



**S. B. JAIN INSTITUTE OF TECHNOLOGY,
MANAGEMENT AND RESEARCH, NAGPUR**

(An Autonomous Institute, Affiliated to RTMNU, Nagpur)

FIRST YEAR ENGINEERING DEPARTMENT

"Emerge as a leading Institute for developing competent and creative Professionals"



Year: First Year

Course Code	Course Title	Hours / Week			Credits	Maximum Marks			ESE
		L	T	P		Continuous Evaluation	End Sem.	Total	Duration (Hrs.)
N-BSC101T	Successive Differentiation and Differential Equation	3	1	0	4	40	60	100	3

Course Objectives

The objective of this course is to make aware the potential engineers with techniques in Differential Calculus, Ordinary Differential equations and Infinite series. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes

After successful completion of this course, the students will be able to:

CO 1	Evaluate: Evaluate derivatives and can implement the appropriate concepts to solve engineering problems.
CO 2	Analyze: Analyze derivatives and gradients of vector functions including directional derivatives.
CO 3	Understand: Identify the convergence and divergence of infinite series of real numbers.
CO 4	Apply: Solve ordinary differential equations by various methods and apply the knowledge in various engineering applications.

SYLLABUS

UNIT- I: Differential Calculus

Successive Differentiation, Taylor's & Maclaurin's series for one variable, indeterminate form, Curvature and Radius of curvature, Circle of Curvature.

UNIT-II: Functions of Multi variables

Functions of multi variables, First and Higher order derivatives, Euler's theorem, Chain rule and total differential coefficient, Jacobians, Taylor's & Maclaurin's series for two variables, Maxima & Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-III: Vector Calculus (Differentiation)

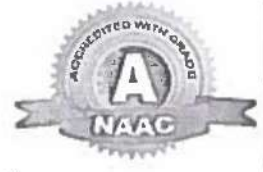
Vector differentiation, Scalar point function, Vector point Function, Gradient, Divergence and Curl, Directional derivatives with their physical interpretation, Solenoidal and irrotational motions.

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UNIT-IV: Infinite Series

Sequences, Infinite series of real numbers, Cauchy criterion, tests of convergence, absolute and conditional convergence.

UNIT-V: First Order Differential Equations

First order & first-degree differential equations: Linear, Reducible to linear & Exact differential equations
First order & higher degree differential equations, Application of First order & first-degree differential equations to simple electrical circuits.

UNIT-VI: Higher Order Differential Equations

Higher order differential equations with constant coefficients, P. I. by method of Variation of parameters, Cauchy's & Legendre's homogeneous differential equations, Simultaneous differential equations,

Differential equations of the type $\frac{d^2y}{dx^2} = f(y)$. Applications of differential equations to Oscillations of a Spring, Oscillatory Electrical Circuits.

Text Books Recommended

1. Higher Engineering Mathematics – B. S. Grewal, 44th Edition, 2020, Khanna Publication.
2. Applied Mathematics Volume I, - P. N. Wartikar and J. N. Wartikar, 2008, Pune Vidyarthi Gruh Prakashan.
3. Text book of Engineering Mathematics – N. P. Bali and Dr. Manish Goyal, 9th Edition 2014, Laxmi Publication Limited.
4. Advanced Engineering Mathematics – H. K. Dass, 22nd Edition 2018, S. Chand Publication.
5. Engineering Mathematics for semester I and II – C. P. Gupta, S. R. Singh & Mukesh Kumar, 2nd Edition, 2015, McGraw Hill Publication.

Reference Books Recommended

1. Advanced Engineering Mathematics- E. Kreyszig, 10th Edition, 2015, John Wiley & Sons Publication.
2. Advanced Engineering Mathematics- R. K. Jain & S. R. K. Iyengar, 5th Edition, 2008, Narosa Publishers.
3. Engineering Mathematics – Ravish R. Singh & Mukul Bhatt, 2nd Edition, 2017, Mc-Graw Hill Publication.
4. Higher Engineering Mathematics – B. V. Ramana, 11th Edition, 2010, Tata McGraw Hill Publication.
5. Mathematics for Machine Learning - A. Aldo Faisal, Cheng Soon Ong, and Marc Peter Deisenroth, 1st Edition, 2020, Cambridge University Press.

