BRAINWARE UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning 2023

SEMESTER – II

Course Code	Course Name	Course Type	Hours per week			Credits	Total Marks
			L	T	P		
HSMCM201	Effective Communication Skills	HS	3	0	0	3	100
BSCM201	Engineering Chemistry	BS	3	0	0	3	100
BSCM202	Probability & Statistics	BS	3	0	0	3	100
BSCM203	Biology for Engineers	BS	2	0	0	2	50
ESCM201	Programming for Problem Solving	ES	3	0	0	3	100
HSMCM291	Effective Communication Skills Lab	HS	0	0	3	1.5	100
BSCM291	Engineering Chemistry Lab	BS	0	0	3	1.5	100
ESCM291	Programming for Problem Solving Lab	ES	0	0	3	1.5	100
ESCM292	Workshop/Manufacturing Practices	ES	0	0	3	1.5	100
Total						**20**	**850**
AUM-2	Yoga and Sports	AU	1	0	0	0	0

Course Code: HSMCM201
Course Name: Effective Communication Skills
Contact: 3L/Week
Credit: 3
Total Allotted Hours: 45L

Course Objective:
The aim of the course is to instill confidence in students by enhancing their Speaking, Reading and Writing Skills with the overall aim of making them employable.

Pre-requisite(s): Basic Knowledge of the English Language

Course Outcomes: After the completion of the course, students would be able to:

CO1: Express ideas with clarity and precision, and articulate themselves with confidence

CO2: Apply effective reading strategies, analyse content and develop comprehension skills through rapid reading techniques.

CO3: Develop writing skills, identify errors, editorialize and write various technical and non-technical content by giving examples and using proper style and language.

CO4: Apply self-assessment techniques to identify areas for personal growth in communication skills, and use goal-setting strategies to enhance productivity.

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Module I: Effective Verbal Communication [10H]

The 5 Cs of Communication
The Dos and Don'ts of Group Discussion
Describing, Persuading, Expanding an idea
Public Speaking

Module II: Effective Reading Strategies [10H]

Rapid reading and other reading techniques
Comprehension practice: Roald Dahl 'Lamb to the Slaughter' and Saki 'The Open Window' and /or 'The Lumber Room'

Module III: Writing Skills [15H]

Common Errors in writing, Creating coherence: arranging paragraphs and sentences in logical order, organising principles of paragraphs and techniques of writing with precision and clarity, Precis writing, Essay writing, drafting different kinds of technical documents, writing drafts, revising, editing and proofreading, technical writing style and language, Writing reports, project proposals, brochures, business letters, writing emails and email etiquettes, memos, minutes of meetings.

Module IV: Communication Skills for Employability: [10H]

Self-Assessment and Self Development, Goal Setting, Emotional Intelligence, Working in a team, Leadership

Text Books

1. Rizvi Ashraf, Professional Communication, Tata McGraw Hill Education
2. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York,2004
3. Agna Fernandez, Generic Skills for Employability, Cambridge , 2020
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Roald Dahl 'Lamb to the Slaughter' and Saki 'The Open Window' and /or 'The Lumber Room'From *The Collected Short Stories of Saki* and *The Collected Short Stories of Roald Dahl*

Reference Books

1. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
2. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.

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Course Code: BSCM201
Course Name: Engineering Chemistry
Contact: 3L/Week
Credit: 3
Allotted Hours: 45L

Course Objective:

The course intends to provide knowledge on atomic and molecular structure, periodic properties, intermolecularforces, stereochemistry and imparts basic idea on principles of thermodynamics and organic reactions.

Pre-requisite(s): 12th level Chemistry

Course Outcome: After competition of the course, students would be able to

CO1. Describe atomic and molecular structure in terms of wave functions. Represent energy levels through molecular spectroscopic methods. Understand the real gas properties and identify different short rangeforces.

