Savitribai Phule Pune University, Pune

Ganeshkhind, Pune-411007 (MS) India

Skill Development Centre (SDC),

Bachelor of Vocation
(B. Voc.)

Course Structure

(Framed as per National Educational Policy 2020)

For
Manufacturing Technology
(Semester - I and II)

(Effective from June 2023 and onwards)

PROPOSED STRUCTURE AND SYLLABUS

FOR BACHELOR IN VOCATION

(Manufacturing Technology)

Eligibility: The eligibility condition for admission to B.Voc. programme shall be 10+2 or equivalent, in any stream.

Course Structure:

The course is equivalent to 4 credits. This Bachelor of Vocation programme is divided into six semesters having 132 credits. Each semester will have 22 credits.

Preamble:

Manufacturing Industry in India is growing rapidly and is also maturing at a faster pace not only in terms of size and model variants available but also in terms of technological advancements in new cars. Across all manufacturing segments, the technology is becoming more and more sophisticated with stringent regulations and increased customer awareness. Requirements of these technologically advanced vehicles, good qualified and well versed technical manpower will be required by all brands in the automobile industry all over the country. Manufacturing course intends to address this requirement through this course.

a) This programme is designed to produce a skilled manpower so that wide variety of options in Manufacturing automation would be available and it will improve the opportunities for the unemployed youth in the country in both the private and public sectors.

b) This programme aims to improve:
   (i) Quality of training
   (ii) High drop-out rates
   (iii) Linkages with Universities and industry
   (iv) Inadequacy of resources.

c) This programme is intended to offer practical training and skills needed to pursue an occupation straight away. It will provide options to the students to select the courses of their choice which are directly aligned to land a job in a chosen profession or a skilled trade. The end result of this programme is to enable an individual to at train self-employment.

Program Outcomes:

The Program Outcomes are the skills and knowledge which the students have at each exit level/at the time of graduation. These Outcomes are generic and are common to all exit levels mentioned in the programme structure.

i. Students with vocational training can find work in several state and central

government organizations, non-profit groups, academic institutions and in private sectors.

ii. This programme prepares students for specific types of occupations and frequently for direct entry into the labour market.

iii. After completion of this programme students will have enough competences, to get benefit from labour market opportunities.

iv. This programme would enable students to update their knowledge and professional skills for entering the work force executing income generating activities or occupying better positions;

v. At each exit level of this programme, students will be able to

a) Apply knowledge of general education subjects and skill development subjects to the conceptualization of engineering models.

b) Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

c) Conduct investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

d) Create, select and apply appropriate techniques, resources, and modern engineering tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

e) Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

f) Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

g) Demonstrate understanding of the social, health, safety, legal and cultural issues and the consequent responsibilities relevant to science and engineering practice.

h) Understand and commit to professional ethics and responsibilities and norms of science and engineering practice.

i) Understand the impact of science and engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development.

j) Demonstrate a knowledge and understanding of management and business practices, such as risk and change management and understand their limitations.

k) Recognize the need for, and have the ability to engage in independent and life-long learning.

Admission / Promotion Process:

In response to the advertisement for registration, interested students will have to register themselves. Admission will be done on the basis of performance of students at Common

Entrance Test (CET). The CET will be conducted in the month of June every year.

Credit-to-contact hour Mapping:

(a) One Credit would mean equivalent of 15 periods of 60 minutes each for theory lecture.

(b) For lab course / workshops / internship / field work / project, the credit weightage for equivalent hours shall be 50% that for lectures.

Attendance:

Students must have 75 % of attendance in each course for appearing examination otherwise he / she will not be strictly allowed for appearing the examination of each course.

Departmental Committee:

The Departmental Committee (DC) of the Centre will monitor the smooth functioning of the programme.

Results Grievances / Redressal Committee:

Grievances / redressal committee will be constituted in the department to resolve all grievances relating to the evaluation. The committee shall consist of Head of the department, the concerned teacher of a particular course and senior faculty member of Department of University. The decision of Grievances / redressal committee will have to be approved by Department committee.

Evaluation Methods:

The assessment will be based on 50:50 ratio of continuous internal assessment (CIA) and semester end examination (SEE). Separate and independent passing in CIA and SEE will be mandatory. In case of failure in CIA of a particular course, students will have to appear for the same CIA, at his/her own responsibility in the next academic year, when the same course is offered during regular academic session or decided by the Internal Faculty. However, in case of failure in SEE in particular course(s), exam will be conducted in immediate subsequent semester.

