SH301NW: Nanotechnology

Teaching Scheme	:03 L per week	**Credits:**	03
Evaluation Scheme	:10 ISA+30 MSE +60 ESE	**TotalMarks:**	100
MSE Duration	: 1.5 Hours		
ESE Duration	:3:00 Hrs		

COURSE DESCRIPTION

This course is intended to introduce the study of Nano Science, Nanomaterials and Nanotechnology in which students will study how to engineer materials via synthesis methodologies and fabrication of materials.

COURSE OBJECTIVES:

Nano Science, Nanomaterials and Nanotechnology course is aimed to make students aware and capable to accept the new challenges of rapidly changing technology via the continuous advancement due to Nanomaterials and Nanotechnology.

COURSE OUTCOMES:

Onthesuccessfulcompletionofthis course,studentsshallableto -

1. **Understand** the basic difference between bulk materials and nano materials and their physical properties
2. **Understand the synthesis and characterization methods** of in order to prepare materials for engineering applications
3. **Preparation & fabrication** of new materials like composites in terms of Nanoparticles, quantum dots, nanofibers, nanorods, nanowires and of several surface morphologies.
4. **Exploration of** materials/composites for application in the field of medical, engineering, agriculture, space, energy, and sensor technology.

MAPPING OF COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) WITH STRENGTH OF CO-RELATION

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	1	1							1		
2	3	1	1							1		
3	3	1	1							1		
4	3	1	1							1		

1-Weaklycorrelated 2 –Moderatelycorrelated 3–Stronglycorrelated

Course Contents

Unit-1 Introduction to Nano Science and Nanomaterials

Background to nanoscience and nanotechnology - scientific revolutions - nanosized effects- surface to volume ratio- – atomic structure – molecules & phases – energy at the nanoscale molecular and atomic size -quantum effects- types of nanotechnology.

Dimensionality, size, and shape dependent in variations in physical properties like Electronic, electrical, magnetic, dielectric, optical, ferroelectric and mechanical

Unit-2 Synthesis of materials and Methods

Ceramic method (Physical mixing method), Ball Milling, Metal nanocrystals by reduction, Sol-gel, Solvothermal synthesis, Photochemical synthesis, Electrochemical synthesis, Physical Vapour Deposition (PVD), Inert gas condensation, Arc discharge, DC sputtering, Ion sputtering, RF & Magnetron sputtering, Pulse Laser Deposition (PLD), Molecular beam epitaxy, Electro-deposition, E-beam Lithography

Unit-3 Characterization Techniques of Nanomaterials

X-ray diffraction (XRD) technique, particle size determination using XRD, Applications of XRD, Electron diffraction and its application, neutron diffraction and its applications, Introduction to Optical microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Tunneling Microscopy, UV visible spectroscopy, Infrared Spectroscopy and Fourier Transform Infrared Spectroscopy, Raman Spectroscopy, Photoluminescence (PL), Photoelectron Spectroscopy (X-Ray Photoelectron Spectroscopy, Auger Electron Spectroscopy & Ultra Violet Photoelectron Spectroscopy)

Unit-4 Functional nanomaterials and fabrication

Hybrid nanomaterials – core-shells, nano shells, self-assembled nanostructures, superlattices, nano-ceramics, polymeric and ceramic nanocomposites, nanoporous materials, nanofluids, nanolayers and carbon based nano materials - Occurrence, production, purification, properties and applications of fullerene, carbon nanotube, graphene, Biomimetic nanomaterials, bioinspired nanomaterials and self-assemblies.

Unit-5 Nanomaterials devices and Applications

Application of nanomaterials in healthcare, biosenors, coatings environment, catalysis, agriculture, automotives, sensors, electronics, photonics, information technology, quantum computing, energy and aerospace sectors.