CO2. Interpret periodic variation of different elemental properties. Deduce quantitative information aboutthe efficiency of various heat engines. Predict the spatial orientation of the molecules.

CO3. Establish molecular orbital diagrams. Differentiate different thermodynamic functions and relate electrochemistry to thermodynamics. Determine various organic compounds.

CO4. Relate empirical rate constants of chemical reactions to molecular processes. Correlate and evaluatethe steps and procedures in a few common experiments in chemical equilibria and kinetics.

CO5. Develop knowledge of fundamental properties of various organic compounds. Analyze the changes inorbitals energy levels of coordination compounds in presence of a crystal field created by surrounding ligands.

Module I: Atomic and Molecular Structure: [10H]

Schrodinger equation. Particle in a 1D-box solution and their applications to simple system. Crystal field theoryand the energy level diagram for transition metal ions and their magnetic properties.

Molecular orbital diagram of homo nuclear diatomic molecules. Pi molecular orbitals of butadiene and Benzeneand aromaticit. Band structure of solids and the role of doping on band structures.

Module IIA: Spectroscopic Techniques and Applications: [4H]

Principles of spectroscopy and selection rule. Electronic spectroscopy of diatomic molecules and applications. IRspectroscopy of diatomic molecule.

Module IIB: Intermolecular Forces and Potential Energy Surfaces: [4H]

Ionic, dipolar and Vander walls interactions, equation of state of real gases and critical phenomena.

Module III: Periodic Properties: **[4H]**

Effective nuclear charge, penetration of orbitals, variations of s, p, d, and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic radii, ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

Module IV: Use of free energy in chemical equilibrium **[10H]**

System, Properties, reversible and irreversible process, thermodynamic functions: Internal energy, enthalpy, First law of thermodynamics, heat capacity, Second law of thermodynamics, carnot cycle, entropy and free energy. Estimations of entropy and free energies.
Electrochemical cell: Free energy and emf. Cell potentials, Nernst equation and applications.

Module VA: Stereochemistry **[7H]**

Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereoisomers, optical activity, absolute configurations and conformational analysis.

Module VB: Organic Reactions: **[6H]**

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ringopenings. Synthesis of commonly use drags molecule.

Text Books:

1. A Text Book of Physical Chemistry by KK Sharma and L K Sharma, Vikas Publishing.
2. Physical Chemistry by Peter Atkins and Julio de Paula's, Oxford.
3. Inorganic Chemistry: Principles of Structure and Reactivity, J. E Huheey, E. A. Keiter, R. L. Keiter, Pearson.
4. Concise Inorganic Chemistry: Fifth Edition by J.D. Lee, Wiley.
5. Organic Chemistry: Structure and Function by K P C Volhardt and NE Schore, publisher W. H. Freeman.
6. Fundamentals of Molecular Spectroscopy by C N Banwell, McGraw Hill Education.
7. Organic Chemistry Vol 1, by I. L. Finar, Pearson.

Reference Books:

1. A Text Book of Physical Chemistry by A.S. Negi and S C Anand, New Age International.
2. Organic Chemistry: Structure and Function by K P C Volhardt and NE Schore, publisher W. H. Freeman.

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Course Code: BSCM202
Course Name: Probability & Statistics
Contact: 3L/Week
Credit: 3
Allotted Hours: 45L

Course Objective:

The objective of this course is to familiarize the students with statistical techniques. It aims to equip the studentswith standard concepts and tools at an intermediate to advanced level that will serve them well towards tacklingvarious problems in the discipline.

Pre-requisite(s): Basic Knowledge of Set Theory, Linear Algebra and Calculus

Course Outcome: After the completion of the course, students would be able to

CO1. Remember and understand the basic concepts of descriptive statistics and solve related problems, evaluate the problems of Correlation and Regression methods.

CO2. Recall the basic knowledge on fundamental probability concepts, including conditional probability and Bayes' Theorem, apply them to evaluate various related problems.

CO3. Understand the basic concepts of random variable, analyze several well-known distributions and solve related problems.

CO4. Remember the basic concepts of Estimation theory and Illustrate the concept of estimation techniques, analyze and evaluate different problems regarding estimation.

CO5. Describe and solve different methods of hypothesis testing and evaluate the results obtained in Z-test,T-test and F-test.

Module I: Descriptive Statistics **[9H]**

Frequency Distribution, Measures of Central Tendency and Dispersion, Moments, Skewness and Kurtosis.Analysis of bivariate data, correlation, regression, method of curve fitting, rank correlation, multiple regression.

Module II: Probability Theory **[5H]**

Review of Basic Probability, Independent events, Conditional Probability, Bayes' Theorem, Application of Bayes' Theorem.

Module III: Probability Distributions **[11H]**

Random variables, Probability Distribution of Discrete and Continuous random variables, Joint Distributions, Expectation, Mean and Variance of Discrete, Continuous and Joint Distributions, Standard Distributions - Binomial, Geometric, Poisson, Uniform, Normal and Exponential distributions, Moments and Moment generating functions of Discrete and Continuous distributions.

Module IV: Parametric Estimation **[11H]**

Population and Sample, sampling distributions, Estimation: Meaning and types, Maximum Likelihood

estimator,Method of moment estimators, Unbiasedness, sufficiency, consistency, efficiency. Confidence Intervals

Module V: Testing of Hypothesis **[9H]**

Statistical hypothesis, testing a hypothesis and significance, Testing of hypothesis for Means and Variances, OneWay ANOVA.

Text Books:

1. "Fundamentals of Mathematical Statistics", S. C. Gupta, V. K. Kapoor, Sultan Chand and Sons, 12th Edition
2. "Probability and Statistics for Engineers and Scientists" , R. E. Walpole, R. H. Mayers, S. L. Mayers and K. Ye, Pearson Education, 8th Edition.
3. "Introduction to Probability and Statistics for Engineers and Scientists", Sheldon M. Ross, AcademicFoundation, 4th Edition.

Reference Books:

1. "Applied Statistics and Probability for Engineers", *Douglas C. Montgomery,* Wiley India,5th Edition.
2. "Probability & Statistics", Spiegel, M. R., Schiller,J. and Srinivasan, R. A. TataMcGraw Hill, 3rd Edition.

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Course Code: BSCM203
Course Name: Biology for Engineers
Contact: 2L/Week
Credit: 2
Allotted hours: 30L

Course Objective:
The objective of the course is to provide an overview on Biological concepts from an engineering perspective.

Pre-requisite(s): Knowledge of basic Biology of Class 12th.

Course Outcome: After the completion of the course, students would be able to:

CO1: Remember and understand basic biological principles and organizational structure of living systems at molecular level.

CO2: Know Energy transformations and information processing in biological systems and appreciate biological processes with an engineering perspective.

CO3: Know about different Biosensors and judge their applications in the common corridors of biology and engineering.

CO4: Analyse the programming algorithms and compare different models.

Module I: Biomolecules and biopolymers [3H]

Structure and Function, Organic and inorganic molecules; Unique Properties of water, Vitamins and Minerals, Carbohydrates, Lipids, Amino Acids, Proteins and Nucleic Acids, Cell as a basic unit of life, prokaryotic and eukaryotic cells, Cell organelles, Cell membrane, Levels of organization: cells, tissues, organs, systems and organisms.

Module II: Transport Phenomena and Communications in Biological Systems [5H]

Membrane channels and ion channels; Fluid flow and mass transfer (nutrients & ions); Transport in plants and animals, Heat Transport - Body temperature regulation. Communication: Cell junctions, Cell-cell communications, cell signalling, Hormones, Pheromones and cell behaviour, Defence mechanisms: In plants: Herbivore, secondary metabolites, In animals: Innate and Adaptive immune systems.

