22295: Democracy, Election and Governance

Unit I	Democracy- Foundation and Dimensions	(08 Hrs)
a. Constitution of India b. Evolution of Democracy- Different Models c. Dimensions of Democracy- Social, Economic, and Political		
Unit II	**Decentralization**	**(08 Hrs)**
a. Indian tradition of decentralization b. History of panchayat Raj institution in the lost independence period c. 73rd and 74th amendments d. Challenges of caste, gender, class, democracy and ethnicity		
Unit III	**Governance**	**(08 Hrs)**
a. Meaning and concepts b. Government and governance c. Inclusion and exclusion		

6. Text Books

Text Books:

1. Banerjee-Dube, I. (2014). A history of modern India. Cambridge University Press.
2. Basu, D. D. (1982). Introduction to the Constitution of India. Prentice Hall of India.
3. Bhargava, R. (2008). Political theory: An introduction. Pearson Education India.

Reference Books:

4. Bhargava, R., Vanaik, A. (2010) Understanding Contemporary India: Critical Perspective. New Delhi: Orient Blackswan.
5. Chandhoke. N., Proyadardhi.P, (ed) (2009), 'Contemporary India: Economy, Society, Politics', Pearson India Education Services Pvt. Ltd, ISBN 978-81-317-1929-9.
6. Chandra, B. (1999). Essays on contemporary India. Har-Anand Publications.
7. Chaterjee, P. (1997). State and Politics in India.
8. Dasgupta. S., (ed) (2011), 'Political Sociology', Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in south Asia. ISBN: 978-317-6027-7.
9. Deshpande, S. (2003). Contemporary India: A Sociological View, New

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Delhi:Viking Publication.
10.Guha, R. (2007). India After Gandhi: The History of the World's Largest. Democracy, HarperCollins Publishers, New York.
11.Guha, R. (2013). Gandhi before India. Penguin UK.
12.Jayal. N.G. (2001). Democracy in India.New Delhi: Oxford University Press.
13.Kohli, A. (1990). Democracy and discontent: India's growing crisis of governability. Cambridge University Press.
14.Kohli, A., Breman, J., & Hawthorn, G. P. (Eds.). (2001). The success of India's democracy (Vol. 6). Cambridge University Press.
15.Kothari, R. (1989). State against democracy: In search of humane governance. Apex Pr.
16.Kothari, R. (1970). Politics in India. New Delhi: Orient Blackswan.
17.Kothari, R. (1995). Caste in Indian politics. Orient Blackswan.
18. Sarkar, S. (2001). Indian democracy: the historical inheritance. the Success of India's Democracy, 23-46.

TH:02 Hrs./week	101007: Environmental Studies-I (Mandatory Non-Credit Course)

Course Objectives:

1. To explain the concepts and strategies related to sustainable development and various components of environment.
2. To examine biotic and abiotic factors within an ecosystem, to identify food chains, webs, as well as energy flow and relationships.
3. To identify and analyze various conservation methods and their effectiveness in relation to renewable and nonrenewable natural resources.
4. To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity on national and local scale.

Course Outcomes: On completion of the course, learner will be able to–

CO1:Demonstrate an integrative approach to environmental issues with a focus on sustainability.

CO2: Explain and identify the role of the organism in energy transfers in different ecosystems.

CO3: Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources.

CO4: Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings.

Course Contents

Unit I **Introduction to environmental studies** **(02 Hrs)**

Multidisciplinary nature of environmental studies; components of environment – atmosphere, hydrosphere, lithosphere and biosphere. Scope and importance; Concept of sustainability and sustainable development.

Unit II **Ecosystems** **(06 Hrs)**

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems:

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit III **Natural Resources: Renewable and Non-renewable Resources** **(08 Hrs)**

Land Resources and land use change; Land degradation, soil erosion and desertification.
Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
Water: Use and over-exploitation of surface and ground water, floods droughts, conflicts over water (international & inter-state).
Heating of earth and circulation of air; air mass formation and precipitation.
Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit IV **Biodiversity and Conservation** **(08 Hrs)**

Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity; In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Suggested Readings:

1. Carson, R. 2002. Silent spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson,B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principals of Conservation Biology.
   Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339:36-37.
7. McCully, P.1996. Rivers no more: the environmental effects of dams (pp.29-64). Zed Books.
8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

101014: Environmental Studies-II

TH: 02 Hr/week **Mandatory Non-Credit Course**

Course Objectives:

1. To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control.
2. To understand the evolution of environmental policies and laws.
3. To explain the concepts behind the interrelations between environment and the development.
4. To examine a range of environmental issues in the field, and relate those to scientific theory.