TEXT BOOKS:

1. Material Science & Engineering – An Introduction by William D. Callister Jr.
2. Introduction to Nanotechnology by Charles P. Poole, Jr., Frank J. Owens
3. Nanoscale Materials- Liz Marzan & Kamat
4. Chemistry of nanomaterials: Synthesis, properties and applications by CNR Rao et.al. Wiley

VCH Verlag Gmbh & Co, Weinheim
5. Processing & properties of structural naonmaterials by Leon L. Shaw (editor)
6. Nanostructure and Nanomaterials: Synthesis , Properties and Application by G. Cao, Imperial College Press, 2004
7. Grain growth and control of microstructure and lecture in polycrystalline materials by V. Lu. Novikov & Vladimi Novikov
8. Handbook of nanoscience, Eng. & Technology by W. Gaddand, D. Bernner, S.L. Solnki & G.J. Infrate (Eds) , CRC press 2002

REFERENCE BOOKS:

1. Nanostructure and Nanomaterials: Synthesis, Properties and Application by G. Cao, Imperial College Press, 2004
2. Nanoscience & Technology: Novel structure and phenomena by Ping Sheng (Editor)
3. Nano Engineering in Science & Technology: An introduction to the world of nano design by Michael Rieth.
4. Elements of X-ray diffraction, B D Cullity- Addison-Wesley Publishing Company, Inc.
5. Willard, Merritt, Dean, Settle - Instrumental Methods of Analysis, 7th edition
6. Encyclopedia of Materials Characterization, C. Richard Brundle and Charles A. Evans, Jr
7. Web based different sources

Evaluation Methodology:

MSE: Mid Semester Examination will be based on 40-50 % of the syllabus

ESE: End Semester Examination will be based on rest of the 75 % of rest of the syllabus (i.e. excluding syllabus of MSE) and 25% syllabus of MSE.

ISA: ISA will be based on any one or combination of following components-

1) Declaredtest
2) Surprisetest
3) MCQTest
4) Performance in Tutorial
5) Assignments/ Tutorial / Punctuality/ Attendance

SH302NBX: ORGANIZATIONAL BEHAVIOR

Teaching Scheme : L:02 T:00 P:00 **Credits:** 02
Evaluation Scheme : 10 ISA + 30 MSE + 60 ESE **Total Marks:** 100

COURSE DESCRIPTION:

The course is intended to provide basic understanding of organizational behavior to engineering students with the basic concept of attitude & job satisfaction. This course introduces the student to the fundamental concepts of organizational behavior (OB); personality, perception and decision making, motivation and leadership etc. Students will study the interpersonal behavior. Students will learn organizational change and conflict management.

DESIRABLE AWARENESS/SKILLS:

Knowledge of basic human skills and organizational behavior

COURSE OBJECTIVES:

The objectives of offering this course are to

1. Understand fundamentals of behavior as well as concept of attitude & job satisfaction in anorganization
2. Understand emotion and moods and apply it at organization
3. Increase understanding of the personality, perception and decision making
4. Acquaint the students with the appropriate concepts, theories of motivation and leadership aswell as interpersonal behavior to make better understanding of behavioral dynamics
5. Understand applications of organizational change, conflict and realize the importance ofpower and politics in organization

COURSE OUTCOMES:

On the successful completion of this course; student shall

1. know the basic concept of organizational behavior, attitude & job satisfaction
2. increased their emotional intelligence as well as its application in professional settings
3. able to demonstrate the ability to understand own personality, perception and decision making
4. understand and implement the fundamental concepts motivation, leadership and apply theinterpersonal behavior in organization
5. deal with organizational change, conflict and use proper power and politics in organization atdifferent level

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	3	2	2	2	2	2	3			3
2	-	-	-	-	-	3	2	2	2	2	2	3			3
3	-	-	-	-	-	3	2	2	2	2	2	3			3
4	-	-	-	-	-	3	2	2	2	2	2	3			3
5	-	-	-	-	-	3	2	2	2	2	2	3			3

1-Weakly correlated 2 - Moderately correlated 3 - Strongly correlated

CONTENTS:

Organization Behavior

Field of organization behavior: past and present, importance, emerging issues, organization behavior: a framework and interdisciplinary influences on organization behavior, challenges and opportunities for organization behavior. Attitude & Job Satisfaction**:** main components of attitudes, types of attitude, cognitive dissonance theory, major job attitudes, job satisfaction, measuring job satisfaction, factors determining job satisfaction, the impact of satisfied and dissatisfied employees on the workplace.