In case a student fails in certain course(s) in a particular semester and the same course(s) are modified / revised / removed from the curriculum in due course, the student will have to appear as per the newly framed curriculum and/or pattern in subsequent semester, at his/her own responsibility.

Continuous Internal Assessment (CIA):

There will be 50 marks for Continuous Internal Assessment. A teacher must select a variety of procedures for the examinations such as-

- Written test / Mid Term test
- Term Paper

- Journals / Lectures / Library notes
- Seminar / Presentations
- Short Quizzes
- Assignments
- Extension Work
- Open Book Test
- Project by Individual / Group of Students.

Semester End Examination (SEE):

- The semester end theory examination for each theory course will be of 50 marks. The total marks shall be 100 for 4 credit theory course (50 marks semester end exam + 50 marks CIA).
- Semester end examination (SEE) time table will be declared by the departmental committee (as per the university annual calendar). The paper setting and assessment of theory courses, laboratory courses and project will done by external (50 %) and internal (50%) examiners. However, in case of non-availability of external examiner for either paper setting or assessment or both, department committee will be empowered to take appropriate decision.
- Pattern of semester end examination of theory course will consist of:
  - Multiple choice questions / fill in the blanks / answer in sentence as compulsory questions and it should cover entire course curriculum.
  - Descriptive questions on entire course curriculum.
  - Number of sub questions (with allotment of marks) in a question may be decided by the examiner.
- Assessment of laboratory courses and project will also have 50% internal and 50% semester end assessment. The semester end practical examination will be conducted at the end of each semester along with the theory examination.
- At the end of each semester, the Departmental Committee will assign grades to the students. The result sheet will be prepared in duplicate.
- The Director of the Centre shall send all results to the Director of Examination for further processing.

Earning Credits:

At the end of every semester, a letter grade will be awarded in each course for which a student had registered. A student's performance will be measured by the number of credits that he/she earned by the weighted Grade Point Average (GPA). The SGPA (Semester Grade Point Average) will be awarded after completion of respective semester and the CGPA (Cumulative Grade Point Average) will be awarded at the respective exit point.

Standards of Passing

No. of Credits	Int Marks Total	Ext Marks Total	Total Marks	Int Passing Marks	Ext Passing Marks	Total Passing Marks

				(30%)	**(30%)**	**(40%)**
1	10	15	25	03	05	10
2	25	25	50	08	08	20
3	35	40	75	11	12	30
4	50	50	100	15	15	40
5	50	75	125	15	23	50
6	75	75	150	23	23	60
12	150	150	300	45	45	120

Grading System:

- The grading reflects a student-own proficiency in the course. A ten point rating scale shall be used for the evaluation of the performance of the students to provide letter grade for each course and overall grade for the Programme. Grade points are based on the total number of marks obtained by him / her in all heads of the examination of the course. The grade points and their equivalent range of marks are shown in Table

Letter Grade	**Points**	**Marks Obtained**
O (Outstanding)	10	80-100
A+ (Excellent)	9	70 - 79
A (Very Good)	8	60 - 69
B+ (Good)	7	55 - 59
B (Above Average)	6	50 - 54
C (Average)	5	45 - 49
P (Pass)	4	40 - 44
F (Fail)	0	0 - 39
Ab (Absent)	0	0

Grade Point Average	**Final Grade**
9.00 - 10.00	O
8.50 - 8.99	A+

7.50 - 8.49	A
6.50 - 7.49	B+
5.50 - 6.49	B
4.25 - 5.49	C
4.00 - 4.24	P
0.00 - 3.99	F

- Non-appearance in any examination / assessment shall be treated as the students have secured zero marks in that subject examination / assessment.
- Minimum P grade (4.00 grade points) shall be the limit to clear / pass the course / subject. A student with F grade will be considered as "failed" in the concerned course and he / she has to clear the course by appearing in the next successive semester examinations. There will be no revaluation or recounting under this system.
- Every student shall be awarded grade points out of maximum 10 points in each subject (based on 10 point scale). Based on the grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and CGPA will be given at respective exit point.

