

New Course

SCHA3011	GREEN TECHNOLOGY	L	T	P	C	Max. Marks
		3	0	0	3	100

COURSE OBJECTIVE:

- To demonstrate the achievement of efficient and economically viable chemical production without being hazardous to human health and environment

UNIT 1: INTRODUCTION**9 Hours**

Fundamentals of Green Technology, need, goal and limitations of Green technology, sustainable development, twelve principles of Green technology.

UNIT 2: GREEN CHEMISTRY**9 Hours**

Green chemistry metrics (atom economy, atom efficiency, E-factor), Green synthesis like photochemical, microwave, sonochemistry and electrochemistry, green reagents, green catalysts, solvent free reactions, toxicity reactions.

UNIT 3 GREEN PROCESSES**9Hours**

Renewable energy technologies like solar, wind, hydropower, geothermal and biomass energy, phytoremediation, eco-restoration, issues and challenges.

UNIT4 GREENER NANOSYNTHESIS AND GREEN NANOMATERIALS**9 Hours**

Greener Synthetic methods for metal and semiconductor and inorganic oxide, functionalized metal nanoparticles. Green materials, -biomaterials, biopolymers, bioplastics, composites, Sensors, Biomimetic Sensors, Smart nanomaterials.

UNIT 5 GREEN NANOMATERIALS FOR ALTERNATIVE ENERGY/REMEDIATION**9 Hours**

Nanomaterials for fuel cells and hydrogen generation and storage. Nanostructures for efficient solar hydrogen production, solar thermal Energy and Photovoltaic. Nanomaterials -Remediation: Nano membranes, Nanofibers, Nano Adsorbents, Nano Catalysts, Nano-sensors.

Max.45 Hours**COURSE OUTCOMES:**

- CO1. Understand the principles of green chemistry and technology
 CO2. Outline to Concepts of Greener Nano synthesis and
 CO3. Apply the Green Nanomaterials to show relevance to green chemistry and technology
 CO4. To familiarize with the synthesis of nanomaterials
 CO5. To understand the application of green nanomaterials for alternative energy
 CO6. Identification, design and evaluation of remediation issues using green nanomaterials

TEXT / REFERENCE BOOKS

1. Mike Lancaster, Green Chemistry: An introductory Text, RSC Publishing V. K. Ahluwalia, Green Chemistry: Environmentally Benign Reactions, Ane Books India, New Delhi, 2006.
2. Jay Warmke, Annie Warmke, Green Technology, Educational Technologies Group, 2009.
3. David. T, Allen and David R. Shonnard, "Green engineering" Prentice Hall NJ, 2002
4. James clark, "Green chemistry" Blackwell publishing, 2008.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max Marks: 100

Part A: 10 questions of 2 marks each - No choice

Part B: 2 questions from each unit of internal choice; each carrying 16 marks

Examination duration: 3 Hours

20 Marks

80 Marks

New Course

SCHA3012	SMART MATERIALS FOR INDUSTRIES	L	T	P	C	Max. Marks
		3	0	0	3	100

COURSE OBJECTIVE:

- To acquire basic understanding of advanced materials, their functions and properties for technological applications and emphasize the significance of materials selection in the design process

Unit I INTRODUCTION TO SMART MATERIALS**9 HOURS**

Smart materials and structures- System intelligence- components and classification of smart structures, common smart materials and associated stimulus-response, Application areas of smart systems Ferroelectric materials: Piezoelectric materials- piezoelectric effect, Direct and converse, parameter definitions, Piezoceramics, Piezopolymers, Piezoelectric materials as sensors, Actuators and bimorphs

Unit II SHAPE MEMORY ALLOYS**9 HOURS**

Shape memory alloys (SMAs), Shape memory effect, Martensitic transformation, One way and two-way SME, training of SMAs, binary and ternary alloy systems, Functional properties of SMAs. Characterization tests for smart materials: Principles, instrumentation and applications of: Ion beam techniques- Surface mass spectrometry, LEIS, ISS; Mass spectrometry.

Unit III CHROMIC MATERIALS**9 HOURS**

Thermochromism, Photochromism, Electrochromism, Halochromism, Solvatochromism- principle and design strategies and applications in industries. Introduction to synchrotron radiation and its applications in materials science; Vibrational spectroscopy of surfaces based on colour change.

