary pulsars). Rays of light bend in the presence of a gravitational field. The Universe is expanding, and the far parts of it are moving away from us faster than the speed of light.The special relativity fits with and solves for elementary particals and thewir interaction where as general relativity solves for the cosmological and astro-physical realm. Special relativity was widely accepted by physics community in 1920. That so why he got Nobel price for physics in 1921.

There is no doubt albert Einstein was already being the greatest scientist of the world. But he was pacifist a good peacemaker. He used to hate the war after 1918, feared that war would soon erupt again before renounced German people and went United States. There he continued working on the general theory searching the ways to make to make believed science as beneficial rather than harmful. But in 1939, when ADOLF HITLER took over Germany in 1933 Einstein renounced German people and went United States. There he continued working on the general theory searching the ways to make believed

science as beneficial rather than harmful. But in 1939, when the world reached him that two German physicists had split uranium, atom, with a slight loss of total mass that was converted into energy he realized that war in itself was not the only dangerous but the lunatics who used it. He discussed with his friends and wrote a letter to President Franklin D. Roosevelt to take some action to stop forth coming danger of war but he got soft replies. He spends a lot money for the sake of peace but his quest for coming danger of war but he got soft replies. He spends a lot money for the sake of peace but his quest for peace was completely ended when Japan attacked over Pearl Harbour. He noticed the world was already into the war. One the on hand he was happy because science was thousands of steeps ahead but he was brokenhearted because of devastating results of it. His last hope was United Nations for the peace .When he died in 1955 he was the only man in the world who believed that he was right about the universe,he who had lead mankind to understand more of that structure than any scientist since Newton.

#### **QUESTIONS:**

1. Write a brief historical survey on Albert Einstein.
2. Write summary in one paragraph about Einstein's deeds.
3. What is Einstein's Brownian Motion? What are its consequences?
4. Explain Einstein's special theory of relativity with one example.
5. What is Einestein's general theory of relativity? Why it is a unique piece of knowledge for advanced physics?
6. State in two paragraphs Einstein as a scientist and a peacemaker.

## **12.MIRACLES OF THE GRASS**

**Joseph Wood Krutch**

Joseph Wood Krutch presents science in an indirect style mixing the magic of Nature with the marvel of scientific investigation skillfully interweaving the poetry of Walt Whitman with the facts of the theory of evolution.

The German writer 'Goethe' defines the grass as living garment of God". Being naturalist he mixes up religious ideas with romantic feeling to the present grass in its real state. Grass possesses the omnipresent quality.

It is widely spread all over mountain,rock, valley,field etc as green object of nature about which Goethe thinks green carpet, soft to feet, restfull to the eye,pleasurable to our soul and gift for our life. It is flourishing and withering according to the symphony of Nature. It is following the system of Nature as other living things which is miracle for Goethe because it is not supernatural rather than fact in Nature.

Like Goethe scientist present grass in an objective reality. Botanists define 'grass is one among numerous genera and species which compose that the family of monocotyledonous flowering plants long known as Gramineae'. According to them all the varieties of grass belong to the same class. Concerning its revolutionary history it was confused since the fossil record was not found. But its history is not before the air breathing animals crawl on earth. But now grass conferred upon different species like wheat paddy etc which are tremendous blessing out of the evolution.

American poet,Walt Whitman wrote poem 'leaves of grass' with the fact of the theory of evolution which is considered as masterpiece. What is grass? answering the question poet says grass represents the unity of national mind and character which is the true spirit of his nation, manifesting changes and progress from the part of God's design. It is ultimately a scented gift for us. But today people are totally ignorant about the tremendous gift of it. Which we called bread though. We are desperately busy seeking recreation, entertainment and recreation like plastic for china, neon light for dawn and sunset or mass produced bread of the texture of cotton in contrast to homemade bread. People are busy seeking experience such joy substituting these things. Of course 'joy be with us'. But such ways of getting joys are funny things for those who wants to have infinite joy of originality. Henry David Thoreau once explained that he did not drink wine because he was afraid it might spoil his taste for water. Now a days people are moving over things very fastly but now as never before nearly everybody can have rather too much of many things not worth having . Deprivation can kill joy especially for those who always want more. More toys a child can play with are burden not a blessing.

Francis Bacon wrote "The happiness of the great" which consists only in thinking how happy others must suppose them to be. In his time the term "status" was popular which is widely accepted by sociologists today which had not been invented by them. The desire for status is the same desire to be envied for Louis xiv because she says no one else in the world can have as many tulips as I can and they will envy me. For Joseph Wood they are over deprived which has killed his joy because the whole eighty seven

thousands of tulips look dull for him.

Economists like Puritan Thorstein Veble said grass is a "status symbol". They took the grass under their principle of lost and profit which author says wrong judgement. Grass is not merely a lawn or status symbol. Beyond of it beauty of it must be taken into consideration. In that sense they are failure to produce more pleasure for the additional effort.