Dr. D. Rangaraj
Dr. S. Anwar

Dr. S. Kulkarni
Dr. P. Kelkar

Dr. H. S. Patil
Dr. Y. Patil
Dr. Y. Patil

Dr. S. Anwar
Dr. V. Anandani
Dr. V. Anandani

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N-BSC102T	Applied Physics	2	0	0	2	20	30	50	2

Sr. No.	Course Objectives
1	To introduce the fundamentals of quantum mechanics to form the foundation of quantum computing.
2	To introduce more advanced physics concepts, which form the basis of modern engineering.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Analyze: Interpret the fundamentals of quantum mechanics and analyze one-dimensional motion of particle in potential box.
CO2	Analyze: Analyze the working of various semiconductor devices.
CO3	Understand: Explain the principle, components, working and applications of Laser in engineering fields.
CO4	Apply: Explain and Apply the concept of TIR in optical communication using fiber cables.

SYLLABUS

UNIT I: Quantum Mechanics:

Introduction of quantum mechanics, de-Broglie's hypothesis, Heisenberg uncertainty relations, Wave function and its probability interpretation, Schrodinger's equation, Energies and wave functions of a single electron in one-dimensional infinite potential well, Phenomenon of tunneling, Introduction to quantum computing.

UNIT II: Semiconductors Physics and Devices:

Band theory of solids, Conductivity in semiconductors, Intrinsic and extrinsic semiconductors, Formation of P-N junction

Devices: Characteristics and applications

P-N junction diode, Zener diode and Transistor

UNIT III: Laser Physics:

Einstein's coefficient, Quantum processes involved in Laser, Stimulated emission and photon amplification, Three level and Four level pumping scheme, Laser oscillation conditions, Ruby laser, He-Ne laser, Applications of Laser in industry.

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UNIT IV: Optical Fibers:

Optical fibers: Propagation of light by total internal reflection, Structure and classification (Based on material, refractive index and number of modes), Modes of propagation in fiber, Acceptance angle, Numerical aperture, Attenuation and dispersion, Advantages over the conventional copper cable, Fiber optics communication system.

Text Books Recommended

1. A Text Book of Engineering Physics- M.N. Avadhanulu, P.G. Kshirsagar and TVS Arun Murthy, 11th Edition 2010, Chand Publication.
2. Engineering Physics- H. Malik and A.K. Singh, 2nd Edition 2017, McGraw Hill Education.
3. Engineering Physics- D.K. Bhattacharya and A. Bhaskaran, 2010, Oxford University Press.
4. Introduction to Quantum Mechanics, David J Griffiths and Darrell F. Schroeter, 3rd Edition 2019, Cambridge University Press.
5. Engineering Physics, P. K. Palaniswamy, 2005, Scitech Publication.

Reference Books Recommended

1. Fundamentals of Physics- David Halliday, Robert Resnick and Jearl Walker, 11th Edition 2018, John Willey and Sons. Inc.
2. Modern Physics- Kenneth Krane, 4th Edition 2019, John Wiley Eastern.
3. Solid State Physics- S.O. Pillai, 9th Edition 2020, New Age International Publishers.
4. Quantum Computing Explained- David McMohan, 2008, Willey-IEEE.
5. IBM Experience: <https://quantumexperience.ng.bluemix.net>
6. Microsoft Quantum Development Kit: <https://www.microsoft.com/en-us/quantum/development-kit>

REFERENCE NPTEL/SWAYAM Courses:

- 1) **Quantum Mechanics I** by Prof. P. Ramadevi (IIT BOMBAY – 12 Weeks)
(https://onlinecourses.nptel.ac.in/noc22_ph06/preview)
- 2) **Introduction to Laser** by Prof. M. R. Shenoy (IIT DELHI -12 Weeks)
(https://onlinecourses.nptel.ac.in/noc23_ph33/preview)
- 3) **Introduction to Semiconductor Devices** by Prof. Naresh Kumar Hemani (IIT HYDERABAD – 12 Weeks) (https://onlinecourses.nptel.ac.in/noc23_ec82/preview)

A.D. Tejane
RK
COI-R. Kulkarni
Dr. H.S. Rao
Dr. Pakrade

Dr. S. Konduswar
Dr. S. Anwar
Dr. V. Aswadani

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N-BSC102P	Applied Physics Lab	0	0	2	1	25	25	50	-

Sr. No.	Course Objectives
1	To understand and strengthen the theoretical concepts of physics by thorough experimentation and effectively communicate experimental results in a standard scientific way.
2	To become familiar with the proper use of various measuring instruments/techniques used in physics laboratories.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Apply: Apply and demonstrate theoretical concepts of physics through experimentation.
CO2	Analyze: Analyze the working and characteristics of various semiconductor devices.
CO3	Analyze: Make use of the various instruments/techniques for the analysis of various phenomenon of solid-state physics and optics.