Unit IV POLYMERIC MATERIALS**9 HOURS**

Thermally responsive polymers, Electroactive polymers microgels, Synthesis, Properties and Applications, Protein-based smart polymers, pH-responsive and photo-responsive polymers, Self-assembly, Molecular imprinting using smart polymers, Approaches to molecular imprinting, Drug delivery using smart polymers

Unit V SENSORS AND SMART HYDROGELS**9 HOURS**

Elastic memory composites, Smart corrosion protection coatings, Self-healing materials, Sensors, Actuators, Transducers, MEMS, Deployment devices, Molecular machines, Smart hydrogels- synthesis, properties and application in industries.

COURSE OUTCOMES:

- CO1. Describe the basic features of smart materials.
 CO2. Illustrate the characteristics of shape memory alloys
 CO3. Obtain a knowledge on chromic materials
 CO4. An understanding of knowledge about Polymeric materials
 CO5. Demonstrate the usage of sensors and smart hydrogels
 CO6. Students will familiarize with various materials in industries.

TEXT / REFERENCE BOOKS

- D.J. Leo, Engineering Analysis of Smart Material Systems, Wiley 2007.
- M. Addington, D.L. Schodek, Smart Materials and New Technologies in Architecture, Elsevier 2005.
- M. Schwartz, New Materials, Processes, and Methods Technology, CRC Press, 2006.
- Galaev, B. Mattiasson (Eds.), Smart Polymers: Applications in Biotechnology and Biomedicine, 2nd ed., CRC Press, 2008.
- N. Yui, R. J. Mrsny, K. Park (Eds.), Reflexive Polymers and Hydrogels: Understanding and Designing Fast Responsive Polymeric Systems, CRC Press, 2004.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max Marks: 100

Part A: 10 questions of 2 marks each - No choice

Part B: 2 questions from each unit of internal choice; each carrying 16 marks

Examination duration: 3 Hours

20 Marks

80 Marks

New Course

SCHA1403	COMPUTATIONAL FLUID DYNAMICS	L	T	P	C	Max. Marks
		3	0	0	3	100

COURSE OBJECTIVE: To understand the flow, temperature field in engineering problems and diffusion in mass transfer operations. Students can develop a Computational Fluid Dynamics code to solve chemical engineering problems

UNIT 1: OVERVIEW OF CFD AND CONSERVATION LAWS**9 hours**

Role of CFD, Problem solving in CFD, Components of CFD Software, Governing Equations of Fluid flow and Heat Transfer, Mass conservation, Momentum and Energy equation, Differential and Integral forms, Conservation and non-conservation form.

UNIT 2: TURBULENCE AND ITS MODELLING**9 hours**

Transition from Laminar to Turbulent flow, Effect of turbulence on time-averaged Navier-Stokes equations, Characteristics of simple turbulent flows, Free turbulent flows, Flat plate boundary layer and pipe flow, Turbulence models, Mixing length model, Reynolds stress equation models.

UNIT 3: FINITE VOLUME METHOD**9 hours**

Introduction, One dimensional steady state diffusion, Two-dimensional diffusion problems, Discretised equations for diffusion problems, One-dimensional unsteady state heat conduction, Discretisation of transient convection-diffusion equation, Solution procedures for unsteady flow calculations, Implementation of Inlet, outlet and wall boundary conditions, Constant pressure boundary condition.

UNIT 4: CFD METHODS**9 hours**

CFD Methods for the Euler Equation- Linearization and Jacobian Matrix ,Eigen values and Eigenvectors, Flux Splitting Methods. CFD Methods For Navier-Stokes Equations-Beam Warming Algorithm, Mac Cormack's scheme, Upwind Techniques.

UNIT 5: GRID GENERATION**9 hours**

Structured Grid generation, Unstructured Grid generation, Adaptive Grid generation, Physical aspects, simple and multiple connected regions, grid generation by PDE solution.

Max.45 hours**Course Outcomes:**

- CO1 Understand the basic concept of CFD and conservation laws in chemical engineering.
- CO2 Ability to develop model for a given fluid flow system.
- CO3 Experiment with finite volume techniques for fluid flow and heat transfer models.
- CO4 Analyze finite difference method for mass transfer problems.
- CO5 Evaluate computational fluid flow problems using finite volume techniques.
- CO6 Solve and Get familiarized to develop grid generation and analysis of complex fluid-flow systems.