Module III: Engineering perspectives of biological sciences [5H]

Biology and engineering, crosstalk – Hybridoma, technology, Plant Tissue Culture, Animal Cell Culture; Tissue Engineering: Principles, methods and applications, Nano biotechnology. Introduction to Biomimetics and Biomimicry, Biomimetic Principles, steps in biomimetic method, Biomimetic Material and working principle.

Module IV: Biosensors [8H]

Introduction; General configuration of biosensor; Generations of biosensors; Basic principle and instrumentation of different biosensors: electrochemical, optical, acoustic, piezoelectric, and calorimetric biosensors; Biological recognition systems: enzyme, antibody, nucleic acid, cell, and tissue;

Properties of ideal materials for biosensors; Application of biosensors for food and fermentation processes, environment monitoring, and clinical diagnostics. Concept of Actuators and Biomimetic Actuation device and systems.

Module V: Bioinformatics [9H]

Sequence similarity, homology, and alignment. Pair wise alignment: Scoring model, pair wise alignment using Hidden Markov models (HMM). Multiple alignment: local alignment gapped and un-gapped global alignment. BLAST, FASTA. Phylogenetic tree construction: Neighbour Joining Algorithm.

Text Books:

1. Biology for Engineers, Rajiv Singal, Gaurav Agarwal, Ritu Bir. CBS Publishers and Distributors, Pvt. Ltd. 1st Ed. 2019.
2. Yoseph Bar-Cohen, "Biomimetics- Biologically Inspired Technologies", 2005.

Reference Books:

1. Data Mining Concepts and techniques, Han & Kamber, Elsevier
2. Introduction to Bioinformatics, Arthur M. Lesk, Oxford University Press
3. Developing Bioinformatics Computer Skills, Cynthia Gibas, Per Jambeck, O'Reilly
4. An Introduction to Bioinformatics Algorithms, Neil C. Jones, Pavel A. Pevzner, MIT Press (MA)
5. Molecular Biology of the Cell, Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter, New York: Garland Science; 2002
6. Bioinformatics: Sequence and Genome Analysis, David W. Mount, Cold Spring Harbor Laboratory Press

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Course Code: ESCM201
Course Name: Programming for Problem solving
Contact: 3L/Week
Credit: 3
Allotted hours: 45L

Course Objective:

The objective of this course is to learn to formulate simple algorithms for arithmetic and logical problems and translate the same to C programs. This course also aims to test and execute the programs with correct programming syntax. This also emphasizes on the concept of conditional branching, iteration and recursion along with functions, arrays, pointers and structures. This course also gives basic ideas of sorting and searchingalgorithms.

Pre-requisite(s): Basic Computer Fundamentals

Course Outcome: After the completion of the course, students would be able to:

CO1: Define, describe and develop algorithms, flowcharts to solve the logical and numerical problems.

CO2: Explain and apply the knowledge of arithmetic, logical and conditional expressions and operationsto develop C program.

CO3: describe and classify different loops structures to solve critical problems using C

CO4: Define and Differentiate among different functions and determine the applications of functions toestablish algorithms.

CO5: define and differentiate the structures and storage of data to illustrate the way of handling the data in C programming

Module I: **[9H]**

Introduction to Programming

Introduction to components of a computer system, Idea of Algorithm, Representation of Algorithm: flowchart/Pseudo code with examples, Variables, Syntax and Logical Errors in compilation.

Arithmetic expressions and precedence

Arithmetic Expression with example, Typecasting.

Conditional Branching

Conditional Branching and Loops.

Module II: **[9H]**

Arrays

Arrays (1-D, 2-D), Character arrays and String.