Author suggests us to live down upon lawn to see what happens if we doubt an experiment might be worthwhile. The little miracles rises its flower toward the sun. Grass lie down on the surface of earth refreshing fair beauty of spring's true face bringing the freshness for all creatures accompanying with them. Furthermore if we go through the experiment of biologists miracles rises through its evolutionary history.

The popular statement "all flesh is grass" is widely accepted by scientists and religious people like St. Peter too. For St. Peter all flesh is grass because man too "withereth and the flower thereof falleth away". For botanists "all flesh is grass" is more than that of st. peter. No creature could exist if it were not for the fact green plants mediate between them and inanimate materials of the earth. They only have the power of rising by one step the relative simplicity of the mineral to the complexity of the protein becomes protoplasm mysteriously which is the essence of creatures' life. In time, a man passes away, he also withers and the flower thereof falls away, protoplasm descends the scale again to merely mineral and grass picks it up again to repeat the cycle. In such revolutionary way the process began some billions of years ago must continue as long as life lasts.

The literal and scientific truths about the miracles of the grass are equally verified just as one is old and another is new one. But here is a big issue raises by the question, which of the two: moral truth of the apostal or the truth of the biologists, is the most profound and the most important? Auther tells us that we may be wrong when we give stress to the particular one because there is a fine chemistry in between them. But it is known that many civilizxations were created and then destroyed by men who were innocent of this chemistry. It might be possible that civilization will fail because we do know one one kind of truth and forget the other in our pride.

QUESTIONS:

1. Why grass is miracle in Nature but not a miraculous thing?
2. How do scientists define grass ?

3. Write the attitudes of puritans and naturalists looking at the grass?
4. How are Francis Bacon and Louis XIV similar in terms of "status"?
5. Why do economists fail to produce more pleasure for the additional effort?
6. How does Walt Whitman's view on grass is evolutionary? Does it similar to the view of biologists?

## TECHNICAL SECTION

### 1. STEAM BOILERS

Steam boiler is an apparatus designed to convert a liquid to vapor. Modern Boilers are developed in response to demand for large quantities of steam at high pressure and temperatures. A boiler consists of a furnace in which fuel is burned on surfaces to transmit heat from the combustion and space where steam can collect.

Modern boilers employ solid fuels. Mechanical stokers ensure an adequate quantity of fuel into the furnace at the proper speed. There is a deeper relationship between air and fuel. Sufficient amount of air is needed for complete combustion of the fuel. The produced hot gases are circulated around the banks of water tubes. The water inside the tube absorbs a large proportion of the heat. Steam circuits are designed to attain the greatest possible fluid velocity.

The loss of heat from combustion can be reduced by the use of fire bricks around the walls of the chamber. Solid walls are lined with water tubes to prevent them from being damaged by excessive heat. Water-tubes are used to withstand high pressures and temperatures. A stop valve is set to allow escape of steam at pressure above normal operating pressure.

## 2. CARBURATION SYSTEM

Carburator is a device which mixes fuel and air in a correct proportion. Components of carburetor include jet, choke or venture valve and storage chamber for liquid fuel. The function of jet is to mix a spray of petrol with air. The jet is inserted into a choke or venture.

The spray of petrol in the piston creates atmospheric pressure in the float chamber. The petrol becomes gas in the compressor and the immediate spray of another drop atomises it. The throttle valve is operated by the accelerator which controls the amount of mixture.

At a high running speed the single jet carburetor fails to supply correct mixture of air and fuel. A second jet is provided to compensate this defect. This compensation jet can supply petrol at the quicker rate than the main jet. It helps to obtain a nearly constant fuel air ratio.

Another problem to be solved is that of starting, when rich mixture is required. To solve this problem there is a provision of an ideler-jet that flows out the fuel into the intake air as a result of reduced pressure near the partially closed throttle valve.

## 3. CHAIN REACTION

Chain reaction is a series of nuclear fissions (splitting of atomic nuclear), is initiated by a nutrition produced in a preceding fission. It is a self- sustaining sequence.

Chain reactions in general are very rapid and emitted neutron travel at a high velocity. However, a greater number of liberated neutrons can be captured and thermolised under the controlled nuclear. Chain Reaction. There is moderator, the object of which is to capture neutron and to minimize escape and leakage for chain reaction.. A moderator can be a liquid (heavy water), a solid (graphite) of low atomic weight and have low neutron absorption. The minimum quantity of uranium required to initiate the chain reaction is called the critical mass.

There is a can or cladding with metal such as aluminum or magnesium to prevent

uranium fuel elements from losing strength and become wrinkled these cans contain the highly radioactive fissions products that prevents reaction taking place between the fuel and the coolant.