TEXT / REFERENCE BOOKS:

- Anderson, J. D., Computational Fluid Dynamics: The Basics with Applications, 2nd Edition, McGraw Hill International Editions, 2012..
- Fletcher, C. A. J., Computational Techniques for Fluid Dynamics, 3rd Edition Springer Verlag, 2001.
- Versteeg, H.K. and Malalasekera, W., An Introduction to Computational Fluid Dynamics: The Finite Volume Method, 2nd Edition , Pearson Education Ltd., 2007.
- Chung T. J., Computational Fluid Dynamics, 2nd Edition, 2nd Edition Cambridge University Press, 2002.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max Marks: 100

Part A: 10 questions of 2 marks each - No choice

Part B: 2 questions from each unit of internal choice; each carrying 16 marks

Examination duration: 3 Hours

20 Marks

80 Marks

New Course

SAIC4001	INDUSTRY 4.0	L	T	P	C	Max. Marks
		2	0	2	2	100

UNIT 1 ADVANCED TECHNOLOGY AND ADVANCED MATERIALS

7 Hrs.

Advanced electro-optical sensing technology-active, passive multi-spectral and hyper spectral imaging; electronic beam steering; vacuum technology, surface and coating technology, health care technology, Nanotechnology- Nano mechanics, Nano optoelectronics; energy storage technology-next generation Li-based Batteries, Hydrogen storage, solar photovoltaics', Flexible electronics. Intellectual Property Rights - case studies governing/pertaining to Materials/Technology.

UNIT 2 TRANSFORMING TECHNOLOGIES IN BIOENGINEERING

7 Hrs.

Establishment of smart biotechnology factory, Artificial intelligence in Bioprocess technology, Omics – Big data analysis through automation, 3D bio printing for tissue engineering. Simulation tools, RSM and Box model. Cyber physical system based telemedicine, diagnosis and therapeutics through real time biosensors. Bio nanotechnology. Intellectual Property rights (IPR): Case Studies.

UNIT 3 ADVANCEMENTS IN SUSTAINABLE BUILT ENVIRONMENT

7 Hrs.

Introduction – Technological developments in Architectural, Engineering and Construction (AEC) - Building Information Modelling (BIM) using Cloud computing technology and Internet of things (IoT) – Unmanned Aerial Vehicles, sensors – Additive manufacturing in construction – Concrete 3D printing - Materials used - Lightweight and functionally graded structures - Net Zero Energy buildings, Bioswales, Biofiltration pond, Ecosan systems- Recent developments in Waste water Management, Air pollution control, waste disposal - Integration of energy, water and environmental systems for a sustainable development- Emerging Technologies: Robot Highway- Vertical farming - Intellectual Property rights: Case studies

UNIT 4 SMART MANUFACTURING

8 Hrs.

Smart factories and interconnection, Smart Manufacturing – automation systems, Additive Manufacturing, Smart grids, Micro Electro Mechanical Systems (MEMS), Stealth technology, Metal Finishing, Self-propelled vehicles, e mobility, green fuels, drones – unmanned aerial vehicles (UAVs), aerodynamics. Robotic Automation and Collaborative Robots – Augmented reality and haptics, engineering cybernetics and artificial intelligence (AI), Disruptive Technologies – Frugal Innovations – Emerging Technologies - Autonomous Robots, Swam Robot, Modular Robotics, Space craft, Intellectual Property Rights (IPR): Case Studies.

UNIT 5 SMART WORLD

8 Hrs.

Smart Sensors and IIOT, Smart grid, Hybrid renewable energy systems, Electronics in Smart city, Integration of Sensors in Robots and Artificial Intelligence, 5G Technology, Communication protocols, Human-Machine Interaction, Virtual Reality, Quantum Computing: Changing trends in transistor technology: Processor, Emerging Trends: Deep Space, Swarm Robots, Cyborg, Geofencing, Pervasive Computing, Intellectual Property Rights- Case Studies.