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Course Outcomes: On completion of the course, learner will be able to–

CO1: Have an understanding of environmental pollution and the science behind those problems and potential solutions.

CO2: Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.

CO3: Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.

CO4: Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.

Course Contents

Unit V **Environmental Pollution** **(08 Hrs)**

Environmental pollution : types, causes, effects and controls; Air, water, soil, chemical and noise pollution

Nuclear hazards and human health risks

Solid waste management: Control measures of urban and industrial waste

Pollution case studies.

Unit VI **Environmental Pollution** **(07 Hrs)**

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities& agriculture.Environment Laws : Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto Protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC).Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context

Unit VII **Human Communities and the Environment** **(06 Hrs)**

Human population and growth; Impacts on environment, human health and welfares.
Carbon foot-print. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods earthquakes, cyclones and landslides. Environmental movements: Chipko, Silent valley, Bishnios of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Unit VIII **Field work** **(05 Hrs)**

- Visit to an area to document environmental assets; river/forest/flora/fauna, etc.
- Visit to a local polluted site – Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river Delhi Ridge, etc

Suggested Readings:

1. Carson, R. 2002. Silent spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson,B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll. Principals of Conservation Biology, Sunderland: Sinauer Associates, 2006
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339:36-37.
7. McCully, P.1996. Rivers no more: the environmental effects of dams (pp.29-64). Zed Books.
8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

103004: Basic Electrical Engineering		
Teaching Scheme: **TH : 03 Hr/week** **PR : 02 Hr/Week**	**Credits** **04**	**Examination Scheme:** **In-Semester : 30 Marks** **End-Semester : 70 Marks** **PR : 25 Marks**

Prerequisite Courses, if any: Engineering physics, electron theory, electricity, potential and kinetic energy

Course Overview: This course aims at enabling students of all Engineering Branches to understand the basic concepts of electrical engineering. This course is designed to provide knowledge of fundamentals and various laws in electromagnetic and magnetic circuits, electrostatics. The steady state analysis of AC and DC circuits, and its applications transformer, batteries and different energy conversion techniques are also included in this course.

Course Objectives:

1. To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2. To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3. To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4. To provide knowledge of the concepts of transformer, different energy conversions techniques.

Course Outcomes:

At the end of course students will be able to

CO1: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.

CO2: Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic

CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.

CO4: Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions

CO5: Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.

CO6: Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.

Course Contents

Unit I **Electromagnetism:** **(6Hrs)**

Review: resistance, emf, current, potential, potential difference and Ohm's law

Electromagnetism: Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule, nature of magnetic field of long straight conductor, solenoid and toroid. Concept of mmf, flux, flux density, reluctance, permeability and field strength, their units and relationships. Simple series magnetic circuit, Introduction to parallel magnetic circuit(Only theoretical treatment), comparison of electric and magnetic circuit, force on current carrying conductor placed in magnetic field, Fleming's left hand rule. Faradays laws of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced e.m.f., self and mutual inductance, coefficient of couplings. Energy stored in magnetic field.

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Unit II **Electrostatics and AC Fundamentals** **(6 Hrs)**

A) **Electrostatics:** Electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance. Capacitor, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors (no derivation) and time constant. **(2Hrs)**

B) **AC Fundamentals:** Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, Period, frequency, instantaneous, peak(maximum), average and r.m.s. values, peak factor and form factor. Phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasor. **(4Hrs)**

Unit III **Single Phase AC Circuits** **(06 Hrs)**

Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, series R-L, R-C and R-L-C circuits, phasor diagrams, voltage, current and power waveforms, resonance in series RLC circuits, concept of impedance, concept of active, reactive, apparent, complex power and power factor, Parallel AC circuits (No numericals), concept of admittance

Unit IV **Polyphase A.C. Circuits and Single phase Transformers** **(06 Hrs)**

A) **Polyphase A.C. Circuits:** Concept of three-phase supply and phase sequence. Balanced and unbalanced load, Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams. **(3Hrs)**

B) **Single phase transformers:** principle of working, construction and types, emf equation, voltage and current ratios. Losses, definition of regulation and efficiency, determination of these by direct loading method. Descriptive treatment of autotransformers. **(3Hrs)**

Unit V **DC Circuits:** **(06 Hrs)**

Classification of electrical networks, Energy sources – ideal and practical voltage and current sources, Simplifications of networks using series and parallel combinations and star-delta conversions, Kirchhoff's laws and their applications for network solutions using loop analysis, Superposition theorem, Thevenin's theorem.