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Sr. No.	List of Experiments
Pre-Lab	i. Introduction to Applied Physics laboratory. ii. Overview of various measuring instruments used in the laboratory. iii. Brief idea regarding Do's and Don'ts to be followed while experimenting in the lab.
1	Experimenting the V-I characteristics of semiconductor diode & determine the value of cut in voltage, static resistance and dynamic resistance.
2	Experimenting the V-I characteristics of Zener diode & determine the value of cut in voltage, breakdown voltage and dynamic resistance.
3	Experimenting the V-I characteristics of LED & determine the value of conduction voltage and dynamic resistance.
4	Experimenting the characteristics of solar cell.
5	Experimenting the characteristics of n-p-n transistor in common base mode & determine the value of input resistance, output resistance and current amplification factor.
6	Experimenting the characteristics of n-p-n transistor in common emitter mode & determine the value of input resistance, output resistance and current amplification factor.
7	Experimenting the Hall Effect in semiconductor & determine the value of Hall coefficient, concentration of charge carrier and its mobility.
8	Determination of wavelength of laser light using plane diffraction Grating.
9	Determination of numerical aperture of optical fiber cable.
10	Determination of Plank's constant using light emitting diode.
11	Determination of radius of curvature of a plano-convex lens by Newton's Rings.
12	Determination of thickness of thin foil paper using air wedge arrangement.
13	Determination of the divergence of laser beam (Demonstration).
14	Study of CRO (Voltage and frequency measurement using Calibration and Lissajous figure method) (Demonstration).
Post Laboratory Session: i. Open ended Experiment. ii. Circuit configuration on the bread boards using semiconductor diode, Zener diode and LED.	

(A minimum of **EIGHT** experiments to be performed based on the above list with minimum **ONE** experiment on **VIRTUAL LAB**.)

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Suggested References:

1. Experiments of Engineering Physics- M.N. Avadhanulu, A.A. Dani and P.M. Pokley, 2003, S. Chand Publication.
2. A Text Book of Engineering Physics- M.N. Avadhanulu, P.G. Kshirsagar and TVS Arun Murthy, 2010, Chand Publication.
3. Engineering Physics- H. Malik and A.K. Singh, 2nd Edition 2017, McGraw Hill Education.
4. Engineering Physics- D.K. Bhattacharya and A. Bhaskaran, 2010, Oxford University Press.
5. Engineering Physics- P.K. Palaniswamy, 2005, Scietech.

(S. Konde)
ADP
Y. Shinde
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Y. Patode
Dr. H.S. Rog
Dr. R. Kulkarni
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N- IKS101T	Indian Knowledge System	2	0	0	2	50	-	50	-

Course Objective

The course intends to provide a general introduction to Indian Knowledge System (IKS) and sensitize the students to the contributions made by Indians in the field of Science, Engineering & Technology.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Understand: Explain the history of Indian Knowledge System and the broad classification of Indian philosophical systems
CO2	Understand: Explain ancient Indian education systems, models of economy and basic concepts of life sciences.
CO3	Understand: Explain the Science, Engineering & Technology heritage of ancient and medieval India.
CO4	Apply: Apply techniques of Vedic mathematics to solve basic mathematical problems.

SYLLABUS

Unit I: Introduction to Indian Knowledge System:

Conception and Constitution of knowledge in Indian tradition, the idea of India, concept of Dharma, Dharma and Religion, Indian concept of space, the cultural integration of India, Concepts and system of Polity and Governance, Indian Philosophy, Indian Schools of Thought, Ethics and Values.

Unit II: Indian Society and Life Sciences:

Education in Ancient India, Gurukuls and Patshalas, Pedagogical concepts (Srayana, Manana and Nidhidyasana), Indian Models of Economy, Business and Management, Indian Calendar, Indian Ecology, Indian civilization, Agriculture and harmony with nature.