UNIT 6 CYBER PHYSICAL SYSTEMS

8 Hrs.

Introduction to Cyber Physical Systems (CPS), Architecture of CPS, Data science and technology for CPS, Prototypes of CPS, Emerging applications in CPS including social space, crowd sourcing, healthcare and human computer interactions, Industrial Artificial Intelligence, Deep Learning, Gamification, Networking systems for CPS applications, Wearable cyber physical systems and applications, Domain applications of CPS: Agriculture, Infrastructure, Disaster management, Energy, Transportation, Intellectual Property Rights (IPR) : Case Studies.

COURSE OUTCOMES:

- CO1. Apply the basic concepts for electro optical sensing technology and selection of materials.
- CO2. Analyze the technology on AI and Big Data for biomedical applications.
- CO3. Elaborate the various technologies for sustainable built environment.
- CO4. Evaluate different smart manufacturing technologies for industrial robotics-based automation.
- CO5. Compare various advanced technologies for development of smart city.
- CO6. Build Cyber physical systems using AI for Industry, Agriculture and disaster management applications.

Max. 45 Hrs.

TEXT / REFERENCE BOOKS

1. William D. Callister, Materials Science and Engineering: An Introduction, John Wiley and Sons Inc. Singapore, 2001.
2. Raghavan V., Physical Metallurgy: Principle and Practice, Prentice Hall India Pvt. Ltd., 2006.
3. Flavio Craveiro, Jose Pinto Duarte, Helena Bartolo and Paulo Jorge Bartolo, "Additive manufacturing as an enabling technology for digital construction: A perspective on Construction 4.0", Automation in Construction, Vol. 103, 2019.
3. Klaus Schwab, Fourth Industrial Revolution, Random House USA Inc., New York, USA, 2017.
4. Oliver Grunow, "SMART FACTORY AND INDUSTRY 4.0. The current state of Application Technologies", Studylab Publications, 2016.
5. Alasdair Gilchrist, "INDUSTRY 4.0: Industrial Internet of Things", Apress, 2016.
6. Sang C.Suh, U.John Tanik, John N Carbone, Abdullah Eroglu, "Applied Cyber-Physical Systems", Springer Publications, New York, 2013

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

PART A: 11 Questions of 2 marks each-No choice

PART B: 2 Questions from each unit with internal choice, each carrying 13 marks

Exam Duration: 3 Hrs.

22 Marks

78 Mark

New Course

SCHA2307	UNIT OPERATIONS LAB	L	T	P	C	Max. Marks
		0	0	4	2	100

1. Flow through Venturimeter
2. Flow through Orifice meter
3. Flow through Pitot tube
4. Characteristics of a Reciprocating pump
5. Characteristics of a Centrifugal pump
6. Characteristics of a Gear pump
7. Flow through packed bed
8. Flow through helical coil
9. Flow through V- Notches
10. Flow through annular pipe/ non circular conduits
11. Particle size distribution - differential and cumulative analysis by manual method using standard screens
12. Determination of Screen Effectiveness by Mechanical Method using Standard screens
13. Energy requirement and crushing constants determination using Ball mill
14. Energy requirement and crushing constants determination using Drop weight crusher
15. Determination of filtration constants at constant pressure conditions using Vacuum Leaf Filter
16. Minimum thickener area calculations performing Batch Sedimentation test

COURSE OUTCOMES:

- CO1 Estimate the critical parameters for various unit operations
 CO2 Design and drawing of mass transfer equipment's
 CO3 Design of pressure vessels and heat transfer equipment's
 CO4 Design of thickeners and cyclone separators
 CO5 Applying the principles of selection & design of supports and enclosures for vessels and columns
 CO6 Acquire the knowledge of CAD in design of equipment's

SCH1301	COMPUTATIONAL METHODS IN CHEMICAL ENGINEERING	L	T	P	C	Max. Marks
		3	0	0	3	100

COURSE OBJECTIVE:

- To impart computational techniques for chemical engineering calculations

UNIT 1: BASICS OF MATLAB**9 Hours**

Starting MATLAB, Help, Simple, Functions, Output, Algebra Vectors, Graphs, Interrupting, Syntax, Suppressing Output, Defining Matrices, Size of Matrix, The Identity Matrix, Specialized Matrices, Diagonal Matrices, The Manipulating Matrices, Matrices, matrix Multiplication, String Arrays, Printing Output, MATLAB Scripting Language: M-File MATLAB Search Path, Path Management, and Startup, File, Function, Errors.