Computation of SGPA (Semester Grade Point Average) and GPA (Grade Point Average):

Grade in each subject / course will be calculated based on the summation of marks obtained in all subject / course.
The computation of SGPA and CGPA will be as below

- Semester Grade Point Average (SGPA) is the weighted average points obtained by the students in a semester and will be computed as follows

$$\textbf{Credit Point (CP) = Credit (C) × Grade Point (G)}$$

$$\textbf{SGPA } (S_i) = \sum (C_i \times G_i) / \sum C_i$$

SGPA = Semester Grade Point Average

C_i = Number of credits of the i^{th} course component

G_i = Grade Point scored by the student in the i^{th} course component

The SGPA will be mentioned on the grade card at the end of every semester.

- The Grade Point Average (GPA) will be used to describe the overall performance of a student in all semester of the course and will be computed as under.

- **Grade Point Average =** $\frac{\text{Total of Grade Point Earned} \times \text{Credits for Each Course}}{\text{Total Credits}}$

$$\mathbf{CGPA} = \sum (C_i \times S_i) / \sum C_i$$

CGPA = Cumulative Grade Point Average

S_i = SGPA of the i^{th} semester

C_i = Number of credits in that semester

The SGPA and GPA shall be rounded off to the second place of decimal.

Grade Card:

Results will be declared by the Centre and the grade card (containing the grades obtained by the student along with SGPA) will be issued by the university after completion of every semester. The grade card will be consisting of following details.

- Title of the courses along with code opted by the student.
- Credits associated with the course.
- Grades and grade points secured by the student.
- Total credits earned by the student in a particular semester.
- Total credits earned by the students till that semester.
- SGPA of the student.
- CGPA of the student (at respective exit point).

Semester - I

Subject Code	Course Name	Course Type	Type of Course	Credits	Internal Marks	External Marks	Total
MTT1.1	General Foundation Course	Department Specific Core-	Theory	2	25	25	50
MTT1.2	Basic Electronics	Department Specific Core-	Theory	2	25	25	50
MTT1.3	Basic Mechanical Engineering	Department Specific Core	Theory	2	25	25	50
MTT1.4	Electronics and Mechanical Lab	Vocational Skills Course (Dept Subject based on Major & Minor)	Practical	2	25	25	50
MTT1.5	Personality Development	Skills Enhancement Course **(Basket)**	Theory/Practical	1+1	25	25	50
MTT1.6	Environmental Awareness	Value Education Course	Theory + Practical	1+1	25	25	50
MTT1.7	Communicative English language	Ability Enhancement Course (AEC)	Theory	2	25	25	50
MTT 1.8	Health and Well Being	Co-Curricular		2	25	25	50
MTT 1.9	From Other Faculty	General /Open Elective (Other Faculty)	Theory	2	25	25	50
MTT 1.10	From Other Faculty	General/ Open Elective (Other Faculty)	Practical	2	25	25	50
MTT 1.11	IKS BOS	Indian Knowledge System **(Basket)**	Theory	2	25	25	50
Total				22 Credits	275	275	550

General foundation course (MTT1.1)

Marks : 50 **Credits : 2**
Contact Hrs. : 30

Chapter- 1: Applied Physics (10Hrs)

1. Units & Dimensions: M.K.S. fundamentals & derived units, S.I. base unit's supplementary units and derived units, Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures Dimensions of various physical quantities, uses of dimensional analysis.

2. Laws of Motion: Intuitive concept of force, Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces, Static and kinetic friction, laws of friction, rolling friction, lubrication. Dynamics of uniform circular motion

3. Surface Tension and Viscosity: molecular forces, molecular theory of surface tension, surface energy, capillary action, concept of viscosity, coefficient of viscosity, principle and construction of viscometers.

4. Vibrations: Vibration as simple spring mass system, elementary and qualitative concept of free and forced vibrations, resonance. Effects of vibrations on building bridges and machines members.

5. Heat: Temperature and its measurement, thermoelectric, platinum resistance thermometers and pyrometers. Conduction through compound media and laws of radiations.

6. Optics: Nature of light, reflection and refraction of a wave from a plane surface. Overhead projector and Epidiascope.

Chapter -2: Applied Chemistry (10hrs)

1. Structure of Atom:

Rutherford model of the structure of atom, Bohr's theory of electrons, quantum numbers and their significance, de-Broglie equation and uncertainty principle, electronic configuration of 1 to 30 elements

2. Periodic Properties of Elements: Periodic law, periodic table, periodicity in properties like atomic radii and volume, ionic radii, ionization energy and electron affinity, Division of elements into s, p, d and f blocks

3. Chemical Bonds: Electrovalent, covalent and coordinate bond and their properties, Metallic bonding (electron cloud mode) and properties (like texture, conductance, luster, ductility and malleability).

4. Fuel and their Classification: Definition, characteristics, classification into solid, liquid and gaseous fuel, Petroleum and brief idea of refining into various factions and their characteristics and uses, Calorific value of fuel, Gaseous fuels- preparation, properties, composition and use of producer gas, water and oil gas.

5. Corrosion: Its meaning, theory of corrosion, prevention of corrosion by various methods using metallic and non-metallic coatings

6. Plastic and Polymers: Plastic-thermo-plastic and thermo-setting, Introduction of Polythene. P.V.C. Nylon, synthetic rubber and phenol-formal-dehyde resin, their application in industry.

Chapter- 3: Applied Mathematics (10Hrs)

1. Basic Aptitude- Fundamental Arithmetical Operation- Addition, Subtraction, Multiplication and Division. Applied Workshop Problems Involving Addition, Subtraction, Multiplication and Division, System Of Units – Definition, Different Types & System Of Units i.e.(C.G.S. & SI Units for Length, Mass, Area, Volume, Capacity, Time) HCF, LCM, Square Root Cube Root. Ratio and proportion.

2. Trigonometry – Introduction, Trigonometric Identities, Quadrant Rule, Trigonometric Ratios of Some Specific Angles, Ratios of Complementary Angles, Trigonometrical ratios, measurement of angles. Trigonometric tables

3. Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi-circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.

Mass, Weight and Density: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.

Speed and Velocity: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.

4. Algebra- Algebraic Expressions and Identities, Terms Coefficients and Factors, Monomials Binomials and Polynomials, Addition, Subtraction, Multiplication and Division of Algebraic Expressions, Algebraic formula Standard Identities and Their Applications.,

5. Basic Statistics and Probability

Reference Books:

1. Chemistry, Satyaprakash, Khanna Publishing House
2. Engineering Chemistry, Saiful Islam, Khanna Publishing House
3. Applied Mathematics-I, J.K. Tyagi, Khanna Publishing House
4. Engineering Mathematics, Reena Garg, Khanna Publishing House

Electronics System (MTT1.2)

Marks : 50 **Credits 2**

Contact Hrs 30

Analog Electronics (20 Hours)

Chapter - 1: Basic Circuits Concepts

Passive components, Resistance, Inductance, Capacitance, series, parallel combinations, Ohm's Law, Series/ parallel resistance circuits, Kirchhoff's law, Definition of Resistance, Voltage, Current, Power, Energy and their units, Relation between electrical, Difference between AC and DC voltage and current, Voltage and Current sources, Symbols and Graphical Representation Overview of AC, DC, Cells and Batteries, Energy and Power.

Chapter -2: Basics of Semiconductor

Semiconductor materials, Metals and Semiconductors and Photo-electric emission, N-type and P-type semiconductor, Effects of temperature on Conductivity of semiconductor, PN junction diode, depletion layer, Forward & Reverse bias, V-I Characteristic, Effects of temperature, Zener diode, Photo diode, LED, Types and applications of diode, Diode as a rectifier, Half wave and full wave rectification, Zener diode Regulator,

Chapter - 3: Semiconductor Devices

Diodes: Semiconductor Diode Characteristics,
Diode circuits: Clipper, Clamper circuits
Transistor: BJT configuration and biasing, Concept of Differential amplifier using BJT, BJT switch and Logic circuits, Principle of MOSFET and CMOS, MOSFET as logic circuits. Light-emitting diode (LED), Photocell, Phototransistor.

Chapter - 4: A.C Circuits

Generation of A.C. voltage, its generation and wave shape. Cycle, frequency, peak value, R.M.S. value, form factor, crest factor, Phase difference, power and power factor

Chapter - 5: The Operational Amplifier and Oscillator

Basic model; Virtual ground concept; Inverting Amplifier, Non-inverting Amplifier, Integrator, Differentiator, