

# Europe Middle Ages (500-1400)

- Invasion from all sides- Vikings from Denmark, Sweden and Norway, Islamic from the south side and Magyars from western Russia front
- Population decline- Around 1000 CE, Latin European had 22 million while China had 60 million and Arab had 40 million
- Six towns outside of London, Paris population was about 20,000
- England Population increased from 1.5 to 5 million during 1100-1300, Paris increased to 280,000 by 1400

# Europe- Revival

- Agriculture- Plow, Horses, Crops
- Revival of town and urbanization- artisans, trade
- Feudal Economy emerged during 11<sup>th</sup> to 17<sup>th</sup> century CE
- Emergence of humanism and local literature

# Crusades

- In 1071 Jerusalem was conquered by the Seljuk Turks
- In 1093 Byzantine emperor requested Pope to wage a war to regain the Christ's Tomb
- Pope in a famous speech declared a holy war. The first crusade consisted of peasants who wanted to escape the crop failure, debt ..
- The crusaders first won in 1099, lost it again in 1187

# Political stability and economic growth

- Non human motive power such as water and wind in the absence of unavailability of labor force
- Universities-Bologna 1088, Paris 1160, Oxford 1220
- Independent but under some control of state and church
- Under graduate program in Liberal arts and Graduate Program in Theology, Law and Medicines

# Horrors of Fourteenth century

- Weather extreme
- Famine (1315-17)
- Banking crisis
- Plague or Black Death (1347-48)
- Hundred year War (1337-1453)
- Peasant revolt

# The Renaissance

- Printing
- Art and Artist
- Occult science
- Metallurgy, Mining and Chemistry, Copernicus

# Age of exploration

- Trade routes to Asia
- Overseas colonies
- Spread of religion
- Compass, maps and astrolabe, Caravels, cannon and rifles

# Renaissance cartography

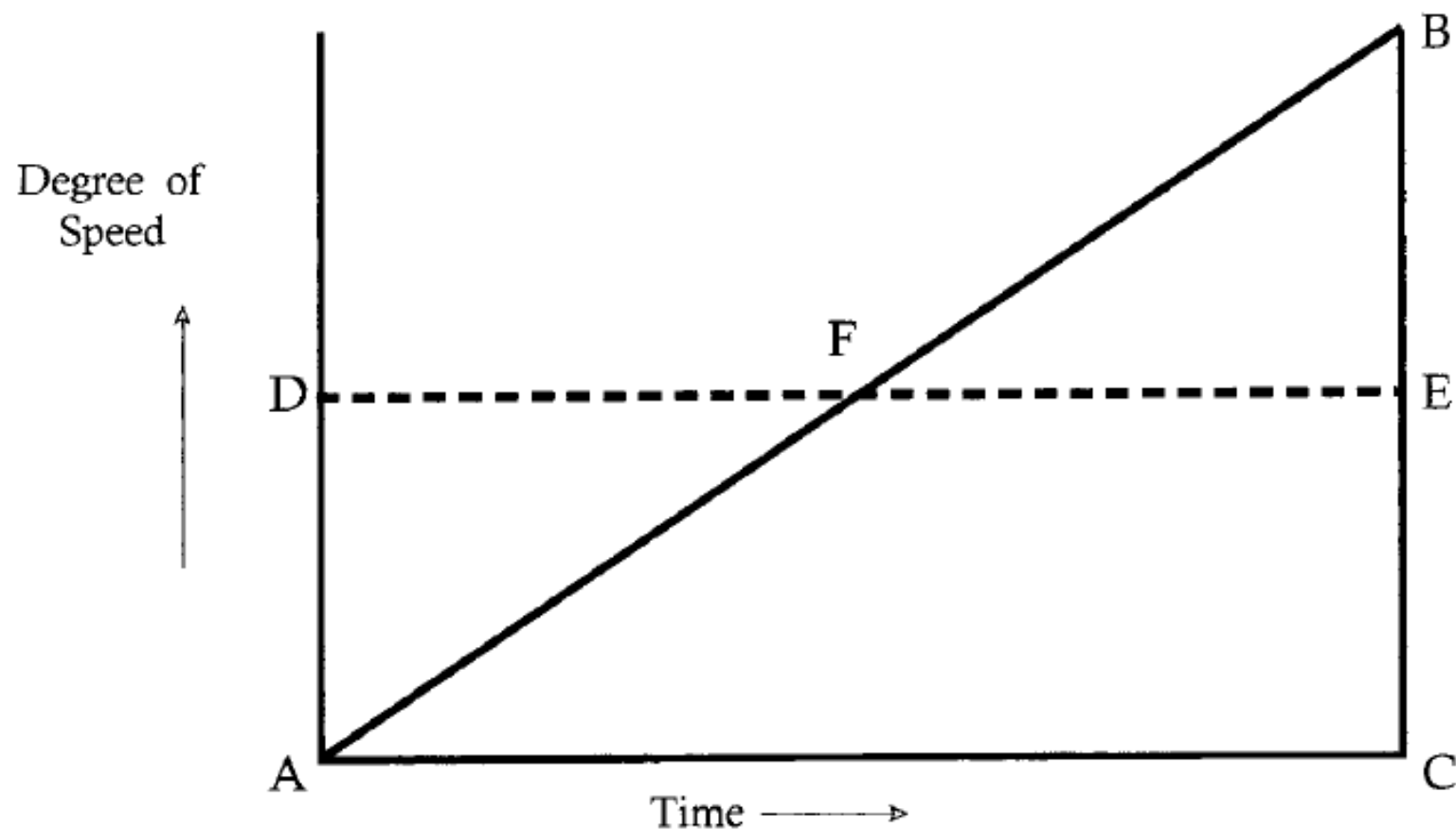
- In the middle ages the best known work was *De Chorographia*
- Introduction of Compass in thirteenth century- charting of sea routes
- In fifteenth century, Ptolemy map was rediscovered by Latin West- diameter and circumference of earth 7000 and 22500 miles
- Space as an abstract conception- cartography, Printing