UNIT 2: FORMULATION OF PHYSICAL PROBLEMS**9 Hours**

Mathematical statement of the problem, Representation of problems, Formulation on extraction in single & multiple stages, Radial heat transfer through a cylindrical conductor, salt accumulation in stirred tank.

UNIT 3: INITIAL VALUE PROBLEMS**9 Hours**

Initial value problems for ordinary differential equations- Trapezoidal method, Runge Kutta methods, interpolation, Extrapolation and Gaussian quadrature.

UNIT 4: NUMERICAL OPTIMIZATION AND PARAMETER ESTIMATION TECHNIQUES**9 Hours**

Methods for constrained and unconstrained optimization- Lagrangian methods, Simplex, Newton line search method, least square regression, Applications- Fitting a kinetic rate law to time dependent data.

UNIT 5: BOUNDARY VALUE PROBLEMS**9 Hours**

Introduction to boundary value problems, finite difference method, finite volume method, finite element method. Applications of BVP-Chemical reaction and diffusion in a spherical catalyst, finite differences for a convection, diffusion equation.

Max.45 Hours**Course Outcomes:**

- CO1:** Understand the basic concepts of Matlab
CO2: Outline to Formulate physical problems
CO3: Solve Initial value problems
CO4: Examine numerical optimization
CO5: Evaluate parameter estimation techniques
CO6: Estimate boundary value problems

TEXT / REFERENCE BOOKS:

- 1 Beers K.J., Numerical Methods for Chemical Engineering: Applications in MATLAB, 1st Edition, Cambridge University Press, 2007.
2. Jain M.K., Iyengar S.R.K., Jain R.K., Numerical methods: Problems and solutions, 4th Edition, New age international publishers, 2003.
- 3 Davis. M.E., Numerical Methods and Modeling for Chemical Engineers, 1st Edition, John Wiley & Sons, 1984.
4. Loney N.W., Applied mathematical models for chemical Engineers, 2nd Edition, CRC press, 2006.
5. Mickley, Reid and Sherwood, Applied Mathematics in Chemical Engineering, 2nd Edition, Tata-McGraw-Hill, New Delhi, 1978

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max Marks: 100

Examination duration: 3 Hours

Part A: 10 questions of 2 marks each - No choice

20 Marks

Part B: 2 questions from each unit of internal choice; each carrying 16 marks

80 Mark

SCHA3013	COMPUTATIONAL METHODS IN CHEMICAL ENGINEERING	L	T	P	C	Max. Marks
		3	0	0	3	100

COURSE OBJECTIVE:

- To impart computational techniques for chemical engineering calculations

UNIT 1: BASICS OF MATLAB**9 Hours**

Starting MATLAB, Help, Simple, Functions, Output, Algebra Vectors, Graphs, Interrupting, Syntax, Suppressing Output, Defining Matrices, Size of Matrix, The Identity Matrix, Specialized Matrices, Diagonal Matrices, The Manipulating Matrices, Matrices, matrix Multiplication, String Arrays, Printing Output, MATLAB Scripting Language: M-File MATLAB Search Path, Path Management, and Startup, File, Function, Errors.

UNIT 2: FORMULATION OF PHYSICAL PROBLEMS**9 Hours**

Mathematical statement of the problem, Representation of problems, **Principles of formation**. Formulation on extraction in single & multiple stages, Radial heat transfer through a cylindrical conductor, salt accumulation in stirred tank. **Unsteady state problems**.

UNIT 3: INITIAL VALUE PROBLEMS**9 Hours**

Initial value problems for ordinary differential equations-**Euler's method**, Trapezoidal method, **Regula flosi method**. Runge Kutta methods, interpolation, Extrapolation and Gaussian quadrature.

UNIT 4: NUMERICAL OPTIMIZATION AND PARAMETER ESTIMATION TECHNIQUES**9 Hours**

Methods for constrained and unconstrained optimization- Lagrangian methods, Simplex, **Big B method**, least square regression, **parameter Estimation Technique**. Applications- **Fitting concentration to time dependent data**.