Function

Functions, Parameter passing in functions, call by value, call by reference,

Recursion

Recursion with example programs, Factorial, Fibonacci series

Module III: **[9H]**

Structure

Structures, Declaring a Structure, Accessing Structure Elements, Array of Structure, Uses of Structures

Module IV: **[9H]**

Pointers

Pointers, The Pointer to an Array, The Pointer to a Function, The Pointer to A Structure, Types of Pointers, Accessing Pointers - Indirectly and Directly

Module V: **[9H]**

File handling

File, File operations, A File-copy Program, Writing to a File, File opening Modes.

Text Books:

1. "Programming in ANSI C", E. Balaguruswamy, Tata McGraw-Hill
2. "Outline of Programming with C", Byron Gottfried, Schaum's ,McGraw-Hill
3. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall

Reference Book:

1. **"**Computer Concepts and Programming in C" R. S. Salaria, , Khanna Publishers.

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Course Code: HSMCM291
Course Name: Effective Communication Skills Lab
Contact: 3P/Week
Credit: 1.5
Allotted hours: 45L

Course Objective:
The aim of the course is to instill confidence in students by enhancing their communication skills through activity based sessions and audio-visual aids.

Pre-requisite(s): Basic knowledge of English

Course Outcome: After taking this course the students should be able to:

CO1: Identify the common errors in speaking and writing English, learn to apply English with proper grammar and sentence structures.

CO2: Read effortlessly with proper knowledge of vocabulary and pronunciation, also understand and employ knowledge of academic, non-academic and technical writing as well.

CO3: Learn and apply listening and speaking skills thoroughly effectively in keeping with the demands of the industry and entrepreneurial endeavors.

CO4: Think critically and express ideas fluently in English language.

Module I: Listening Skills **[5H]**
Listening to audio clips, inspirational videos, telephonic conversations, aural comprehension, pronunciation, voice modulation and clear articulation.

Module II: Speaking Skills **[15H]**
Self-introduction, Pronunciation practice through audio-visual aids, Extempore, JAM, Speech, Dialogue-Situation-based conversation, Word Power (Vocabulary based activities) , Group Discussion, Debate, Mock Interviews, Presentation Skills , Art of Story-telling (for example for brand promotion etc.)

Module III: Reading and Writing Skills **[15H]**
Reading and understanding technical/non-technical passages, dialogues, essays and short stories for comprehension practice, academic and technical writing, common errors, formal/ official correspondences (letters, emails, memos, reports, agenda & minutes of meeting, Resume/CV, Cover Letter)

Module IV: Lab Activities **[10H]**
Quizzes, Role-play, Group Discussion sessions, delivering Presentations, Mock-Interviews, Teamwork and Time-management based activities

Text Books:

1. Advanced Manual for Communication Laboratories and Technical Report Writing. D. Sudha

Rani.Pearson. New Delhi. 2012
2. Cambridge Interchange 5th Edition, Better Learning Series -Books 1, 2 and 3 . Jack C. Richards
3. Contemporary Communicative English for Technical Communication. Pearson. New Delhi. 2011
4. On Writing Well. David Zinsser. Collins; 6th Edition Revised and Updated.2001

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Course Code: BSCM291
Course Name: Engineering Chemistry Lab
Contact: 3P/Week
Credit: 1.5
Allotted Hours: 45L

Course Objective:

This course intends to provide knowledge and practical applications on quantitative estimation, chromatographic techniques and handling of various instruments like pH meter, potentiometer, viscometer, conductivity meter.

Prerequisite: 12th level Chemistry

Course Outcome: After the competition of the course, students would be able to:

CO1: Examine the different water testing parameters and predict the quality of water.

CO2: Explain and evaluate different liquid properties like viscosity, surface tension etc.

CO3: Describe conductometric and pH metric titration and estimate quantitatively via application of thesetechniques.

CO4: Analyze the elemental composition of a salt and evaluating its implications on real-world applications.

CO5: Interpret the principle of TLC method and apply the technique to separate amino acids.

Module I: **[6H]**
Conductometric titration for determination of the strength of a given HCl solution by titrating againsta standard NaOH solution.