# Theology and Philosophy

- Paris Condemnation 1277- 219 execrable errors
- Debates over extent of its impact
- Subordination of philosophy- God could have created in other ways
- Intellectual imagination without the pretense of truth

# Nicole Oresme (1320-82) – Uniformly difform



# Printing

- Johannes Gutenberg- late 1430's
- By 1499 spread to 250 cities
- Book fair started- Frankfurt
- Contributed to formation of a new class- Humanist

# Art and sculptor

- Vision and Perspective
- Experimentation, Mathematical rules- Fresco
- Growth of Native languages- Erasmus, Dante, Boccaccio etc.
- Renaissance Men- Donatello, Michelangelo, Raphael, Leonardo da Vinci etc.

# Leonardo da Vinci (1452-1519)

- Scientists, Mathematician, Engineer
- Inventor, Anatomist, Botanist
- Painter, Sculptor, Architect
- Musician, Writer

# Occult sciences and Neo Platonism

- Hermeticism from Greek philosopher Hermes Trismegistus- Thrice Great based on Astrology, Alchemy and Theurgy (divine spirits)
- Demonology, Kabbala, or Qabala from Jews- secret mysteries
- Rosicrucianism early 17<sup>th</sup> century- secret societies and symbols
- Marsilio Ficino (1469-74)- Synthesized hermeticism and Kabbalism

# Renaissance philosophers

- Robert Grosseteste (1168-1253) and Roger Bacon (1215-1292)- advocate of experiments as a philosophical tool
- Heinrich Cornelius Agrippa- *De Occulta Philosophia* or Three Book of Occult Philosophy (1530-33)
- His work divided into Natural Magic, Celestial and Ceremonial Magic- corresponding to physics, mathematics and theology
- John Dee- Astrology, Alchemy, Mathematics, Navigational and Computational astronomy

# Alchemy

- Medicines to heal metal, body and soul- Ancient and Arabian texts
- Craft tradition barred it from being included in University
- Pope John XXII Decree in 1317 on the fear of gold economy
- Under cover- Luna for silver, Sol for Gold, Mars for Iron, Venus for Copper, Mercury for Quick Silver etc.



# Mining, Metallurgy and Chemistry

- Individual mining to systematic
- Smelting of metals, Purification and material testing
- Georgios Agricola's *De re Metallica*, 1556- Opening, closing of mines
- Chemistry school developed- oxidation, reduction, amalgamation

# Renaissance medicine

- Wise women, Charmers, Wizards, Astrologer, Priests, Herbalist, Barbers, Pharmacist, Surgeons, Physician
- Infant mortality was high- One in four or five did not survive 1<sup>st</sup> year
- Paracelsus (1493-1541) Army surgeon who rejected Humoralism, related diseases to external causes, alchemical properties
- Andreas Vesalius (1514-64)- De Humani Corporis Fabrica (The Fabric of Human Body) 1543

# Renaissance medicine

- Medical education- 1540s Padua, 1630's Leiden etc. Birth of Clinic and Rise of Hospital Medicine Midwifery
- Ambroise Pare (1510-90)- 'Works on Surgery' 1575- Gunshot wounds
- Gabriel Fallopius
- William Harvey 1628- An Anatomical Disquisition of the Movement of Heart and Blood

# Renaissance-Nature and Natural

- Super natural
- Preternatural
- Artificial
- Unnatural

# Mechanics

- Dynamics and Kinematics- Natural philosophy
- Science of weight- (Balance and Lever) Jordanus de Nemore, Archimedes
- Mechanical Art- Practical such as military machines, architecture, weaving
- Mechanical problem- Strato 4<sup>th</sup> Century BC

# Mechanical Problem

- Theoretical than manual art- was included in Padua University in 1560
- Mathematical, Concerned with motion and effect that can be outside of nature and for human use
- Property of circle- a point along a rotating radius moves at a speed in accordance with distance from the center
- Property of balance epistemologically higher than that of lever

# Mechanical Art

- Greek idea of 'techne' and its Latin translation 'ars'- Episteme
- Early Modern period- Liberal and Mechanical Art
- Liberal Art- Grammar, Logic, Rhetoric, Arithmetic, Geometry, Theory of Music, Astronomy
- Mechanical Art- Architecture, Masonry, Agriculture, Tailoring, Weaving, Blacksmithing, Theatrical Art etc.

# The second phase 1540-1650

- Wars of religion in France 1560-98 in Germany 1618-48, Low Countries (1568-1648)- States General of Holland 1576, Commonwealth of England 1649
- Rise led by traders and manufacturer, Emergence of Denmark, Sweden, Poland and Russia
- Iron and coal driving the transition and emergence of Britain
- Use of Coal-Shipment from Newcastle increased 14 times to half a million tons during the period 1564-1634



# Astronomy

- Navigational requirement of Spanish and Portuguese
- Prediction of astronomical events such as eclipses
- Setting date for Ester
- Copernicus, Tycho, Kepler and Galileo

# Copernicus (1473-1543)

- Born in Poland, studied in Cracow then Ferrera (Law), Bologna (astronomy), Padua (medicine)
- Save the phenomena
- Commentariolus (1514) Little Commentary, Completed in 1532
- Joacim Rheticus 1539- De Revolutionibus Orbium Coelestium (On the revolution of the celestial orbits) 1543

# De Revolutionibus Orbium Coelestium

- Dedicated to Pope Paul III, preface by Andreas Osiander
- Comprised of six books
- Three motion of Earth to account for change of season
- Hypothesis as the means to do science

# Copernicus system

- Sun near the center
- Epi cycles and Eccentrics
- Stellar parallax
- Reception was limited to professional astronomers

# Tycho Brahe (1546-1601)

- Danish island 'Hveen'- Uraniborg- Castle of Heaven and Stjerneborg- Castle of Stars
- Library, printing press, paper mill, several alchemical laboratories
- Big instruments and record keeping, One percent crown revenue
- Court position in Prague in 1597 as Imperial Mathematician

# Tycho observation

- Spotted an exploding star in 1572
- Comet outside the sphere of Moon
- Rejected Copernicus system due to missing stellar parallax
- Proposed a new system in 1588

# Kepler (1571-1630)

- Early occupation was writing almanac and horoscopes
- Pursued theology in University of Tübingen
- Revelation in class room in Graz 1595- Platonic solids
- Mystery of the Universe 1596- Copernican idea

# Johannes Kepler

- Left Graz and became assistant to Tycho
- Astronomia Nova 1609- First two laws of planetary motion, causes
- Harmonice Mundi (Harmonies of the World) 1619-Third law
- Relatively less attention to the work by his contemporaries



# Galileo Galilei (1564-1642)

- A Tuscan, he was brought up in Florence
- Professor in Pisa (1589-91) and Padua
- Telescope- Dutch man Hans Lipperhey, brought out Starry Messenger 1610
- Jupiter's Moon as Cosimo de Medici who was Duke of Tuscany- Moves to Florence, Chief Mathematician and Philosopher

# Galileo- Imperial Mathematician

- Supports Copernicus idea, Reported to Inquisition in 1611, Argues if Bible is God's word, Nature is God's work
- 'Letters on Sun spot' 1613- Objected for its non perfect nature
- 1616 ban on teaching, holding or defending Copernican system
- Fight with Orazio Grassi over three Comets- 'Assayer' in 1623

# Dialogues concerning two Chief World System

- Urban VIII takes over, suggests changes
- 'On the Tides' to 'Dialogues of the Two Chief System of World' 1632 dedicated to Pope and written in Italian
- Salviati- Galileo, Sagredo- Interested Amateur and Simplicio- Aristotle
- Reaction was sharp and immediate, Committee formed-Galileo summoned, Trial begins

# Galileo trial

- Summoned for appearance
- Convicted of 'vehement suspicion of heresy'. In public, cursed, abjured and detested Copernican system
- Remains in prison and house arrest, attended by his daughter
- Discourse on two New Science (Kinematics and Strength of Material)  
1638- Published by Elsevier

# Galileo-Persona

- Mastery over Language, Wit
- Observation and Memory
- Precision
- Vision and willingness to fight for his idea

# Galileo

- 'The Grand Book of Nature is written in Mathematics'
- Mathematical physics- application of mathematics to motion and mechanics
- Physical astronomy
- Methodology

# Galileo-Two New Sciences

- Distribution of stress- Strength of beam is proportional to square of cross sectional depth
- Law of falling bodies-recognition of role of medium
- Kinematics law as a description
- Role of experiment

# William Harvey (1578-1657)

- He studied in Padua and was taught blood flowed from the head from the same route and remained still in the body
- Two system- Natural system containing venous blood with its origin in liver and Vital system containing arterial blood and spirits flowing from heart
- He was curious of the function of tiny flaps in heart, investigated live animal such as fish, chicken, pigeon etc.
- Disputed Galen's theory, publishes 'De motu cordis' or On the Motion of Heart and Blood in 1628



# William Gilbert (1544-1603)

- Medical Practitioner, Physician to Queen Elizabeth I
- 'De Magnete' or On the Magnet 1600
- Father of electricity- 'elektron' or like amber or yellow fossilized resin which when rubbed with cloth or fur attracted light objects chaff
- Centre of Earth is Iron, Map of Moon

# Francis Bacon (1561-1626)

- Restructuring of traditional learning- scholasticism, humanism, magic
- Goal should become obtaining practical knowledge
- Method of science- inductive
- New Atlantis- Literary and philosophic, Salomon House

# Francis Bacon (1561-1626)

- Trinity college, Political career (1581-1617) Impeachment 1621
- Advancement of Learning-1605, *Cogitata et visa*- 1607
- Human mind as Crooked mirror
- Novum Organum Scientiarum- 1620

# Bacon's Idols

- Idols of the tribe- senses, discerning order, wishful thinking, premature judgment
- Idols of the cave- education, experience, gender, customs etc.
- Idols of the market place- distortion through communication, languages
- Idols of the theatre- philosophies such as scholastic, superstitious etc.

# Descartes's contribution (1596-1650)

- Born in 1596, Initial studies in Jesuit college and served army at 22
- Beekman's influence, Rules for the direction of Mind (method for unified science)
- Moved to Amsterdam in 1628-Works on 'The World'
- It was Collection of Physics, Mechanics, Machines, Animal etc. and was ready by 1633- Explanation through mechanistic physics

# Descartes

- Discourse on Method-1637 (Optics and Meteorology) Cogito ergo sum
- Meditation on First Philosophy (1639-): analytic and synthetic
- Controversy over his Cartesian philosophy at University of Utrecht- Regius and Voetius
- Moves to Egmond , correspondence with Princess Elizabeth of Bohemia to whom he dedicates his principles of physics and later joins Court of Queen Christina, Sweden in 1649

# Skepticism

- Senses can mislead
- I might be crazy
- I might be misleading
- An evil genius can be fooling me

SEVERAL years have now elapsed since I first became aware that I had accepted, even from my youth, many false opinions for true, and that consequently what I afterward based on such principles was highly doubtful; and from that time I was convinced of the necessity of undertaking once in my life to rid myself of all the opinions I had adopted, and of commencing anew the work of building from the foundation, if I desired to establish a firm and abiding superstructure in the sciences.



# Mind and Body- Cartesian Dualism

- Mind is non-extended, non physical and non-spatial
- Body is extended and non-thinking
- Mental events cause physical events or the other way
- Objections by Gassendi and Elizabeth- mind body interaction known as problem of interactionism

# Descartes- Science and Religion

- System of world in which there are two domains- Mind and Extension
- Extension and movement comprise the physical world
- Physical world is mindless- Science corresponds to it which can be approached through measurable qualities such as weight, volume etc. and to an extent through secondary qualities such as color, smell, taste etc.
- Mind comprises moral for example love, will, passion, faith etc. and unapproachable from the physical domain

# Mechanical explanation

- Motion in the world is fixed which gets transferred from one to another. Each as far as in its power, tries to remain in its state
- Natural movement is along straight lines. Bodies moving in a circle tend to move away from the center
- Vortex theory- universe is spherical, like water in bucket, vacuum
- All living things are complex machines- mechanical philosophy

# Scientific societies

- Scientific society in Rome (1600-1630) and Florence (1651-67)
- Royal Society of London 1662, Paris Science Academy 1666
- Academies in Russia, Prussia, Sweden, other parts
- Jobs, publication, surveys, expedition etc. Initial idea was to exchange without any methodological pursuit, Funding

# Journals, Observatories, Botanical Gardens

- Pumping, hydraulics, gunnery and navigation
- Journal- Philosophical Transaction of Royal Society, des Scavans, 1666
- Astronomical Observatories- France 1667, Britain 1675, Prussia 1700, Russia 1724, Sweden 1747
- Botanical Garden- Jardin du roi 1635, Royal Garden at Kew 1753 etc.

# Experimental Science

- Gassendi (1592-1655)- Democritus Atomic theory, Corpuscular hypothesis
- Robert Boyle (1627-91)- Mechanical explanation for problems in Chemistry, Vacuum pump
- Robert Hooke- Experimental Physicist, Elasticity, balance of wheels
- Work house- Microscope, furnace, dissecting instrument, air pump , thermometer, barometer etc.

# Newton (1642-1727)

- Trinity College Cambridge 1661- developed laws in 1665 vacation
- Dispersion, 1672- Light made of different colors
- Theology and Alchemy- 1670s and early 80s
- Mathematical Principle of Natural Philosophy- published by Royal Society London in 1687 with support from Edmond Halley

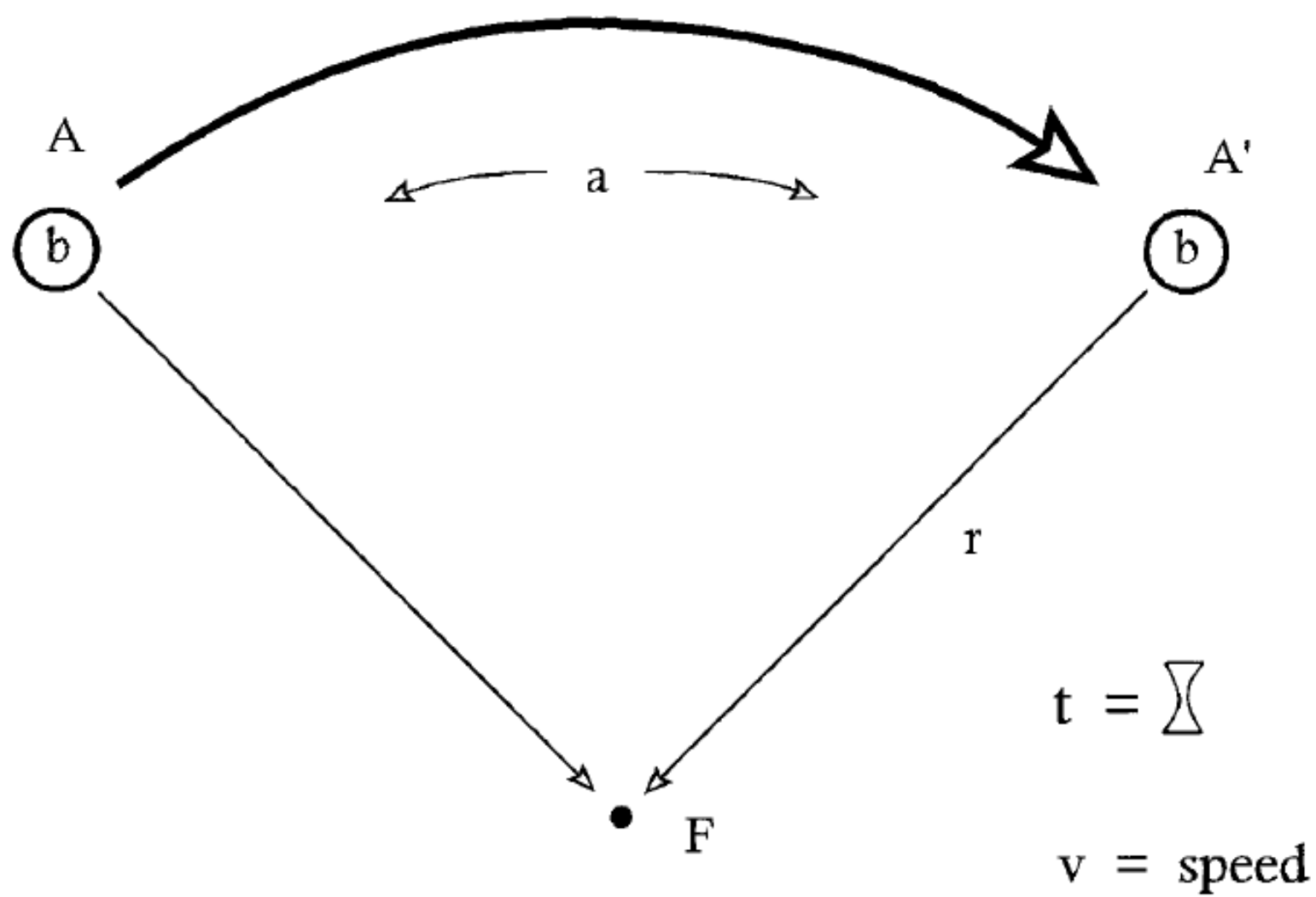
# Newton- University to Government

- Moved in 1696 to London as Chief Warden Mint
- Becomes President of Royal Society in 1703
- Scientific method
- Calculus- controversy with Leibniz



# Principia, 1687

- Book I- Motion of bodies in Free Space
- Book II- Mathematical treatise on Hydrostatic and Hydrodynamics
- Book III- System of the World
- Second edition, 1713 God as Great Clock Maker



# Optiks 1704- Natural Philosophy to Theology

- Proof by experiment- color a physical property of light
- Seven colors of rainbow correspond to seven notes of music
- Particle theory of light- Hooke's disagreement
- Series of queries- method of science, electricity, magnetism, cause of gravity, ethical conduct of human etc.

# Pre Industrial revolution

- Classical, Occult, New Science or Mechanical- experimental
- Experiments were reported unlike occult science
- New Science- atomism, mechanical features rather than theism for example Descartes idea of spirit
- Practice mostly devoid of science

# Science and Industrial Revolution

- Classical science- Astronomy, Mathematics, Mechanics and Optics
- Newton and French revolution, spread through Leibniz and Frederick
- Baconian Science- Systematic study of electricity, magnetism and heat, Botany, Meteorology, Natural History, Geology, Chemistry
- Experiments, Instruments, loosely theoretical

# Industrial revolution: Key changes

- Demographic changes- During 1450-1800 population of Europe increased from 2 to 9 million
- Capital economic system-pressure on land, innovation, production, mass migration, division of labor, family roles
- Agricultural practices, Public land under cultivation- Norfolk
- Mechanization of Textile industry- During 1766-87, cotton output increased five times

# Iron production

- Abrahm Darby 1709- Coke in place of charcoal for iron smelting
- Puddling process 1784 Henry Cort- Pig to wrought by stirring the melt
- Iron production went up ten times in eighteenth century
- Mining – Pumping through animal and fire engine

# Steam Engine

- Steam engine- Thomas Savery 1698, Thomas Newcomen and John Cawley 1712, 5HP
- John Smeaton- who also coined the term civil engineering
- James Watt- separate vessel for condensation
- Locomotive- Richard Trevithick, 1800



# Industrial revolution- constituent factors

- New Energy sources- Renewable to coal and later Oil
- Organization of labor- For example Richard Arkwright's factory in 1789
- New means of financing industrial development- Interest rate fell to 3 percent in 1757, London Stock Exchange in 1773
- Ideological changes – Mercantile trade to free market, Adam Smith's Wealth of Nation in 1776

# Nineteenth century Britain

- Worker productivity doubled between 1830-1850
- Iron production went up from 7lakh tons in 1830 to 4 million in 1860
- Coal production from 24 million tons in 1830 to 110 million in 1870
- Urban population crossed 50 percent by 1850

# Discovery of Oxygen

- Phlogiston theory of combustion and corrosion- all combustible material have two parts phlogiston that was given off during burning while dephlogisticated material or calx is its true form
- Carl Wilhelm Scheele in 1773 (fire air) and Joseph Priestly in 1774 which he termed dephlogisticated air
- It was named Oxygen by Lavoisier in 1777 from vital air
- Scheele wrote a letter to Lavoisier in 1774 which he never admitted

# Electricity

- Newton's assistant 1720- Conductor and Non Conductor properties of electricity called electric and non-electric
- Dufay in France- Two kind of electricity, vitreous and resinous corresponding to glass and amber
- von Kleist 1745 (Musschenbroek) electric fluid in bottle- Leyden Jar
- Franklin showed that there are not two but one kind of electric which have positive and negative charge, lightning conductor 1753

# Science and Application

- Watt and Smeaton became members of Royal Society
- Notion of science- Watt and CL Berthollet's chlorine process in 1780
- Thomas Telford's design for Thames Bridge in early 19<sup>th</sup> century
- Mid Nineteenth century, John Rankine- Manual of Applied Mechanics

# Engineering

- In mid nineteenth century, engineers were artisans, instrument makers, mechanic, mining engineer etc.
- Engineering school in Paris, Germany's Siemens, Otto, Diesel etc.
- Internal combustion engine, steam turbine
- Mechanical engineering- steam hammer

# Scientific Institutions

- Ecole Poly technique France 1794
- Austrian polytechnique, Vienna
- Royal Institution of England 1799
- Humboldt University Berlin 1810

# Development of Engineering Science

- WJM Rankine served at Glasgow University 1855-72 as Professor civil engineering and mechanics
- F Redtenbacher- GTH Karlsruhe, Germany
- Robert Henry Thurston- Stevens Institute of Technology and Cornell, ME Curriculum and Lab in US
- Industry based science (1850-1925)- DuPont, Kodak, Siemens, Bell ..



# No. of Verses in the Vedic Book

- Rig-Veda- 10522
- Yajurveda- 1984
- Samveda- 1875
- Atharvaveda- 5977

# The Vedas-1700-500 BCE

- Samithas or collection- Mantras and benediction
- Aranyakas- Tests on rituals, ceremonies, sacrifices
- Brahmanas- commentaries on rituals and sacrifices
- Upanishad-meditation, philosophy

# Post Vedic Literature

- Vedangas
- Upaveda
- Purana
- Fifth and other Vedas

# Vedangas

- Kalpa- performance of rituals with basis in mathematics, geometry and calendrics
- Shiksha - phonetics
- Chhandas- Metrical structure
- Nirukta- etymology
- Vyakarana- Grammar
- Jyotisha- astronomical and other cyclical phenomena

# Vedic literature

- Sarasvati (Indus) script part of Indo Aryan and Dravidian languages - Translation errors arising due to conception
- Reference to Sarasvati river which believed to have become dry around 1900 BCE- Rig Veda in third millennium BCE
- Inner planets in correspondence with outer ones
- Gestation period and sacredness

# Vedic worldview

- Knowledge- Lower or dual and higher or unified
- Complementarity: Nyaya (Logic) and Vaisheshika (Physics); Sankhya (Cosmology) and Yoga (Psychology)
- Chariot drawn by horses or senses- Mind is the driver and self as the true observer
- Universe goes through cyclone of creation and destruction