UNIT 5: BOUNDARY VALUE PROBLEMS**9 Hours**

Introduction to boundary value problems, finite difference method, finite volume method, finite element method. **grid formation concept**. Applications of BVP-Chemical reaction and diffusion in a spherical catalyst, finite differences for a convection, diffusion equation.

Max.45 Hours**Course Outcomes:****CO1:** Understand the basic concepts of Matlab**CO2:** Outline to Formulate physical problems**CO3:** Solve Initial value problems**CO4:** Examine numerical optimization**CO5:** Evaluate parameter estimation techniques**CO6:** Estimate boundary value problems**TEXT / REFERENCE BOOKS:**

1 Beers K.J., Numerical Methods for Chemical Engineering: Applications in MATLAB, 1st Edition, Cambridge University Press, 2007.

2. Jain M.K., Iyengar S.R.K., Jain R.K., Numerical methods: Problems and solutions, 4th Edition, New age international publishers, 2003.

3 Davis. M.E., Numerical Methods and Modeling for Chemical Engineers, 1st Edition, John Wiley & Sons, 1984.

4. Loney N.W., Applied mathematical models for chemical Engineers, 2nd Edition, CRC press, 2006.

5. Mickley, Reid and Sherwood, Applied Mathematics in Chemical Engineering, 2nd Edition, Tata-McGraw-Hill, New Delhi, 1978

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max Marks: 100

Part A: 10 questions of 2 marks each - No choice

Part B: 2 questions from each unit of internal choice; each carrying 16 marks

Examination duration: 3 Hours

20 Marks

80 Marks

New Course

SAIC4003	UNIVERSAL HUMAN VALUES	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES

- To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence
- To understand (or developing clarity) the harmony in the human being, family, society and nature/existence
- To strengthen self-reflection
- To develop commitment and courage to act

MODULE 1 COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
 2. Self-Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self- exploration
 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
 6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.
- Practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

MODULE 2 UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
 8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
 9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
 10. Understanding the characteristics and activities of 'I' and harmony in 'I'
 11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
 12. Programs to ensure Sanyam and Health.
- Practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

MODULE 3 UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

MODULE 4 UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE

18. Understanding the harmony in the Nature

19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature

20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space

21. Holistic perception of harmony at all levels of existence.

Practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

MODULE 5 IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS

22. Natural acceptance of human values

23. Definitiveness of Ethical Human Conduct

24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

26. Case studies of typical holistic technologies, management models and production systems

27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

28. Sum up.

Practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Total: 28 Lectures And 14 Practice Sessions

COURSE OUTCOMES

On completion of the course, the student are expected

CO1: To become more aware of themselves, and their surroundings (family, society, nature)

CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind

CO3: To have better critical ability

CO4: To become sensitive to their commitment towards what they have understood (human values, human relationship and human society)

CO5: To apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction

TEXT /REFERENCE BOOKS

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
4. The Story of Stuff (Book).
5. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
6. Small is Beautiful - E. F Schumacher.
7. Slow is Beautiful - Cecile Andrews

8. Economy of Permanence - J C Kumarappa
9. Bharat Mein Angreji Raj – PanditSunderlal
10. Rediscovering India - by Dharampal
11. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
12. India Wins Freedom - Maulana Abdul Kalam Azad
13. Vivekananda - Romain Rolland (English)
14. Gandhi - Romain Rolland (English)

ASSESSMENT:

Assessment by faculty mentor: 10 marks

Self-assessment:: 10 marks

Assessment by peers: 10 marks

Socially relevant project/Group Activities/Assignments: 20 marks

Semester End Examination: 50 marks

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
Department of Chemical Engineering
SCHOOL OF BIO AND CHEMICAL ENGINEERING

MINUTES OF BOARD OF STUDIES VIRTUAL MEETING HELD ON 26TH JUNE 2020.