Ayurveda, Plural medical systems, Ayurveda and other forms of traditional Indian medicine, health and environment, Religion and Healing.

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Unit III: Indian Science and Technology:

History of Science in India, India's contributions to the world of science, developments in astronomy, mathematics and chemistry, History of Technology in India, agriculture, urbanism, early Craft Techniques and Metallurgy, Constructions, Transport, Textiles, Paper and Writing, Water Management System.

Unit IV: Vedic Mathematics:

History of Vedic Mathematics, Features of Vedic Mathematics, 16 sutras and 13 sub-sutras, High Speed Addition and Subtraction, Mental Multiplication and Division Techniques, Squares and Square roots, Cubes and Cube roots.

TEXT BOOKS RECOMMENDED

1. Traditional Knowledge System in India, Amit Jha 1st Edition, 2023, Atlantic Publishers and Distributors.
2. Indian Knowledge Systems - Vol 1 & 2, Avadhesh K. Singh, Kapil Kapoor, 1st Edition, 2005, D.K. Print World Ltd.
3. State And Government in Ancient India, A. S. Altekar 1st Edition, 2016, Motilal Banarsidass.
4. Indians: A Brief History of a Civilization, Namit Arora 1st Edition, 2021, Penguin Viking.
5. History of Ancient Indian Medical Science: Vardhatrayi, Gurupada Sarma Halder, 1st Edition, 1996, Sharada Prakashan.
6. Engineering and Technology in Ancient India, Ravi Prakash Arya, 1st Edition 2020, Indian Foundation for Vedic Science.
7. Fundamentals & Applications of Vedic Mathematics 2014, State Council of Educational Research & Training.

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Dr. Rajendra
S. Kumbhojkar
DR. R. Kulkarni
Y. Shinde
Dr. Y. Patil
S. Kumbhojkar
S. Anwar

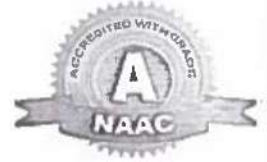
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V. Asudani

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Course Code	Course Title	Hours /Week			Credits	Maximum Marks			ESE
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N-CC101	Liberal Learning Course - 1	1	0	2	2	50	-	50	-

Course Objectives

1. To make the students understand the importance of sound health and fitness
2. To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.

Course Outcomes

After successful completion of this course, the students will be able to:

- | | |
|-----|---|
| CO1 | Apply: Apply the various techniques to promote Physical Fitness |
| CO2 | Apply: Choose and Apply various forms of Yogic activities and Meditation techniques to promote physical and mental wellbeing |
| CO3 | Create: Outline the various NCC schemes and Plan & execute various activities under NSS |

SYLLABUS

UNIT I: Physical Education & Fitness

Concept, Aims and Objectives of Physical Education, Meaning and importance of Physical Fitness, Components of Physical Fitness, Exercises to increase strength, flexibility, endurance, agility, speed, cardio vascular fitness, co-ordination abilities.

Unit II: Yoga & Meditation

Meaning and importance of Yoga, Difference between Yoga & Exercise and Introduction to Ashtanya Yoga Various Asanas (Techniques and Benefits)

Breathing Techniques: Pranayam, Kapalbhati, Anulom Vilom, Bhastrika Pranayam

Sitting Yoga Asanas: Padmasana, Ardha Matsyendrasana, Vajrasana, Janu Sirsasana, Paschimottanasana, Janu Sirshasana, Gomukhasana

Lying Asanas: Bhujanasana, Halasana, Dhanurasana, Sarvangasana, Matsyasana

Standing Asanas: Trikonasana, Vrikshasana, Tadasana, Virabhadrasana, Chakrasana, Suryanamaskar

Unit III: NCC/NSS

National Cadet Corps scheme, introduction to defense services, foot drill and arms drill.

Introduction to basic concepts of NSS, programme and activities, understanding youth – issues, challenges and opportunities.

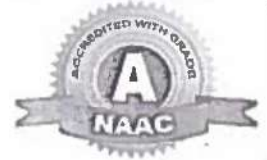
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TEXT BOOKS RECOMMENDED

1. Physical Education, Dr.K. Chaudhary & Dr. Indrajit Basu, 1st Edition, 2020, Harbour Press International
2. Patanjali Yoga Sutras by SwamiVivekanand , 2019, Fingerprint Publishing House.
3. Light on Yoga by B.K.S. Iyengar, 2006, Thorsons Publication.

