1.0 Society and its Elements

Definition of Society:
Many definitions of society; the definitions keeps changing, since society is dynamic.

i. **Schaefer and Lamm**: the largest form of human group, which consists of people who share common heritage and culture. (Richard T. Schaefer and Robert P. Lamm)

ii. **Ian Robertson**: society gives content, direction and meaning to our lives, and we, in turn, in countless ways, reshape the society that we leave to the next generation. Society is a population that occupies the same territory, is subject to the same political authority and participates in a common culture.

iii. **P. Gisbert**: a complicated network of social relationships by which every human being is interconnected with his fellows.

iv. **MacIver and Page**: a system of usages and procedures, authority and mutual aid, of many groupings and divisions, of controls of human behavior and of liberties.

v. **Ginsberg**: a collection of individuals unified by certain relation or modes of behavior, which mark them off from others who do not enter into these relations or who differ from them in behavior

vi. **A.W. Green**: the largest group to which any individual belongs

vii. **John F. Cuber**: a group of people who have lived long enough to become organized and to consider themselves and considered as a unit more or less distinct from other human units.

1.0.1 **A settlement with the following criteria is called a society** (TBG, p1)

i. Population: A society has population. It can be small or big.

ii. Common territory: The people of a society occupy a common territory.

iii. Government or political authority: The people of a society have a common government and political authority.

iv. Common culture and a sense of relationship/membership and committed to group.
1.0.2 **Essential elements of a society** (RPA, TBG, p1)

i. People and plurality: society consists of people, of both sexes, of different physical features (age, skin color, eye color, hair color, height, weight, face type).

ii. Likeness and differences: Members of a society are alike in many aspects. This “alikeness” bonds them, and they seek understanding and cooperation from each other. The members of a society are different in many ways too, like culture (language, religion, art, music, dance, food, dress, values, belief system), profession, interest, opinion, views etc.

iii. Cooperation and interdependence: Members of a society cooperate with each other, and they depend on each other. When the level of mutual cooperation reduces, society tends to disintegrate.

iv. Stable and dynamic: Society is relatively stable; the norms, values, and culture are normally stable. Yet, society is dynamic. Some elements of a society change slowly, and some change rapidly, depending on external and internal factors.

1.0.3 **Types/Evolution of Society** (R 3)

i. Tribal: hunting and gathering society

ii. Pastoral: domesticate animals

iii. Horticultural: domesticate plants

iv. Agricultural/feudal: cultivation of crops, animal energy, irrigation, saving of seed

v. Industrial: mechanized production, mass production

vi. Post-industrial: information and service, generation of knowledge

1.0.4 **Factors/Drivers/Causes of social change** (RPA 4)

i. Physical environment/Contact with other societies: Physically easily accessible society changes rapidly than those located in remote (difficult to access) areas due to frequent contacts with members of different societies.

ii. Natural causes: Earthquake, landslide, flood, desertification, and tsunami disintegrate social fabric and changes society.

iii. Technological: Information, knowledge and skills: Rate of social change depends on access to information, ability to put together the information into knowledge, ability to convert the knowledge into skills

iv. Anthropogenic (Human) activities: International War, Civil War, displacement for “developmental” activities, industrial accidents, mass migration, education, economic opportunity

1.0.5 **Classical Theories of social change**: (RPA 6)

i. Cyclical: ups and downs, birth and death, Oswald Spengler: approximate 1000 year cycle. Critics of this theory cite examples that do not follow the 1000 year cycle.

ii. Evolution: changing with time, getting complex with time, society develops through time and change.

iii. Functionalist: changes as required to keep the whole society functioning, when particular part of a society changes; based on the assumption that society is a
stable, orderly system; August Comte (1798-1857), Herbert Spencer, Emile Durkheim, and Talcott Parsons propagate this theory. Society is composed of interrelated parts, each of which serves a function and contributes to the overall stability of the society. This theory emphasizes on changing role of different parts of a society to maintain stability of a society.

iv. Conflict: Karl Marx (19th century) social class conflict between have and have-nots. Expanded version of conflict theory finds social conflict between any groups in which the potential for inequity exists: racial, gender, religious, political, economic, and so on. Unequal groups usually have conflicting values and agendas, causing them to compete against one another. This constant competition between groups forms the basis for the ever-changing nature of society.

The triad is usually described in the following way:

- The thesis is an intellectual proposition.
- The antithesis is simply the negation of the thesis, a reaction to the proposition.
- The synthesis solves the conflict between the thesis and antithesis by reconciling their common truths and forming a new thesis, starting the process over.

Cyclical: The Greeks were the first to utilize this model. Plato spoke of eras of time when, initially, hope blossoms only to deteriorate as that era disintegrates. Spengler's view of change was very similar to that of the Greeks, but his model was dressed in a biological rather than uuological garb. Culture, according to him, is the living entity of people, and culture is housed in the civilization of that it arises, develops, ripens, decays and falls never to return. An element of hope, however, was predicted in a similar model by Toynbee, who believed the cyclical change could be interrupted by the creative minority. More recently Sorokin considered that social changes follow a trendless cyclic pattern, i.e., like a swinging pendulum, culture moves in one direction and then back in another.

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The functionalist perspective, also called functionalism, is one of the major theoretical perspectives in sociology. It has its origins in the works of Emile Durkheim, who was especially interested in how social order is possible or how society remains relatively stable. Functionalism interprets each part of society in terms of how it contributes to the stability of the whole society. Society is more than the sum of its parts; rather, each part of society is functional for the stability of the whole society. The different parts are primarily the institutions of society, each of which is organized to fill different needs and each of which has particular consequences for the form and shape of society. The parts all depend on each other.

For example, the government, or state, provides education for the children of the family, which in turn pays taxes on which the state depends to keep itself running. The family is dependent upon the school to help children grow up to have good jobs so that they can raise and support their own families. In the process, the children become law-abiding, taxpaying citizens, who in turn support the state. If all goes well, the parts of society produce order, stability, and productivity. If all does not go well, the parts of society then must adapt to recapture a new order, stability, and productivity.

Functionalism emphasizes the consensus and order that exist in society, focusing on social stability and shared public values. From this perspective, disorganization in the system, such as deviant behavior, leads to change because societal components must adjust to achieve stability. **When one part of the system is not working or is dysfunctional, it affects all other parts and creates social problems, which leads to social change.**

The functionalist perspective achieved its greatest popularity among American sociologists in the 1940s and 1950s. While European functionalists originally focused on explaining the inner workings of social order, American functionalists focused on discovering the functions of human behavior. Among these American functionalist sociologists is Robert K. Merton, who divided human
functions into two types: manifest functions, which are intentional and obvious, and latent functions, which are unintentional and not obvious. The manifest function of attending a church or synagogue, for instance, is to worship as part of a religious community, but its latent function may be to help members learn to discern personal from institutional values. With common sense, manifest functions become easily apparent. Yet this is not necessarily the case for latent functions, which often demand a sociological approach to be revealed.

Functionalism has received criticism for neglecting the negative functions of an event such as divorce. Critics also claim that the perspective justifies the status quo and complacency on the part of society's members. Functionalism does not encourage people to take an active role in changing their social environment, even when such change may benefit them. Instead, functionalism sees active social change as undesirable because the various parts of society will compensate naturally for any problems that may arise.

References
http://www.cliffsnotes.com/study_guide/topicArticleId-26957,articleId-26837.html.
Source: http://sociology.about.com/od/Sociological-Theory/a/Functionalist-Theory.htm
Accessed: June 14, 2013

Conflict theory emphasizes the role of coercion and power in producing social order. This perspective is derived from the works of Karl Marx, who saw society as fragmented into groups that compete for social and economic resources. Social order is maintained by domination, with power in the hands of those with the greatest political, economic, and social resources. When consensus exists, it is attributable to people being united around common interests, often in opposition to other groups.

According to conflict theory, inequality exists because those in control of a disproportionate share of society's resources actively defend their advantages. The masses are not bound to society by their shared values, but by coercion at the hands of those in power. This perspective emphasizes social control, not consensus and conformity. Groups and individuals advance their own interests, struggling over control of societal resources. Those with the most resources exercise power over others with inequality and power struggles resulting. There is great attention paid to class, race, and gender in this perspective because they are seen as the grounds of the most pertinent and enduring struggles in society.

Whereas most other sociological theories focus on the positive aspects of society, conflict perspective focuses on the negative, conflicted, and ever-changing nature of society. Unlike functionalists who defend the status quo, avoid social change, and believe people cooperate to effect social order, conflict theorists challenge the status quo, encourage social change (even when this means social revolution), and believe rich and powerful people force social order on the poor and the weak. Conflict theorists, for example, may interpret an "elite" board of regents raising tuition to pay for esoteric new programs that raise the prestige of a local college as self-serving rather than as beneficial for students.

Whereas American sociologists in the 1940s and 1950s generally ignored the conflict perspective in favor of the functionalist, the tumultuous 1960s saw American sociologists gain considerable interest in conflict theory. They also expanded Marx's idea that the key conflict in society was strictly economic. Today, conflict theorists find social conflict between any groups in which the potential for inequality exists: racial, gender, religious, political, economic, and so on. Conflict theorists note that unequal groups usually have conflicting values and agendas, causing them to compete against one another. This constant competition between groups forms the basis for the ever-changing nature of society. Critics of the conflict perspective point to its overly negative view of society. The theory ultimately attributes humanitarian efforts, altruism, democracy, civil rights, and other positive aspects of society to capitalistic designs to control the masses, not to inherent interests in preserving society and social order.

References
http://www.cliffsnotes.com/study_guide/topicArticleId-26957,articleId-26837.html.
Source: http://sociology.about.com/od/Sociological-Theory/a/Conflict-Theory.htm
Accessed: June 14, 2013
There are many theories of social change. Generally, a theory of change should include elements such as structural aspects of change (like population shifts), Processes and mechanisms of social change, and directions of change.

- **Hegelian**: The classic Hegelian dialectic model of change is based on the interaction of opposing forces. Starting from a point of momentary stasis, Thesis countered by Antithesis first yields conflict, then it subsequently results in a new Synthesis.

- **Marxist**: Marxism presents a dialectical and materialist concept of history; Humankind's history is a fundamental struggle between social classes.

- **Kuhnian**: The philosopher of science, Thomas Kuhn argues in *The Structure of Scientific Revolutions* with respect to the Copernican Revolution that people are unlikely to jettison an unworkable paradigm, despite many indications that the paradigm is not functioning properly, until a better paradigm can be presented.

- **Heraclitan**: The Greek philosopher Heraclitus used the metaphor of a river to speak of change thus, "On those stepping into rivers staying the same other and other waters flow" (DK22B12). What Heraclitus seems to be suggesting here, later interpretations notwithstanding, is that, in order for the river to remain the river, change must constantly be taking place. Thus one may think of the Heraclitan model as parallel to that of a living organism, which, in order to remain alive, must constantly be changing. A contemporary application of this approach is shown in the social change theory **SEED-SCALE** which builds off of the **Complexity Theory** subfield of **Emergence**.

- **Daoist**: The Chinese philosophical work *Dao De Jing*, I.8 and II.78 uses the metaphor of water as the ideal agent of change. Water, although soft and yielding, will eventually wear away stone. Change in this model is to be natural, harmonious and steady, albeit imperceptible.

- **Resource-based economy**: Jacque Fresco's concept of a resource-based economy that replaces the need for the current monetary economy, which is "scarcity-oriented" or "scarcity-based". Fresco argues that the world is rich in natural resources and energy and that — with modern technology and judicious efficiency — the needs of the global population can be met with abundance, while at the same time removing the current limitations of what is deemed possible due to notions of economic viability. Fresco's work in *The Venus Project* deals with physical reality and natural law rather than economic abstractions. *The Venus Project*'s website says this: "The Venus Project is neither Utopian nor Orwellian, nor does it reflect the dreams of impractical idealists. Instead, it presents attainable goals requiring only the intelligent application of what we already know."!

Source:
Accessed: June 14, 2013

1.0.6 **Eastern and Western values of society**

*Eastern Values*

Panchasheel:
1. Mutual respect for each other's territorial integrity and sovereignty,
2. Mutual non-aggression,
3. Mutual non-interference in each other's internal affairs,
4. Equality and mutual benefit, and
5. Peaceful co-existence
i. Social Harmony
ii. Sacrifice for the welfare of group
iii. Modesty and frugality
iv. Truth and Integrity
v. Respect to elder, teacher, guest and ancestor
vi. Maintaining culture and tradition
vii. Helping the people in need (Paropakar)
viii. Purity in thought and acts
ix. Ritual as important as devotion or work

Western/American Values (Robin Williams, 1970)
i. Achievement and success
ii. Activity and work
iii. Moral orientation
iv. Humanitarianism
v. Efficiency and practicality
vi. Progress
vii. Material comfort
viii. Equality
ix. Freedom
x. External conformity
xi. Science and rationality
xii. Nationalism-patriotism
xiii. Democracy
xiv. Individual personality
xv. Group-superiority themes

1.0.7 Brief History of engineering practice in eastern and western societies (TBG, pp.6-7)
### 1.1 Impacts and Consequences of Technology on Society

#### 1.1.1 Socio-cultural Impact

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livelihood</td>
<td>Livelihood is diversifying, many types of livelihood options available</td>
</tr>
<tr>
<td>Specialization of Profession</td>
<td>Specialization in profession is increasing</td>
</tr>
<tr>
<td>Health</td>
<td>Access to health services is increasing, specific medicines are available, diagnosis process improving, genetic engineering is curing previously incurable diseases, assistance to specific needs of disabled persons getting better through technically designed equipment, welfare of aged citizens getting better</td>
</tr>
<tr>
<td>Education</td>
<td>Access to education services getting better, distance learning is improving access to education and latest information, e-book, e-library, standardization of educational quality through use of ICT technology, on line evaluation, on line test possible,</td>
</tr>
<tr>
<td>Family</td>
<td>Family relation getting complex due to in-vitro fertilization, test-tube baby, cloning, Family size reducing due to easier access to contraception, micro-family getting possible, life span increasing, several generation in family, change in status of female and disabled</td>
</tr>
<tr>
<td>Living Standard</td>
<td>Living standard increasing, HDI increasing, poverty decreasing, employment opportunity increasing, price of goods decreasing</td>
</tr>
<tr>
<td>Language</td>
<td>Use of international language increasing, language use getting standardized through mass media, brail script helping blind, sign language use increasing for deaf</td>
</tr>
<tr>
<td>Social Norms and Values</td>
<td>Social norms and values increasingly being challenged and altered or replaced, social class disintegrating, new economic class emerging</td>
</tr>
<tr>
<td>Family tradition, culture, heritage</td>
<td>Family traditions increasingly being challenged and altered or replaced, heritage preservation getting better</td>
</tr>
<tr>
<td>Urbanization</td>
<td>Urbanization increasing, concentration of resources and resource users</td>
</tr>
<tr>
<td>Commercialized Recreation</td>
<td>Traditional dances, music, drama and games giving ways to movies, video games, theme parks, pay per view programs</td>
</tr>
</tbody>
</table>

#### 1.1.2 Impact on Agriculture

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Production</td>
<td>Food production mechanized, food production increasing, Green Revolution</td>
</tr>
<tr>
<td>Food Processing</td>
<td>Food processing getting complex, requiring industrial management</td>
</tr>
<tr>
<td>Food Preservation</td>
<td>Food security increasing</td>
</tr>
<tr>
<td>Mechanization</td>
<td>Mechanization of all aspects of agriculture is increasing</td>
</tr>
<tr>
<td>Commercialization</td>
<td>From subsistence to cash crop, genetically modified food, patented seeds</td>
</tr>
<tr>
<td>Food Variety</td>
<td>Increasing, year round availability</td>
</tr>
<tr>
<td>Fertilizer/Pesticide</td>
<td>From organic to chemical, pesticide use increasing</td>
</tr>
<tr>
<td>Water use</td>
<td>Increasing due to cash crops, reduced use by sprinkler, drip, root zone</td>
</tr>
</tbody>
</table>

#### 1.1.3 Impact on Communication

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information generation and dissemination</td>
<td>Increasing access to information</td>
</tr>
<tr>
<td>Mass communication: Newspaper, Magazines, FM Radio, TV, instant/breaking news</td>
<td>Enhanced public awareness, timely information to people</td>
</tr>
<tr>
<td>Internet and Social Media</td>
<td>Increased access to information, social media influencing design of communication techniques</td>
</tr>
<tr>
<td>Telephone, mobile phone</td>
<td>Increased and easier access to telephone</td>
</tr>
<tr>
<td>Virtual Meeting, virtual reality, tele-medicines</td>
<td>Less need of physical presence in meeting, distance medicine services and remote controller operation possible</td>
</tr>
</tbody>
</table>
1.1.4 **Impact on Industry, Economy and Job**

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Production and mass production</td>
<td>Increased production of similar size and design</td>
</tr>
<tr>
<td>Price of goods</td>
<td>Relatively decreasing due to mass production</td>
</tr>
<tr>
<td>Capital intensive technologies and labor saving device use</td>
<td>Increasing</td>
</tr>
<tr>
<td>Mechanization, Automation, and Robotics use</td>
<td>Increasing efficiency of industry, economic indicators improving</td>
</tr>
<tr>
<td>Job opportunities</td>
<td>Increasing, also for women, after WW II</td>
</tr>
</tbody>
</table>

1.1.5 **Impact on Transportation: mass transportation of goods and services**

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land transportation</td>
<td>Road, multilevel roads, railways</td>
</tr>
<tr>
<td>Underground</td>
<td>Metro/Underground railways</td>
</tr>
<tr>
<td>Water</td>
<td>Naval transportation, river navigation</td>
</tr>
<tr>
<td>Air</td>
<td>Air cargo, air travel, air ambulance</td>
</tr>
</tbody>
</table>

1.1.6 **Impact on Politics**

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spreading of message/manifesto and propaganda</td>
<td>Increasing speed spreading political messages and messages reaching to more people</td>
</tr>
<tr>
<td>TV Debate, recognition of candidates, election management</td>
<td>People get chance to evaluate the candidates, election managers manipulate media to their advantage</td>
</tr>
<tr>
<td>Link between politicians &amp; people</td>
<td>Increasing without physical contact/presence</td>
</tr>
<tr>
<td>Social media influencing policies</td>
<td>Increasing</td>
</tr>
<tr>
<td>e-voting, e-governance</td>
<td>Increasing</td>
</tr>
</tbody>
</table>

1.1.7 **Impact on Dispute/Conflict Resolution**

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfare</td>
<td>Increased use of gun powder, rockets, missiles, drones, improvised explosive devices</td>
</tr>
<tr>
<td>Weapons of mass destruction</td>
<td>atom bomb, hydrogen bomb, nuclear bomb made but not yet used (except two in WW II), Star War, MAD policy</td>
</tr>
<tr>
<td>Weapons of mass deception</td>
<td>Misuse/abuse of mass media increasing</td>
</tr>
</tbody>
</table>

1.1.8 **Commercialized recreation**

<table>
<thead>
<tr>
<th>Impact on</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional recreation</td>
<td>Declining</td>
</tr>
<tr>
<td>Modern recreation</td>
<td>Increasing. Theme parks, swimming pools, video game parlor</td>
</tr>
<tr>
<td>International games</td>
<td>Increasingly being costly and commercialized, pay per view, exclusive right to broadcast</td>
</tr>
</tbody>
</table>

1.1.9 **Consequences:**

- Global Village through development of Transportation technology and ICT technology
- Industrialization and fossil fuel use causing global warming and increase in frequency of extreme events (Global Climate Change)
- Human Development Index parameters improving: GNP, GDP, Per Capita Income, Per Capita Energy use, access to education/health, WATSAN/WASH, employment, poverty, infant mortality
1.2 Effects of Major Technological Developments such as Printing, Gunpowder, Mechanization, Computer, Organic Chemistry, Communication Satellites

1.2.1 Printing: (RPA-C p3)
Written and mass produced record of agreements, laws, rules, regulations, guidelines, procedure, manuals, books, newspapers, magazines, journals, easily available
Effects:
Need to memorize diminished, information available when needed
Judgment based on written laws rather than wisdom of justices.
3D printing: can change production mode, 3D Printers print house:

1.2.2 Gunpowder: (RPA-C p4)
Explosives, Dynamite, Warfare, Colonization, Endangered species, Crime, Terrorism
Effects: warfare getting increasingly violent and costly, species getting extinct, increasing use of gunpowder in crimes and terrorist activities

1.2.3 Mechanization: (RPA-C p8-9)
Industrial production, agricultural mechanization, transportation, robotics, automation,
Effects:
Lower cost of goods and food
Easier movement over long distances
Standardization and interchangeability of design, size, shape
Safer working environment for dangerous jobs
Higher living standard, material comfort

1.2.4 Computer: (RPA-C p9, p30)
Modeling, simulation (visualization of potential impacts and solution before the event occurs and solutions implemented), design, solution techniques (FDM, FEM), Management Information System, Spatial planning using GIS, computer crimes, intrusion on personal privacy, data mining, data theft,
Effects: information generating, storing and dissemination
Design of materials using simulation
Electronic equipment

Impact of Computer on Society (RPA, p30)

- Wide application: applicable almost everywhere
- Employment: increased for persons with new skills
- Productivity and competition: increased
- Standard of living: has improved.
- Privacy: reduced

Computer Crimes

Electronic Transaction Act 2004 has listed the following acts under the Computer Crime
i. Theft, damage or alteration of computer source code
ii. Unauthorized access to materials on computer
iii. Destruction and computer and information system
iv. Publication of illegal materials on electronic form
v. Violation of confidentiality
vi. Posting of false information
vii. Submitting or showing forged license or certificate
viii. Non-submission of the document or other materials
ix. Computer fraud

1.2.5 Organic Chemistry: (RPA-C p7)
Plastic, Polymer, plastic, Construction glues, fossil fuel, construction materials
Effects: New materials: including construction materials, PPR pipes, PVC pipes, synthetic glues, synthetic clothes, bio-degradable plastic, light weight and stronger materials, water proofing, paint
Fossil fuel: transportation, bitumen

1.2.6 Communication Satellites: (RPA-C p5)
Mass Communication: Radio, TV, Newspaper, Internet, WWW, social media, virtual meetings, Satellite maps, GIS, GPS, Map making, Open Source Mapping, Google Maps, Global Circulation Modeling, Surveying, Wild Fire detection, Early Warning
Effects: ICT development, TV, GPS, Satellite Maps, Weather forecasting, Climate Modeling, LiDAR, GIS based planning (urban, land use etc), Remote Sensing
1.3 Cultural Motivations and Limitations

1.3.1 Cultural Motivation to adopt new technology
Cultural norms and values can motivate society to develop and adopt new technology. The work culture and belief system based on “fate in one’s own hand” motivates to society to develop and adopt new technology.

1.3.2 Cultural limitations to adopt new technology
Cultural norms and values can limit society to develop and adopt new technology, especially if such norms are explained to the general public by tying up with religion. Fatalism can de-motivate and limit development and adoption of new technology.

1.4 Eastern vs. Western Philosophy of Change and Development

1.4.1 Acceptance of change: eastern and western perspectives
In general, Western society accepts change more readily than eastern society. Tradition, rituals, customs, culture, and heritage are more valued in eastern society.

1.4.2 Changes brought by engineers in human societies (TBG, p. 9)
Mass production of goods through machines
Automation
Faster means of transportation
Mass communication
Inventing labor saving devices
Creating faster pace of life
Commercializing recreation
Emphasizing on high degree of specialization

1.4.3 Changing concept of development
from economic and physical infrastructure to social and environmental
from “development” as all costs to holistic, equitable and sustainable development

1.4.4 Engineers’ roles in development activities (TBG, p.8)
Creating Vision
Preparing Mission
Execution
Monitor and Evaluate
Train
Upgrade Profession

1.5 Political and Individual Freedoms versus Social Goals
Political freedom is the freedom to choose who will govern the society, free and fair election is the basis of exercise of political freedom. Individual freedom is the freedom to choose things that mostly affects himself/herself. Individual freedom to exercise one’s rights ends when its exercise infringes open someone else’s freedom. Political freedom is limited within state/national boundary.
1.5.1 **Relation between individual freedom and social good**
Individual freedom can be curbed when such curbing is for social good/harmony.

1.5.2 **Limits on individual behavior**
Individual behavior is limited by its interference in someone else’s freedom.

1.5.3 **Economic, legal and philosophical analyses of individual freedom**
(TBG, pp 10-12)

1.6 **Exponential Growth. Alternative use of Scarce Resources,**

1.6.1 **Exponential growth of population**
World population is growing at exponential rate. The growth is highest in developing countries. In highly industrialized countries population is stagnant or decreasing. Urban population is increasing at much faster rate. Rural population is decreasing, partly due to migration.

1.6.2 **Exponential growth in exploitation of natural resources**
Advances in technology has made it possible to exploit natural resources at ever high rate, increased access to resources.

1.6.3 **Exponential decrease in availability of usable resources**
Usable water is reducing due to contamination. Forest cover is decreasing rapidly. Many species are getting extinct. Biodiversity is decreasing.

1.6.4 **Alternative use of scarce resources:**
Scarcce resources: usable water, usable land, breathable air, minerals, heavy metals, radioactive materials, herbs, scarce metals
Traditional Energy Source: Wood, Coal, Natural Gas, and Fossil Fuel
Alternative Energy: Hydro, Solar, Wind, Bio-fuel, Nuclear, atomic

1.7 **Cause of International Tensions**

1.7.1 **Energy Security:**
Fossil fuel, coal, nuclear, hydropower

1.7.2 **Water Security:**
Upstream vs. downstream users
Riparian vs. Prior Use right
Rhine, Mekong, Bramhaputra, Ganga, Indus, Nile, Rio Grande, Euphrates and Tigris
Climate change aggravating water security and water quality

1.7.3 **Land Security:** lands with strategic value and land with natural resources
Mt. Sinai, Israel vs. Syria
Islands in Pacific Ocean: China vs, Japan, China vs. Korea, Korea vs. Japan
Kashmir: India vs. Pakistan
China vs. India: Arunachal Pradesh
Falklands: UK vs. Argentina
Kalapani: Nepal vs. India
Falklands: Argentina vs. Britain
Global warming Sea level rise: land under sea

1.7.4 **Food Security**
Desertification
Starvation
Whalers vs. environmentalists (Green peace)
Genetically Modified Food vs. Natural Right to produce, preserve and use seed
Patent on seeds

1.7.5 **Religion**
Christianity vs. Judaism
Christianity vs. Islamic
Judaism vs. Islamic
Hindus vs. Islamic

1.7.6 **Political Ideology**
Capitalism vs. Communism
Ultra Nationalism
Influence/Domination

1.7.7 **Climate Change**
GHG emission
Polluters vs. Adopters and “Copers”
Ozone layer depletion
Developers vs. Environmentalists (Green Peace)
Sea level rise: land under salty sea water

1.7.8 **Industrial and Business**
Industries manufacturing war equipment work in background to aggravate existing conflicts

1.8 **Risk and Overall Cost/Benefit**
Risk is inherent in any engineering decision; there is no such thing as risk free decision.
The goal of an engineer (or a professional) in making decision is to reduce the level of risk to an acceptable level.

1.8.1 **Rational Analysis in Engineering Decision Making** *(RPA, pp.66-67)*
Rational: having its source in or being guided by the intellect (distinguished from experience or emotion);
Engineering decisions made by following accepted norms and standards are considered rational decisions. Rational decision does not necessarily mean the best decision. The rational decision making process assumes that the data/information available for making the decision are available, can be quantified and analyzed; however, the weightage assigned to the parameters affecting risk analysis tend to be subjective, based on the decision maker’s experience and perception.

A simple example of a rational decision making process in engineering is as follows. In a hydropower projects, the locations of various civil engineering components (like headworks, desilting basin, headrace canal/pipe, forebay, powerhouse, tailrace exit point) and electro-mechanical components (like selection of turbine, generator) has to be decided. There are multiple parameters affecting the decision, one of them being the locations of the civil engineering components; different locations result in different benefit-cost ratio. Decision is made based on evaluation of different options of the location of the components.

1.8.2 Risk and Acceptable risk

Risk: Exposure to the possibility of loss, injury, or other adverse circumstance
Risk: The expected value, taken over all possible states of the world, of the loss incurred in making a choice.

The level of acceptable risk depends on social value system. In a society with low value of human life, the level of acceptable risk is high, which affects analysis of overall benefit/cost of a project because of lower cost of insurance, safety measures, medical provisions, etc.

1.8.3 Newer parameters of cost of projects

Overall cost: involves cost of ecological services, social cost, cultural cost, heritage loss cost, on top of economic cost.

1.9 Education and Training of Technologists, Scientists and Engineers.

1.9.1 Traditional education and training of Technologists, Scientists and Engineers

Formal training
Continuous Education
Skill versus Knowledge

1.9.2 Multi-disciplinary education and training of Technologists, Scientists and Engineers
Technologists, Scientists and Engineers from different disciplines coming together to solve complex problems
Education and Training of separate disciplines, provided one at a time

1.9.3 Interdisciplinary education and training of Technologists, Scientists and Engineers
Education and training of multiple disciplines intertwined, at provided at the same time

<table>
<thead>
<tr>
<th>General Characteristics of Developing Countries</th>
<th>American Values</th>
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<tbody>
<tr>
<td>1. Agriculture as the main occupation</td>
<td>1. Achievement and success</td>
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<td>2. High population growth</td>
<td>2. Activity and work</td>
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<td>3. Low per capita GNP</td>
<td>3. Moral orientation</td>
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<td>4. unemployment and under employment</td>
<td>4. Humanitarianism</td>
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<td>5. technological backwardness</td>
<td>5. Efficiency and practicality</td>
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<td>6. low labor productivity</td>
<td>6. Progress</td>
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<td>7. Dualism</td>
<td>7. Material comfort</td>
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<td>8. Underutilized natural resources</td>
<td>8. Equality</td>
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<td>11. Science and rationality</td>
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<td>12. Nationalism – patriotism</td>
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<td>13. Democracy</td>
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<td>15. Group – superiority themes</td>
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Old Exam Questions from Chapter 1 (Background Perspective)

**Society:**
1. Define society. Explain the approaches for social change. (8) (RPA, p2)
2. Discuss in brief about the elements of a society. (8) (RPA, pp 6-7)
3. What are the essential elements of a society? Describe in detail. (8) (RPA, pp 6-7)
4. What do you mean by social change? Discuss the sources of social change. (12) (RPA, pp 4-5)
5. What is social change? What are the factors responsible for social change? (8) (RPA, pp 4-5)
6. What do you mean by social change? Discuss the sources of social change. (12) (RPA, pp 4-5)
7. What do you mean by social change? Discuss the sources of social change. (12) (RPA, pp 4-5)
8. Briefly discuss functionalist, evolution and conflict theory on social and cultural change. (7) (RPA, pp 6-7)
9. Briefly discuss functionalist, evolution and conflict theory on social and cultural change. (7) (RPA, pp 6-7)
10. What are the theories of social and cultural change? Briefly explain the evolution theory of cultural change. (8)
11. What is the impact of education in social and cultural change? Explain. (8)
12. What do you understand by society? Discuss the theories of social change.
13. Define social change. What are the theories of social change? Explain about the cyclical theory.
14. Describe the characteristics of the western society.

**Impact of Technology on Society**
15. Define technology. What are the effects of technology on society?
16. Explain technological change.
17. Briefly explain the impact of technology on society.
18. Describe the impact of technology in the rural society.
19. What is the role of transportation facility to improve the economic condition of the rural people of Nepal? Explain with the help of suitable example. (7)
20. What do you understand by technology and how does it impact the society? Throw light on how technological development is reflected in Human Development. (15) (RPA, pp 16-18)

21. What is the impact of technology on society for bringing social as well as cultural change? Briefly discuss. (7) (RPA, pp 16-18)

22. ‘Technology is the indicator of development.’ Relate it with societies of the world. Write technological achievement of 21st century that has greatest impact on human.

23. Write about the impact of computer in society.

24. Explain the impact of computer in the society.

25. What are the impacts of computer on society? Discuss in detail.

Developing Countries

26. Explain the characteristics of developing countries.

27. What do you understand by developed and developing countries? Discuss.

Short Note Type Questions

a. Factors causing Social Change
b. Cause of international tensions
c. Characteristics of developing countries
d. Individual freedom versus societal goals
Unit Test Questions:

1. List the essential elements of a society.
2. List the stages of evolution society.
3. List the factors of social change.
4. List the classical theories of social change.
5. List the impact of recent technological advances on agricultural practices in Nepal.
6. List the four major technological developments which have impacted society as large.
7. List the actions considered to be computer crime by the Electronic Transaction Act 2004 of Nepal.
8. List the impacts of developments in communication technology in the society and technical works.
9. List the sources of international tension.
10. List different types of education and trainings related to engineers and scientists.