The following members were present in the meeting:

1. Dr. Wilson Aruni – Pro Vice Chancellor – Chair Person
2. Dr.Vignesh Muthu Vijayan – Associate Professor – IIT Madras – External member
3. Dr.K.Sathish Kumar – Associate Professor – SSN college of Engineering – External member
4. Dr.S.Sathish – Associate Professor – Head of the Department
5. Dr.D.Prabu – Associate Professor – Internal member
6. Dr.D.Joshua Amarnath – Professor – Internal member
7. Dr.A. Annam Renita – Professor – Internal member
8. Dr. S.S.Dawn – Professor – Head (Centre for Waste Management) – Internal member
9. Dr.J.Aravind Kumar – Asst. Professor – Internal member
10. Mr.D.Venkatesan – Asst. Professor – Internal member

At the outset, the Chair Person welcomed the members of BoS and placed the agenda for the deliberations of the members. The following deliberations were made as per the items of the circulated agenda.

1. Agenda item # 1 Modifications proposed for 2020 batch 'Bachelors of Technology – Chemical Engineering' students in SCHA1102 – Material Sciences.

Head of the department informed that the department teams have been working on the modification of curricula and in this direction the following changes were made on SCHA1102.

- a. In Unit 2 of SCHA1102 - varieties of cast iron, effect of impurities, LD methods to be removed since it was covered in Introduction part of Unit 1
- b. Incorporation of the following topics in Unit IV- Characterization of biomaterials, Degradation of materials in the biological environment

The External members considered the revision made and discussed different issues. Dr. K. Sathish Kumar pointed that the incorporated topics was not repeated in Industry 4.0. And it was confirmed that the topics are not repeated in IV4.0.

Then the members approved the modification in curricula for consideration. The matter regarding the implementation of scheme from academic year 2020-21 batch onwards.

2. Agenda item # 2 Skilling in professional domains and branch specific areas to promote industry ready competency among learners. Necessary certification courses to improve the modern tool usage.

Head pointed the workshop and certification course offered by the department such as Process simulation and Fire safety.

The BoS recommended that simulation courses like ASPEN, HYSYS should also promote the industry ready competency among the students.

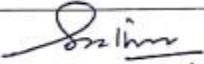


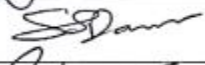
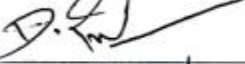
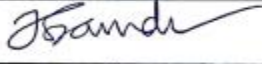
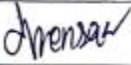
3. Agenda item # 3 Introduction of New elective Courses : Green Technology, Industry 4.0, Computational Fluid Dynamics, Smart materials, Computational methods in Chemical Engineering was projected as elective courses.

4. Academic flexibilities with extra credits acquired through either advanced study of same courses or with procuring additional credits from additional courses as per student's choice - suggestion. Universal Human values was introduced as a mandate course

Head ask the suggestion to the External members for students undergoing specialisation.

The BoS recommended that advanced courses/NPTEL courses/ simulation courses like ASPEN, HYSYS can be selected for the specialisation. Also recommend that the students can opt these courses at the end of the fourth semester subject to the condition prescribed by the Senate time to time.

The meeting ended with the Vote of thanks to the Chair.

Internal Member	Designation	Signature
Dr.S.Sathish	HoD	
Dr.D.Joshua Amarnath	Professor	
Dr.A. Annam Renita	Professor	
Dr. S.S.Dawn	Professor	
Dr.D.Prabu	Associate Professor	
Dr.J.AravindKumar	Asst. Professor	
Mr.D.Venkatesan	Asst. Professor	


PRO VICE CHANCELLOR/CHAIR

12/5/21, 12:03 PM

Sathyabama Institute of Science and Technology (Deemed to be University) Mail - MINUTES OF THE BOS MEETING HEL...



Hod Chemical <chemicalhod@sathyabama.ac.in>

MINUTES OF THE BOS MEETING HELD ON 26/06/20


5 messages

Hod Chemical <chemicalhod@sathyabama.ac.in>
To: vigneshm@iitm.ac.in
Bcc: sathishkumark@ssn.edu.in

Sun, Jun 28, 2020 at 10:44 PM

Respected Sir,
Please find the attachment of BoS minutes of meeting held on 26//06/20 for your information . In this regard i request you to check it once before we take it in to academic council.

thanks and regards
HOD

 **BoS- MOM- Department of Chemical Engineering.docx**
16K

Vignesh MuthuVijayan <vigneshm@iitm.ac.in>
To: Hod Chemical <chemicalhod@sathyabama.ac.in>

Mon, Jun 29, 2020 at 12:28 AM

It looks fine. Please go ahead.

Vignesh