Emotions and Moods:

The basic emotions, The basic moods: Positive and negative effect, The function of emotions, Sources of emotions and moods, Emotional labor, Affective events theory, Emotional Intelligence: The case for El, The case against El, Emotion regulation, OB applications of emotions and moods: Selection, Decision Making, Creativity, Motivation, Leadership, Negotiation, Customer Service, Job Attitudes, Deviant workplace behaviors, Safety and injury at work, How managers can influence moods

Personality, Perception and Decision Making:

Personality: Definitions, Myers-Briggs Type Indicator (MBTI), The Big Five Personality Model, Personality Traits, Perception: Factors affecting perception, Attribution theory, Improving perception, Perception and its application in organization, Decision Making: Meaning, Types of decisions, Decision Making Process, Decision Making Conditions

Motivation, Leadership and Interpersonal Behavior:

Motivation: Definitions, Meaning, Types, Maslow's theory of hierarchy of needs, Alderfer's ERG theory, McClelland's Learned Needs Theory, Theory X and Theory Y, Motivation-Hygiene Two Factor theory, Goal Setting Theory. Leadership: definitions, types, traits of leadership, transactions vs transformational leadership, VUCA leaders, leadership grid &

leadership formulation, Interpersonal behavior: Introduction - Johari window, Ego state Analysis of transactions, Life script-Life positions- Stroking, Psychological games, Benefits of transactional analysis.

Organizational Change, Conflict and Power & Politics:

Introduction, Forces for change, Factors in organizational change, Planned change, Resistance to change, Managing resistance to change, Conflict: Definition, Transition of conflict, Types of conflict, Conflict process, Causes of conflict, Conflict resolution model. Power & Politics: Definition & meaning, Difference between power & authority, Bases of power, Power tactics, Politics: power in action, Factors contributing to political behavior: Individual & organizational, Impression management, Machiavellianism- strategies used by executives

TEXTBOOKS:

1. Organizational Behavior, Stephen P. Robbins, 18th edition, Pearson publications
2. Organizational Behavior, Shuchi Sharma, Tata McGraw Hill
3. Organizational Behavior, Ray French, 3rd edition, Wiley Publications
4. Organizational Behavior, K. Aswathappa, 13th edition, Himalaya Publishing House, 2018

REFERENCES:

1. Organizational Behavior, Neharika Vohra Stephen P. Robbins, Timothy A. Judge, 18th edition, Pearson Education, 2022
2. Organizational Behavior, L.M. Prasad, Sultan Chand & Sons, 2019

EVALUATION METHODOLOGY:

MSE: The Mid-Semester Examination will cover 50% of the syllabus.
ESE: The End-Semester Examination will cover 75% of the remaining syllabus (excluding the MSE syllabus) and 25% of the MSE syllabus.

ISA: The Internal Sessional Assessment (ISA) will be based on any one or a combination of the following components:

1. Declared Test
2. Surprise Test
3. MCQ Test
4. Performance in Tutorials
5. Assignments/Tutorials/Punctuality/Attendance

Additionally, the Course Coordinator may select other components and will announce the method of evaluation at the beginning of the course.

SH303NY: LIFE SKILLS

Teaching Scheme: L 02 T:00 P:00 **Credits:** 02
Evaluation Scheme: 10 ISA + 30 MSE + 60 ESE **Total Marks:** 100

COURSE DESCRIPTION:

The course is intended to provide basic life skills to the engineering students. This course introduces different aspects of personality as well as skills like critical thinking problem solving, stress management & leadership skills.

DESIRABLE AWARENESS:

Basic knowledge of life skills and leadership skills

COURSE OBJECTIVES:

The objectives of the course are to -

1. develop the positive personality in prospective engineers.
2. learn stress management
3. Inculcate critical thinking process and problem-solving skills.
4. understand group behavior and conflict management
5. learn leadership qualities and practice them.

COURSE OUTCOMES:

After completing this course, Students will able to –

1) understand own personality traits.
2) apply critical thinking on a particular problem.
3) analyze different problems by using skills.
4) understand how to work efficiently in group.
5) understand & apply an effective leadership skills

RELEVANCE OF POS AND STRENGTH OF CORRELATION:

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	-	-	2	3	-	3
2	-	-	-	-	-	2	-	-	2	3	-	3
3	-	-	-	-	-	2	-	-	2	3	-	3
4	-	-	-	-	-	2	-	-	3	3	-	3
5	-	-	-	-	-	2	-	3	2	3	-	3

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENT:

Introduction to Life Skills:

Importance of life skills for engineers.