FAD Talwar
Dr. Rama
S. Kondekar

TK Shinde

AK
C.D. R. Kelkar
Dr. N.S. Iyengar

Y. Patil

S. A. Kulkarni

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Course Code	Course Title	Hours / Week			Credits	Maximum Marks			ESE
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N-BSC104T	Integral Calculus and Linear Algebra	3	1	0	4	40	60	100	3

Course Objectives

The objective of this course is to make aware the potential engineers with techniques in Integral Calculus, Matrices. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes

After successful completion of this course, the students will be able to:

CO 1	Evaluate: Evaluate improper definite integral using Beta and Gamma functions.
CO 2	Understand: Recognize and sketch the graphs of the Cartesian and Polar curves by using properties.
CO 3	Evaluate: Evaluate multiple integrals for regions in the plane and find area and mass of the region bounded by the curves.
CO 4	Evaluate: Evaluate line, surface and volume integrals of vector point functions over the curves.
CO 5	Evaluate: Evaluate Eigen values and Eigen vectors of matrices and understand their significance in various applications.

SYLLABUS

UNIT- I: Integral Calculus-I

Beta and Gamma functions, Differentiation under the integral sign, Root mean square value.

UNIT- II: Integral Calculus-II

Tracing of curves. (Cartesian and polar curves), Calculation of Perimeter, area, surface area and volume, Application of definite integration.

UNIT-III: Multiple Integration

Elementary double integrals, Change of variable (Cartesian to polar), Change of order of integration, Elementary triple integrals. Applications to find Mass, Area.

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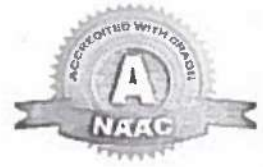


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UNIT-IV: Vector Calculus (Integration)

Vector integration, Line, Surface and Volume integrals, Stoke's theorem, Gauss divergence theorem and Green's theorem, Simple applications of these theorems.

Unit-V: Matrix Algebra-I

Inverse by Partitioning method, Solution of system of linear equation by ad-joint method, Rank of Matrix, Consistency, Characteristics equation, Eigen values and Eigen vectors, Linear dependence and independence of vectors.

Unit-VI: Matrix Algebra-II

Cayley-Hamilton Theorem and its applications, Reduction to Diagonal form, Sylvester's theorem and its applications, Linear and orthogonal transformation, Quadratic form of the matrix, Reduction of matrix into canonical form, Largest Eigen value by Iteration method.

Text Books Recommended

1. Higher Engineering Mathematics – B. S. Grewal, 44th Edition, 2020, Khanna Publication.
2. Applied Mathematics Volume I, - P. N. Wartikar and J. N. Wartikar, 2008, Pune Vidyarthi Gruh Prakashan.
3. Text book of Engineering Mathematics – N. P. Bali and Dr. Manish Goyal, 9th Edition 2014, Laxmi Publication Limited.
4. Advanced Engineering Mathematics – H. K. Dass, 22nd Edition 2018, S. Chand Publication.
5. Engineering Mathematics for semester I and II – C. P. Gupta, S. R. Singh & Mukesh Kumar, 2nd Edition, 2015, McGraw Hill Publication.

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2. Advanced Engineering Mathematics- R. K. Jain & S. R. K. Iyengar, 5th Edition, 2008, Narosa Publishers.
3. Engineering Mathematics – Ravish R. Singh & Mukul Bhatt, 2nd Edition, 2017, Mc-Graw Hill Publication.
4. Higher Engineering Mathematics – B. V. Ramana, 11th Edition, 2010, Tata McGraw Hill Publication.
5. Mathematics for Machine Learning - A. Aldo Faisal, Cheng Soon Ong, and Marc Peter Deisenroth, 1st Edition, 2020, Cambridge University Press.

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N-BSC103T	Chemistry for Engineering	2	0	0	2	20	30	50	2

Sr. No.	COURSE OBJECTIVES
1	To provide the students with knowledge of chemical properties of matter for its concern with applications in engineering.
2	To explain the students with relevant skill sets for identification and application of concepts in chemistry to cater industry and social needs.