# Self represented in five levels

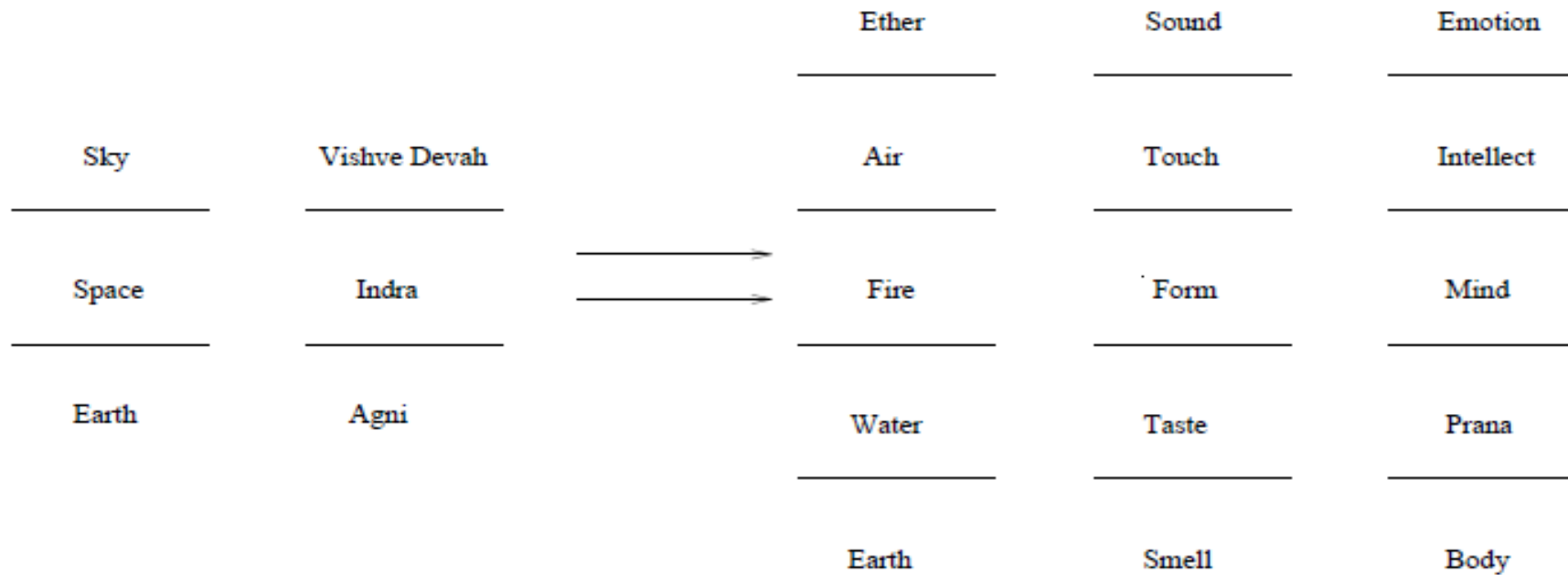
- Physical body or Anamaya Kosha
- Energy sheaths or Pranamaya Kosha
- Mental sheaths or manomaya koshas
- Intellect Sheaths or Vijanamaya Kosha and Emotion sheaths or anandamaya koshas

# Structure of Mind

- Manas- Lower mind which collects impression
- Ahankara- I'ness and Buddhi- Intellect (Together the internal instrument of Mind)
- Chitta- memory bank
- Atman- Self or Brahman or Jiva



# Vedic cosmology (Kak, 2005)



# Vedic planetary model (Kak 2005)

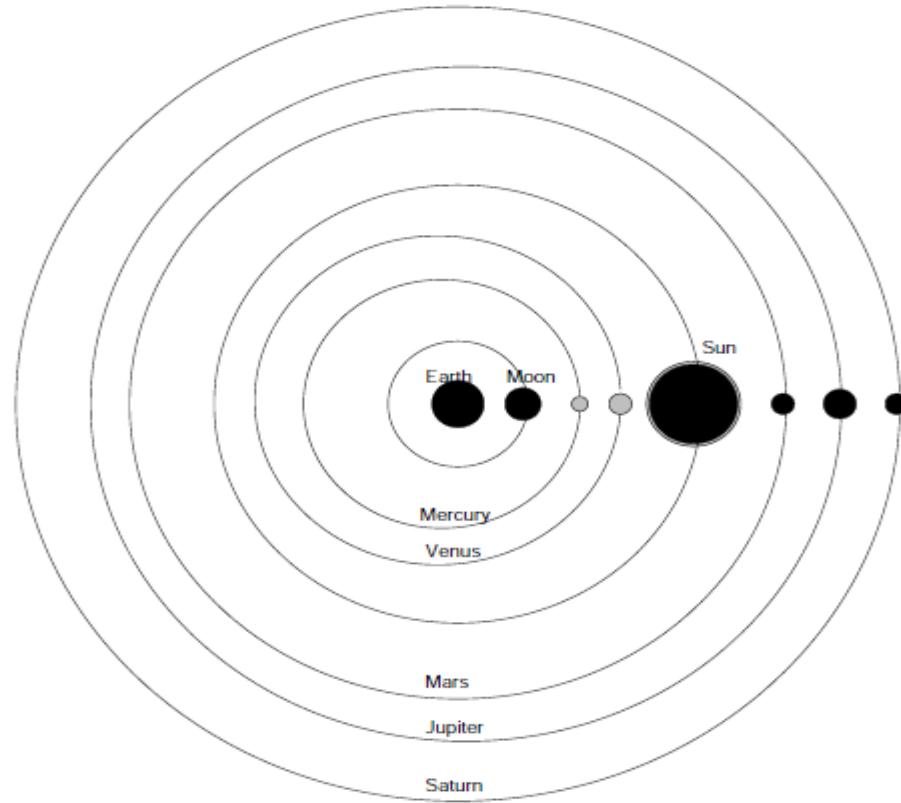


Figure 2: The Vedic planetary model

# Astronomy- Nakhatra Vidya

- Calculator (ganaka) and Star Gazer (nakshatra darsha). Time taken to reach the starting point- Yuga, Kaliyuga- 432,000 years commenced from Feb. 18 3,102 BCE
- Planet or Graha- Mars, Mercury, Jupiter, Venus, Saturn, Sun, Moon
- Eclipses were explained through religious perspective
- Instruments- Gnomon (sariku) and yantra