Communication Skills & Written Communication

Verbal and non-verbal communication, Effective listening skills, Presentation skills and public speaking, Guiding and giving directions. Technical writing and documentation-mail etiquette, Report writing.

Organizational Change and Stress Management & Personality

Forces for change, managing planed change, what can change agents change?, resistance to change, approaches' to managing organizational change, stress: consequences of stress, sources of stress, how to overcome stress. Personality**:** meaning, formation, determinants, traits for building positive personality, self awareness: how to gain? developing positive personality: subconscious programming and conscious programming, SWOT analysis

Critical Thinking & Problem Solving

Creativity, lateral thinking, critical thinking, multiple intelligence, problem solving, six thinking hats, mind mapping & analytical thinking.

Group Behavior and Motivation

Definition, types, formation of groups, building effective teams; conflict: meaning, nature, types, process of conflict, conflict resolution, Motivation meaning, types, steps, Maslow's theory of hierarchy of needs, Vroom's expectancy theory of motivation, Alderfer's ERG theory.

Leadership Skills:

Leadership, levels of leadership, making of a leader, types of leadership, transactions vs transformational leadership, VUCA leaders, dart leadership, leadership grid & leadership formulation.

TEXT BOOK:

1. Life Skills for Engineers, Complied by ICT Academy of Kerala, McGraw Hill Education(India) Private Ltd., 2016
2. Organizational Behavior, Suja R. Nair, Himalaya Publications, 2014
3. Organizational Behavior, V.S.P. Rao, 1st edition, Excel Publications, 2009
4. Personality Development and Soft skills, Oxford University Press by Barun K. Mitra 2stedition, 2016.
5. Steps to Build Positive Attitude by Asha Thorat, Book tango Publication.2014.

REFERENCES:

1) Personality Development & Soft Skills, Barun K. Mitra, 1st Edition; Oxford Publishers,2011.
2) Soft Skill for Managers, Kalyana, 1st Edition; Wiley Publishing Ltd., 2015.
3) The 1st Book of Life Skills; Larry James; 1st Edition; Embassy Books.,2016.
4) Development of Life Skills and Professional Practice; Shalini Verma, 1st Edition; SultanChand (G/L) & Company, 2014.
5) The 5 Levels of Leadership, John C. Maxwell, Centre Street, A division of Hachette BookGroup Inc., 2014.

EVALUATION METHODOLOGY:

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4. Performance in Tutorials
5. Assignments/Tutorials/Punctuality/Attendance

Additionally, the Course Coordinator may select other components and will announce the method of evaluation at the beginning of the course.

Title: Forts' Engineering, Management, and Culture

Duration: 60 hours

Credits: 2

Applicability: UG courses in Engineering, Management, Architecture, Inter-disciplinary and other relevant areas, as per NEP 2020.

SN	TITLE	DURATION
1	**INTRODUCTION**	**6**
1.1	Introduction to Forts and their importance: Geo-political importance, strategic locations, architectural importance, alignment with natural surroundings	
1.2	Distinguished features of Forts: Architecture, construction style, water conservation measures	
1.3	Types of Forts: Hill forts, Sea forts, Land forts, Forest forts	
2	**ENGINEERING PERSPECTIVE**	**8**
2.1	Innovative Construction Techniques: Foundation, Fortifications and its levels, Gates, Granaries, Ammunition storage, Palaces, Offices, and other buildings	
2.2	Water Management on Forts: Lakes and tanks, water conservation, internal water storage, water storage on various types of forts	
3	**MANAGEMENT PERSPECTIVE**	**8**
3.1	Aadnyapatra (Royal Edict): Instructions related to forts, security measures, financial measures, architectural and constructional suggestions	
3.2	Strategic Importance of Forts	
3.3	Management Practices on Forts: Work Culture, Skill Development, HR Development	
4	**FORTS CULTURE**	**8**
4.1	Ideal Work Culture: Values, Attitude, Ethics, Behavior	
4.2	Grapevine communication: Relevance and importance in organizations, impact	
4.3	Financial planning and management on Forts	
4.4	Personality Traits and their relation with Forts	
5	**FORT VISITS** (Visit the forts for understanding the architecture, geo-political situation, water management, and other aspects. These visits to be planned considering the logistics arrangements, safety of the students, time and costs incurred, and other important and relevant aspects)	**30**