COURSE OUTCOMES	
After successful completion of this course the student will be able to:	
CO 1	Evaluate: Evaluate the various important parameters of water like hardness, alkalinity, pH for its industrial applications, domestic usage and outline the WHO and BIS guidelines for the drinking water.
CO 2	Evaluate: Estimate the energy efficiencies of coal for its use as a fuel and understand the grading of coal
CO 3	Understand: Explain the synthesis and properties of advanced materials for their respective applications in the field of engineering and medicine
CO 4	Analyze: Outline the construction, working, reaction mechanisms, applications of energy storage systems like primary battery, secondary battery, alkaline fuel cells and apply the principles of green chemistry for sustainable development.

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SYLLABUS

UNIT-I: Water Technology:

Guideline of WHO and BIS for drinking water. Hardness of water and types of hardness, Methods for Softening of water: Lime-Soda process, Zeolite process, and de-mineralization process. Numerical based on lime-soda and Zeolite process. Boiler Troubles- (causes, effect on boiler operation and methods of prevention) – Scales and sludge, caustic embrittlement, boiler corrosion.

UNIT-II: Energy and its Calculations:

Solid Fuel: Introduction: Calorific value, GCV and NCV. Determination of calorific value by Bomb and Boy's calorimeter; numerical based on calorific value determination; Solid fuels-significance of proximate and ultimate analysis, Grading of coal (brief).

Liquid Fuel: Fractional distillation of crude petroleum (boiling point wise separation only) use of gasoline and diesel in internal combustion engine: knocking and chemical constitution of fuel, Octane and Cetane number, Combustion calculations – Numerical based on combustion calculations for solid, liquid and gaseous fuels.

UNIT-III: Advanced Materials:

Properties and applications – Biodegradable polymers-Polylactic acid (PLA) and Polycaprolactone(PCL). Conducting polymers –Polycetylene, Polyaniline, Polypyrrole, (Brief Idea about advancement in improved Solar Conducting Materials) Composite materials-introduction, general classification –Particle reinforced, Fiber reinforced structural and its industrial applications. Nanomaterial-Definition, nano scale. Carbon nano tubes (CNT) types and difference between Single wall NT, Multi wall NT; applications of nanomaterial in medicine, environment and electronics.

UNIT-IV: Green Chemistry and Energy Storage systems:

Green Chemistry: 12 principles of green chemistry, Synthesis of chemicals by green chemistry routes, 3R-Reduce, Reuse and Recycle, Concept of Carbon Credit.

Energy Storage systems: Types of batteries, primary and secondary batteries, important definitions-energy density, and power density. Types of batteries a) Secondary Battery: Lithium ion, Nickel-Cadmium b) Fuel cell H₂-O₂ application, advantages and limitation (Example: Alkaline fuel Cell).

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Revision	BoS Meeting	Date	w. c. f.
-	7 th	13-07-2023	2023-24



**S. B. JAIN INSTITUTE OF TECHNOLOGY,
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FIRST YEAR ENGINEERING DEPARTMENT

"Emerge as a leading Institute for developing competent and creative Professionals"



TEXT BOOKS RECOMMENDED

1. Engineering Chemistry - S.S. Dara, 12th Edition, 2010, S. Chand Publications, New Delhi.
2. A Textbook of Engineering Chemistry - Jain Anil K., 1st Reprint, 2010, Dhanpat Rai Publications, New Delhi.
3. Textbook of Engineering Chemistry - S.N. Narkhede, R.T. Jadhav, A. B. Bhake, A.U. Zadgaonkar, 1st Edition, 2008, Das Dasganu Prakashan, Nagpur.
4. Applied Chemistry - Dr. A.V. Bharati and Walekar, 1st Edition, 2012, Tech-Max Publications, Pune.

REFERENCE BOOKS RECOMMENDED

1. Physical Chemistry - Barrow Gordon M, 1st Edition, 2007 The Mcgraw-Hill Companies, New York.
2. Inorganic Chemistry Principles of Structure and Reactivity - Huhheey James, 1st Edition, 1960, Pearson Publication, India.

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S. K. Kerkar
R.K.
(Dr. A. Kerkar)
S. Anwar
S. Kondawar
S. Palawde
Dr. N. S. R.