Module II: **[6H]**
pH metric titration for determination of strength of a given HCl solution against a standard NaOH solution.

Module III: **[3H]**
Determination of dissolved oxygen present in a given water sample.

Module IV: **[3H]**
To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution).

Module V: **[3H]**
Determination of surface tension and viscosity.

Module VI: **[3H]**
Thin layer chromatography.

Module VII: **[3H]**
Determination of the rate constant of a reaction.

Module VIII: **[3H]**
Determination of cell constant of a conductivity cell using 0.1M KCl solution

Module IX: **[3H]**
Saponification/acid value of oil

Module X: **[12H]**
Chemical analysis of a salt

Text Books:

1. Vogel's Qualitative Inorganic Analysis, G. Svehla, 7th edition, Pearson.
2. Vogel's Text Book of Quantitative Chemical Analysis, J. Mendham, R. C. Denny, J. D. Barnes, M. J. K. Thomas,6th edition, Pearson
3. Practical Physical Chemistry, S. R. Palit, S. K. De, Science Book Agency
4. B. Sc. Honours Practical Chemistry, S, Dutta, Bharati Book Stall.

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Course Code: ESCM291
Course Name: Programming for Problem solving Lab
Contact: 3P/Week
Credit: 1.5
Allotted Hours: 45L

Course Objective:

The objective of this course is to implement the basics concepts of C programming to solve simple to complex problems. This course also helps students to use the concept of C programming like conditional branching, iteration, recursion, function, array, pointer and structure to execute the programs by using the correct syntax.

Pre-requisite(s): Basic Computer Fundamentals.

Course Outcome: After the completion of the course, students would be able to:

CO1: Apply the knowledge of arithmetic and logical expression and operators to solve real life problems using C

CO2: Establish the concept of conditional statements to solve the real life problems using C

CO3: Categorise different types of iterations and develop program to solve critical computational and logicalproblems.

CO4: Apply the knowledge of different types of functions to ease the execution of a program to solvedifficult and complex problems.

CO5. Illustrate the concept of different types of structures and storage of data for solving real life problemsusing C.

Module I: Problem solving using computers: **[3H]**
Lab1: Familiarization with programming environment

Module II: Variable types and type conversions: **[3H]**
Lab 2: Simple computational problems using arithmetic expressions

Module III: Branching and logical expressions: **[6H]**
Lab 3: Problems involving if-then-else structures

Module IV: Loops, while and for loops: **[6H]**
Lab 4: Iterative problems e.g., sum of series

Module V: 1D Arrays: searching, sorting: **[6H]**
Lab 5: 1D Array manipulation

Module VI: 2D arrays and Strings **[6H]**
Lab 6: Matrix problems, String operations

Module VII: Functions, call by value, call by reference **[3H]**
Lab 7: Simple functions

Module VIII: Recursion, structure of recursive calls **[6H]**
Lab 8: Recursive functions

Module IX: Pointers, structures and dynamic memory allocation **[3H]**
Lab 9: Pointers and structures

Module X: File handling: **[3H]**
Lab 10: File handling.

Text Book:

1. Computer Concepts and Programming in C, R. S. Salaria, Khanna Publishers.

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Course Code: ESCM292
Course Name: Workshop / Manufacturing Practices
Contact: 3P/Week
Credits: 1.5
Allotted Hours: 45L

Course Objective:
The objective of this course is to gain knowledge about various types of metal removal, joining and manufacturing processes. This course also helps the students to use the concept of traditional manufacturing processes to correlate with the industry level.

Pre-requisite(s): NIL

Course Outcome: After the completion of the course, students would be able to:

CO1: Acquire skills in basic engineering practice to identify, select and use various marking, Measuring, and holding, striking and cutting tools & equipment's and machines.

CO2: Understand job drawing and develop jobs as per specifications in allotted time.