Unit VI **Work, Power, Energy and Batteries** **(06 Hrs)**

A) **Work, Power, Energy:** Effect of temperature on resistance, resistance temperature coefficient, insulation resistance, conversion of energy from one form to another in electrical, mechanical and thermal systems. **(4Hrs)**

B) **Batteries :**Different types of batteries (Lead Acid and Lithium Ion), construction, working principle, applications, ratings, charging and discharging, concept of depth of charging, maintenance of batteries, series -parallel connection of batteries **(2Hrs)**

Books & Other Resources:

Text Books:

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989
2. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication
3. V.K. Mehta, RohitMehata Basic Electrical Engineering, S Chand Publications
4. B.L. Theraja, A text book on electrical technology Vol-I

Reference Books:

1. H Cotton, Electrical technology, CBS Publications
2. L. S. Bobrow, —Fundamentals of Electrical Engineeringl, Oxford University Press, 2011.
3. E. Hughes, —Electrical and Electronics Technologyl, Pearson, 2010.
4. D. C. Kulshreshtha, —Basic Electrical Engineeringl, McGraw Hill, 2009.

Guidelines for Instructor's Manual

The Instructor's Manual should contain following related to every experiment –

- Brief theory related to the experiment
- Apparatus with their detailed specifications.

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- Connection diagram /circuit diagram.
- Observation table/ simulation waveforms.
- Sample calculations for one/two reading.
- Result table.
- Graph and Conclusions.
- Few questions related to the experiment.
- Relevance of practical in real life /industry

Guidelines for Student's Lab Journal

The Student's Lab Journal should contain following related to every experiment –

- Theory related to the experiment.
- Apparatus with their detailed specifications.
- Connection diagram /circuit diagram.
- Observation table/ simulation waveforms.
- Sample calculations for one/two reading.
- Result table.
- Graph and Conclusions.
- Few short questions related to the experiment.

Guidelines for Lab /TW Assessment

- There should be continuous assessment for the TW.
- Assessment must be based on understanding of theory, attentiveness during practical, understanding .
- Session, how efficiently the student is able to do connections and get the results.
- Timely submission of journal.

Suggested List of Laboratory Experiments/Assignments

Group A

Following **eight** practical are compulsory

1. To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, real life resistors, inductors and capacitors
2. To calculate and measure of charging and discharging of capacitor and observe the response on storage oscilloscope.
3. To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and current waveforms on storage oscilloscope.
4. To derive resonance frequency and analyze resonance in series RLC circuit.
5. To verify the relation between phase and line quantities in three phase balanced star delta connections of load.
6. To determine efficiency and regulation of transformer by direct loading test of a single phase transformer.
7. To verify KVL and Superposition theorem.
8. To verify Thevenin's theorem in a DC network

Group B

From following **minimum two** practical are compulsory

1. To measure insulation resistance of electrical equipment's/cable using Megger
2. To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, ELCB.
3. To measure of earth resistance at substation earthing using fall of potential method with IS 3043 standard.
4. To study of LT and HT electricity bills.

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107009: Engineering Chemistry		
Teaching Scheme: **TH : 04 Hrs/week** **PR : 02 Hrs/Week**	**Credits** **05**	**Examination Scheme:** **In Semester : 30 Marks** **End Semester: 70 Marks** **PR : 25 Marks**

Prerequisite Courses, if any:
Types of titrations, volumetric analysis, structure property relationship, types of crystals, periodic table, classification and properties of polymers, electromagnetic radiation, electrochemical series

Companion Course, if any: Laboratory Practical

Course Objectives:
1. To understand technology involved in analysis and improving quality of water as commodity.
2. To acquire the knowledge of electro-analytical techniques that facilitates rapid and precise understanding of materials.
3. To understand structure, properties and applications of speciality polymers and nano material.
4. To study conventional and alternative fuels with respect to their properties and applications.
5. To study spectroscopic techniques for chemical analysis.
6. To understand corrosion mechanisms and preventive methods for corrosion control.

Course Outcomes:
On completion of the course, learner will be able to–
CO1: Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
CO2: Select appropriate electro-technique and method of material analysis.
CO3: Demonstrate the knowledge of advanced engineering materials for various engineering applications.
CO4: Analyze fuel and suggest use of alternative fuels.
CO5: Identify chemical compounds based on their structure.
CO6: Explain causes of corrosion and methods for minimizing corrosion.

Course Contents

Unit I **Water Technology** **(08Hrs)**

Impurities in water, hardness of water: Types, Units and Numericals. Determination of hardness (by EDTA method using molarity concept) and alkalinity, numericals. Ill effects of hard water in boiler - priming and foaming, boiler corrosion, caustic embrittlement, scale and sludge.
Water treatment: i) Zeolite method and numericalsii) Demineralization method. Purification of water: Reverse osmosis and Electrodialysis.