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V. Asudemi

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FIRST YEAR ENGINEERING DEPARTMENT

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Year: First Year

Course Code	Course Title	Hours /Week			Credits	Maximum Marks			ESE
		L	T	P		Continual Evaluation	End Sem. Exam	Total	Duration (Hrs.)
N-BSC103P	Engineering Chemistry Lab	0	0	2	1	25	25	50	-

Sr. No.	COURSE OBJECTIVE
1	To inculcate amongst students the understanding of various chemical reactions involved in qualitative as well as quantitative analysis of water pertaining to the various impurities which subsequently analyzed and recorded in a scientific way.
2	To impart the knowledge of the various methods about grading of coal.
3	To provide the students with the knowledge of preparation of advanced material and overview its engineering applications.

COURSE OUTCOMES

After successful completion of this course the student will be able to:

CO 1	Evaluate: Explain and estimate important parameters like hardness, alkalinity, dissolved oxygen, pH of given water sample.
CO 2	Evaluate: Analyze and estimate various metal ions like Ni ²⁺ and metals like Ca ²⁺ , Mg ²⁺ in given water.
CO 3	Apply: Demonstrate the preparation of urea formaldehyde, phenol formaldehyde polymers and Explain its specific engineering applications. Explain the principles of green chemistry used in the preparation of polymer.
CO 4	Evaluate: Evaluate moisture content, volatile content and ash content of a given coal sample and outline its significances which are required for coal grading.

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Sr. No.	LIST OF EXPERIMENTS
Pre-Lab	1. Familiarization with applied chemistry lab. 2. Overview of instruments used in proximate analysis of coal (hot air oven, muffle furnace). 3. Outline the various types of titrations. 4. Brief idea regarding dos and don'ts to be followed during working in a chemistry lab.
1	Determination of temporary and permanent hardness of water by complexometric method.
2	Estimation the amount of Ni ⁺² ions in a given solution by complexometric method.
3	Estimation of free chlorine in the water by iodometry.
4	Determination of type and extent of alkalinity by Warder's method.
5	Estimation of dissolved oxygen in a water sample.
6	Determination of capacity of anion exchange resin.
7	Determination of moisture content of coal.
8	Determination of volatile matter content of coal.
9	Determination of ash content of coal.
10	Preparation of urea formaldehyde resin (Demonstration).
11	Preparation of phenol formaldehyde resin (Demonstration).
12	Determination of pH of waste sample (Demonstration).
13	Preparation of polymer by using green chemistry route. (Demonstration).

Post laboratory session:

1. Open ended experiments.
2. Determine the total hardness of domestic water sample by complexometric method.
3. Estimate the amount of free chlorine in a given water sample by iodometry method.

(A minimum of EIGHT experiments (excluding Pre-lab and Post lab sessions) to be performed based on the above list with minimum ONE experiment on VIRTUAL LAB).

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**SUGGESTED
REFERENCES**

1. A Textbook on experiment and calculation in engineering chemistry - S.S. Dara, 1st Edition, 2008, S. Chand Publication, New Delhi.
2. Vogel's Textbook of Quantitative Chemical Analysis - C. K. Jerry, 5th Edition, 1989, Longman Publishers, New York.
3. Applied Chemistry theory and practical - O. P. Virmani and A. K. Narula, 2nd Edition, 2020, New Age International, New Delhi.
4. Laboratory Manual on Engineering Chemistry - Dr. Subdharani, 3rd Edition, 2012, Dhanpat Rai Publishing, New Delhi.

ADT
D. Rama
S. Kondawar
Y. Shinde
AK
(Dr. R. Kulkarni)
Dr. S. S. Patil
Y. Patil
S. Kondawar
S. Amwani

V. A. Sudani

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Year: First Year

Course Code	Course Title	Hours/Week			Credits	Maximum Marks			ESE
		L	T	P		Continuous Evaluation	End Sem. Exam	Total	Duration (Hrs.)
N- AEC101T	Communicative English	1	0	0	1	20	30	50	2

Course Objective

The course empowers the learners to enhance the communication skills and thereby enhance employability.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Apply: Apply and develop the concept of Word Building.
CO2	Understand: Understand grammatical structure in oral and written communication.
CO3	Create: Develop competency for communication skills.
CO4	Create: Develop and improve competency in technical writing skills.

SYLLABUS

Unit I: Vocabulary Building:

The Concept of Word Building, Synonyms, Antonyms, Standard Abbreviations, Technical Jargons, Derivation of words from foreign languages, Idioms, Phrases.