CO3: Inspect and develop the job for the desired dimensions and shape used in various manufacturing applications.

CO4: Illustrate and analyze different machines and equipment's adopting safety practices.

Module I: Carpentry: [9H]
i) Demonstration of different woodworking tools / machines. ii) Demonstration of different wood working processes, like planning, marking, chiseling, grooving, turning of wood etc. iii) One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.

Module II: Fitting: [9H]
i) Demonstration of different fitting tools and drilling machines and power tools ii) Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc. iii) One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.

Module III: Welding: [9H]
i) Demonstration of different welding tools / machines/gas cutting ii) Demonstration on SMAW, Resistance spot welding, Gas Welding, MAG and rebuilding of broken parts with welding. iii) One simple job involving butt, t- joint and lap join.

Module IV: Machine Shop: [9H]
i) Safety Precautions. Demonstration of different types of machine tools like lathe, shaper and slotting etc. ii). Nomenclature of single point cutting tools. iii) Preparation of one job in the Lathe machine involves the operation of Facing, Plane Turning, Step Turning, and Grooving.

Module V: Black Smithy Shop/Sheet Metal Working: [9H]

i) To prepare a 'Ring' from a given piece of mild steel rod by hand forging. ii) Demonstration of all the hand tools iii) To make an S-hook from a given round rod. iv) Demonstration of different sheet metal tools / machines. v) Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting.

Text Books:

1. Workshop Technology, Media Promoters and Publishers,S.K. Hajara Chaudhary, New Delhi, 2015
2. Workshop Technology, Dhanpat Rai and sons,B.S. Raghuwanshi, New Delhi 2014
3. Workshop Practice Manual, K. Venkat Reddy, BS Publications, Hyderabad 2014
4. Kents Mechanical Engineering Hand book, John Wiley and Sons, New York.

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Course Code: AUM-2
Course Name: Yoga and Sports
Contact: 1L/Week
Credit: Nil
Allotted Hours: 15L

Course Objective:

This audit course aims to evoke social consciousness among students about importance of the physical fitness through diverse yoga activities and sports. It is intended to make students aware of various aspects of health-related fitness by participating in various activities such as strength, flexibility, balance, coordination, basic sequencing and meditation through various asanas of yoga and sports. It is also intended to increase awareness about the problems associated with inadequate fitness and overcome them by active participation in yoga and sports.

Pre-requisite(s): Nil

Course Outcome: After the completion of the course, students would be able to:

CO1: Identify and explain the aims and objectives of Yoga and Physical education.
CO2: Evaluate the components of physical fitness and differentiate between health-related fitness and wellness.
CO3: Identify and assess the effectiveness of specific yoga poses in managing health conditions, such as hypertension, obesity, back pain, diabetes, and asthma.

Yoga and Sports **[15 H]**

Introduction to Physical Education and Yoga

Introduction to physical education, Meaning & definition of physical education, Aims & objectives of physical education, Changing trends in physical education.

Concept of physical fitness, wellness, lifestyle; Importance of physical fitness and wellness; Components of physical fitness; Components of health-related fitness; Components of wellness; Preventing health-fitness through lifestyle change and concept of Positive Lifestyle.

Meaning and importance of Yoga; Elements of Yoga; Introduction of Asanas, Pranayama, Meditation & Yogic Kriyas; Yoga for concentration & related Asanas (Sukhasana, Tadasana, Padmasana & Shashankasana); Relaxation Techniques for improving concentration - Yog-nidra; Yoga and lifestyle, Asanas as preventive healthcare measures.

Importance of Yoga in various health-related problems

Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana.

Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana.

Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana.

Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana.

Asthma: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

Text books:

1. Health, Yoga And Physical Education by Dr. H.L. Khatri and Dr. Suman Lata ParagonInternational Publishers
2. Modern Trends and Physical Education by Prof. Ajmer Singh.
3. Light On Yoga by B.K.S. Iyengar