Unit II **Instrumental Methods of Analysis** **(08Hrs)**

Introduction: Types of reference electrode (calomel electrode), indicator electrode (glass electrode), ion selective electrode: ion selective membranes such as solid membrane, enzyme based membrane and gas sensing membrane.
[A] Conductometry: Introduction, conductivity cell, conductometric titrations of acid versus base with titration curve.
[B] pHmetry: Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base with titration curve.

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Unit III **Engineering Materials** **(08Hrs)**

A] Speciality polymers: Introduction, preparation, properties and applications of the following polymers:

1. Engineering Thermoplastic: Polycarbonate,
2. Bio-degradable polymers: Poly (hydroxybutyrate-hydroxyvalanate),
3. Conducting Polymer: Polyacetylene,
4. Electroluminescent polymer: Polyphenylenevinylene,
5. Polymer composites: Fiber reinforced plastic (FRP)- Glass reinforced and Carbon reinforced polymer composite

[B] Nanomaterials: Introduction, classification of nanomaterials based on dimensions (zero dimensional, one-dimensional, two-dimensional and three-dimensional), structure, properties and applications of graphene and carbon nanotubes, quantum dots (semiconductor nanoparticles).

Unit IV **Fuels** **(08Hrs)**

Introduction (definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel),

Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV), Determination of Calorific value: Principle, construction and working of Bomb calorimeter and Boy's gas calorimeter and numericals,

Solid fuel: Coal: Analysis of Coal-Proximate and Ultimate analysis, numericals,

Liquid fuel: Petroleum: Refining of petroleum /crude oil and composition, boiling range and uses of various fractions,

Gaseous fuel: Composition, properties and applications of CNG. Hydrogen gas as a future fuel

Alternative fuels: Power alcohol and biodiesel.

Unit V **Spectroscopic Techniques** **(08Hrs)**

[A]UV-Visible Spectroscopy:

Introduction, interaction of electromagnetic radiation with matter, statement of Beer's law and Lambert's law, absorption of UV radiation by organic molecule leading to different electronic transitions, terms involved in UV-visible Spectroscopy- chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic shift and hypochromic shift, Instrumentation and basic principle of single beam spectrophotometer, applications of UV-visible spectroscopy.

[B] Infra red Spectroscopy:

Introduction, Principle of IR Spectroscopy, types of vibrations: Stretching (symmetric and asymmetric) and bending (scissoring, rocking, wagging and twisting), conditions of absorption of IR radiations, vibration of diatomic and polyatomic molecules. Instrumentation with block diagram. Parts of IR spectrum, fundamental group region, fingerprint region, applications of IR spectroscopy.

Unit VI **Corrosion Science** **(08Hrs)**

Introduction, Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films and Pilling-Bedworth's rule, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, galvanic cell corrosion, concentration cell corrosion, Factors influencing rate of corrosion. Methods of corrosion control and prevention: cathodic and anodic protection, metallic coatings and its types, surface preparation, methods to apply metallic coatings-hot dipping, cladding, electroplating, cementation.

Books & Other Resources:

Text Books:

1. Engineering Chemistry by O .G. Palanna, Tata Magraw Hill Education Pvt. Ltd.
2. Textbook of Engineering Chemistry by Dr. S. S. Dara, Dr. S. S. Umare, S. Chand & Company Ltd.
3. Textbook of Engineering Chemistry by Dr. Sunita Rattan, S. K. Kataria& Sons Publisher

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Reference Books:

1. Engineering Chemistry, Wiley India Pvt. Ltd.
2. Inorganic Chemistry, 5 ed by Shriver and Atkins, Oxford University Press
3. Basic Concept of Analytical Chemistry, 2ed , S. M. Khopkar, New Age-International Publisher
4. Instrumental Methods of Chemical Analysis, G. R. Chatwal& S. K. Anand, Himalaya Publishing House
5. Spectroscopy of organic compounds, 2 ed, P. S. Kalsi, New Age-International Ltd., Publisher
6. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadevSreedhar, Wiley Eastern Limited

1. To determine hardness of water by EDTA method
2. To determine alkalinity of water
3. To determine strength of strong acid using pH meter
4. To determine maximum wavelength of absorption of $CuSO_4$/$FeSO_4$/ $KMnO_4$, verify Beer's law and find unknown concentration of given sample.
5. Titration of a mixture of weak acid and strong base using conductometer
6. Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin
7. To determine molecular weight/radius of macromolecule polystyrene/ polyvinyl alcohol by viscosity measurement.
8. Proximate analysis of coal.
9. To coat copper and zinc on iron plate using electroplating.
10. Preparation of biodiesel from oil.
11. Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles

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