Unit II: Functional Grammar:

Prepositions, Conjunctions, Verbs, Tenses, Voices, Degrees of Comparison, Transformation of Sentences, Modals.

Unit III: Communication Skills:

Introduction to Communication, Objectives of Communication, Modes of Communication, Barriers of Communication and Methods to overcome it.

Unit IV: Technical Writing:

Types of Writing (Expository, Descriptive, Persuasive, Narrative), Process of Writing, Email writing, Letter Writing, Précis Writing and Minutes of Meeting.

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Year: First Year

Course Code	Course Title	Hours / Week			Credits	Maximum Marks			ESE Duration (Hrs.)
		L	T	P		Continuous Evaluation	End Sem. Exam	Total	
N-BSC102P	Applied Physics Lab	0	0	2	1	25	25	50	-

Sr. No.	Course Objectives
1	To understand and strengthen the theoretical concepts of physics by thorough experimentation and effectively communicate experimental results in a standard scientific way.
2	To become familiar with the proper use of various measuring instruments/techniques used in physics laboratories.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Apply: Apply and demonstrate theoretical concepts of physics through experimentation.
CO2	Analyze: Analyze the working and characteristics of various semiconductor devices.
CO3	Analyze: Make use of the various instruments/techniques for the analysis of various phenomenon of solid-state physics and optics.

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TEXT BOOKS RECOMMENDED

1. Communication Skills, Dr. Lalita Bisen, Dr. Bhumika Agrawal, and Dr. N. Thejo Kalyani. Edition 2021, Himalaya Publishing House, Nagpur
2. Functional English for Technical Students, Dr. Pratibha Mahato and Dr. Dora Thompson, Edition, 2018, Himalayan Publishing House, Nagpur

REFERENCE BOOKS RECOMMENDED

1. Cambridge Grammar of English. A comprehensive guide spoken and written English Grammar and usage – Ronald Carter and amp; Michael McCarthy, 1st Edition June 2008, Cambridge University Press.
2. Technical Writing, Presentation Skills and Online Communication: Professional Tools and Insights – Raymond Green law 1st edition March 2012, IGI Global.

AD Talshe
D. Rama
Y. Shirde
S. Hemde
AK
Dr. H. S. Roy
Y. Patil
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S. Anwar

V. Asudani

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Course Code	Course Title	Hours/Week			Credits	Maximum Marks			ESE
		L	T	P		Continuous Evaluation	End Sem. Exam	Total	Duration (Hrs.)
N- AEC101P	Communicative English Lab	0	0	2	1	25	25	50	-

Sr. No.	Course Objectives
1.	To provide practice and improve students' oral communication skills.
2.	To enhance speaking and presentation skills of the students.

Course Outcomes	
After successful completion of this course the student will be able to:	
CO1	Apply: Develop and apply listening competency.
CO2	Understand: Understand the art speech craft and presentation skills.
CO3	Understand: Understand and interpret the reading comprehension.
CO4	Apply: Demonstrate and execute the non-verbal traits in professional domain.
CO5	Understand: Recognize and explain the concept of time management and team work.

Sr. No.	LIST OF EXPERIMENTS
1	Listening skills: Develop the art of effective listening.
2	Public speaking: Learn the art of influencing decisions and impacting the listeners.
3	Presentation skills: Interact with the audience, transmit the message with clarity and interpret and understand the mind-set of the listeners.
4	Situational conversational skills: Develop oral communication skill and gain confidence to speak in public.
5	Reading skills: Effectively handle reading skills and develop active listening skills.
6	Non-verbal skills: Compliment the message with the body during delivery.
7	Time management: Increase effectiveness, efficiency and productivity.
8	Team work: Enhance teamwork skills that are essential for your academic and professional success.
9	Open ended Experiment.

Post Laboratory Session-

1. Submit a 400-450 words synopsis of a book/movie from the list provided.
2. Prepare a video CV of 3-5 minutes.

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REFERENCE BOOKS RECOMMENDED

1. Communication Skills for Engineers and Scientists Paperback – 2009 by Sangeeta Sharma and Binod Mishra.
2. Soft Skills Training: A Workbook to Develop Skills for Employment Book by Frederick H. Wentz Edition 2012.

AD/ysine
ref. Y. Shinde
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