Chain reaction is controlled in a such way that a steady neutron flux rate and steady production of heat energy is maintained. The moderator with a control rod or rods of cadmium have a very high neutron absorption cross- section is used to control it. It functions to stabilize chain reaction. Thus, chain reactions self- sustaining of the ratio of the number of daughter neutrons that cause fission to the number of parent neutrons is one.

## 4. CONDUCTORS AND CONDUCTIVITY

Electric current is a flow of electrons. Electrons flow through are called conductors. The way could be one point to another through a medium vacuum. The speed of electrons depends on the medium that is conductivity of the medium. If the medium is solid the electrons flow will be slower.

Current flows according to the degree of resistance of conductors. Solution in liquids is known as good conductors. Insulators are known as a bad conductor which stops the electron to flow. Most gases at normal temperature and pressure are good insulators, but gases maintained at low pressure in a sealed tube allow flowing current. Solids greatly in resistance are good conductors, are so resistant are insulators.

The length and the cross section of the conductor and its resistivity of material and increase in temperature. Therefore the temperatures insulated conductors must be kept reasonably low because any insulator liable to lose their insulating properties and allows the current to pass through it.

## 5. PETROLEUM

Petroleum may be defined as the complex mixture of various substances, mostly hydrocarbons they contain appropriate processing method must be adopted to manufacture the necessary quantities of product of the required qualities from the

crude oils. The main manufacturing method used in oil refinery is fractional distillation. The method is based on the differences in the physical properties of the hydrocarbons. It is separated out into petrol, aviation spirit, kerosene, diesel oil and lubricants.

The development of the pipe-still has revolutionized refinery processes. It is capable of continuous operation and efficient fractionation. In order to obtain the most effective separation of the fractions, a modern distilling unit consists of a break line furnace and a number of fractioning towers. Crude oil passes through tubes, it is heated and enters into the fractioning plant where it comes into the contact with condensed vapor and gets distilled.

In the process of cracking the hydrocarbons are subjected to a relatively high temperature (550c) over a period of time which leads to the breakdown of large molecular into smaller one and light oils such as petrol is produced. Catalytic cracking process is used for the conversion of heavy oils to higher octane petrol.

## 6. PILES FOR FOUNDATIONS

In modern engineering piles of 'concrete' or 'steel' are driven into the ground to support a structure. Unstable soils, piles are indispensable building supports and may also be used to stable ground when exceptionally large structural load is involved. The carrying capacity of the pile depends on the frictional resistance of the ground against the sides of the piles. Piles are driven into the ground by pile driver. Alternative method is used in case the soil is difficult to excavate, in this method soil is cured out and then whole is filled with compacted concrete. Such formatted piles are known as in situ piles.

IN case of driven piles, piles are driven into the ground by machines. It consists of a frame with appliances for raising and dropping a pile hammer. The frame can be adjusted as needed. Hamlet is placed on the head of pile to protect it from the blows of a hammer.

Still piles are now extensively used for structures as it is capable of being driven through hard material with less risk of damage, its length can be increase to the depth. Whereas, the concrete piles are difficult to handle, to transport, as they are very heavy, require reinforcement and liable to be damaged.

## 7. SUSPENSION BRIDGES

Suspension Bridge is a bridge with overhead cables supporting its roadway. In modern time the suspension bridge has provided an economic solution to the problem of long spans where relatively light traffic has to be carried over.

There are two-distinct method of constructing the cable:

- \_The wires may be twisted round central stand-stranded wire ropes.
- \_The wires may be spun parallel to each other and clamped together at eternal.

Parallel wire method spinning the cable has some advantages over the stranded wire method.

Continuously made cables are anchored through the tops of the towers and down through side towers. Saddles are fixed on the tower to prevent the cables from being robbed against the tower. The cable stands are normally looped round strand shoes, which are in turn connected by chains to an anchor plate embedded in the base of the anchorage.

Cast-steel cable-bands are attached to the cables along the main span at intervals. These bands suspenders bear the entire weighty of the deck. The braced-chain suspenders are rigid and high tensile strength.

## 8. AEROFOILS

This passage talks of the technological development in the field of aeronautical engineering. Aerofoils are shaped surfaces such as the rudder, the elevators and ailerons. Aerofoils produces a lifting force and functions to control aircraft in flight. The jet or the propeller provides horizontal thrust, while the wing produces a lifting force in order to sustain the aircraft.

An important consideration in the design of an aeroplane is its wings. Lifting power of the wings depend roughly on the wing area, its profile and the angle of incidents. Aircraft usually employs aerofoils that are then and streamline that allows the air flow smoothly and without turburance. In case of a rapid loss of lift, the slots are fitted to the leading

edge of the wings to guide the steadily flow of air. Flaps are fitted to the trailing edges for the landing on slow speed.

Wing has a vertical component called lift and the horizontal components called drag which are set to the direction of motion. Drag creates resistance to the motion. While laminar flow over the wing reduces its resistance. However, the air swirls around the wing tips and trailing edge into a region of low pressure which produces a vortex.



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