# Ancient Science

- Panini fifth-sixth century BCE-4000 or finite number of rules for whole of grammar
- Error correction and detection- Forms of Chanting
- Tantra represents structure of the consciousness
- Concept of Infinity, void

# Gestation period of mammals

|                |          |
|----------------|----------|
| ass            | 365 days |
| baboon, sacred | 183 days |
| cat            | 63 days  |
| cow            | 280 days |
| dog            | 61 days  |
| elephant       | 645 days |
| goat           | 151 days |
| horse          | 337 days |
| human          | 267 days |
| rabbit         | 31 days  |
| sheep          | 148 days |

# Vedic Mathematics

- Sulabhsutras, Baudhayana Sutras- Pythagoreans theorem
- Numerals from Brahmi script for example fish for zero- Binary numbers by 1<sup>st</sup> CE from Pingala's Chhandhashutra
- Circumference of paridhih or Earth- 4967 yojanas
- Fire altar, Chariot- dividing the area and angle into equal part, Use of pi for area of circle, Big numbers

# Astrology

- Vedanga Jyotisha- 1200 BCE
- Suryasidhanta- 200 BCE
- Twelve signs are equal to 27 nakshatras or 1 sign is 2.25 constellation
- Samhita, Siddhanta or Ganita, Jataka or native, Prasna and Sakuna

# Ancient science

- Speed of light- Rig Veda- 2002 yojana in half a nimesha (yojana-13.6 km and nimesha-  $16/75^{\text{th}}$  second, it becomes close up to 6% speed of light)
- Scientific Imagination
- Concept of evolution, Dasavatara
- Embryo transfer and division, airtight suits



# Modernity: different ways of understanding

- A period: Fifteenth and Sixteenth Century Enlightenment project
- Philosophical idea
- Form of society
- As an experience

# Philosophical Idea

- Reason- to explain the world, Kante
- It does not look at past for legitimacy and justification: Habermas
- Science- Objective and Universal, Rationalization and Reflexivity
- Progress: Emancipation, removal of poverty

# As form of Society- Institutional

- Economic – Increasing mechanization, Inanimate sources of power, Industrial production, Urbanization, Free market and capitalism etc.
- Political- Decentralization, democratization, greater participation in decision making, bureaucracy, public welfare policies etc.
- Social- Particularism to universalism, ascription to achievement, collective orientation to self orientation, functional diffuseness to functional specificity
- Market, Money and Bureaucratization

# Modernity as a form of Experience

- Social-psychological aspect of modernity
- On one hand it promises: progress, advancement, removal of ignorance, joy, power etc.
- On the other hand, it brings in: uncertainty, risk and confusion
- Marshal Berman: A unity in disunity, perpetual disintegration and renewal of struggle and contradiction

# Forms of Engagement

- In what ways, societies engage with modernity:
- Celebration of modernity
- Rejection and negation
- Creative negotiation with modernity

# Modernity

- Celebration of Modernity- Neo Colonialism; Globalization a logical extension of modernity
- Critical theory or Frankfurt School- Jürgen Habermas' Instrumental rationality, Reason for domination
- H. Marcuse of Frankfurt school- Consumer culture, false needs
- High or Late Modernity and Post Modernism

# Post Modern Condition- Lyotard

- Jean Francois Lyotard- *Post Modern Condition* 1984
- The idea of pure and true knowledge is itself a myth
- Scientific knowledge are justified in the name of progress
- Uncertainty, fragmentation, emergence etc.

# Emile Durkheim

- Mechanical solidarity to organic solidarity
- Collective conscience to individual
- Anomie- breakdown of moral order
- Moral community



# Modernity- Weber

- Max Weber- Capitalism demanded profit leading to rationalization so that result could be calculated and efficiency increased
- Rationalization- It has led to progress of reason and freedom and same time led to bureaucratization constraining human potential
- Feudal system operated through traditional leadership while modern society through rational legal system for example democracy
- Rationalization or the process of replacing old values and traditions with thoughts and actions which appear to be more rational

# A Giddens- High or Late Modernity

- Post modernity is due to the scope modernity provides
- Industrialism, Capitalism, Surveillance and nation state
- Separation of time and space, disembedding of social life , reflexive appropriation of knowledge- Disembedding mechanism for example, money, expert system
- Risk society- Reflexivity will not allow foundationalism

# Jürgen Habermas- Communicative rationality

- Representational culture of 17<sup>th</sup> century was superseded by the emergence of Public sphere for example, newspaper, journal, coffee house etc.
- Colonization of life world by amalgamation of corporate and state, technology and science- Commercial mass media has turned it passive
- Enlightenment is an unfinished project- There is possibility and scope of correction
- Communicative rationality- to transmit and renew cultural knowledge in a process of achieving mutual understanding, social rationality

# Alain Touraine- Modernity

- Social movement- Terrain in which Reason and Subject come together
- Modernity created dualism between reason and subject, privileging the former over the other
- Reason is reified and elevated while subject relegated
- Without reason, subject is trapped into an obsession of identity- without subject reason becomes instrument of might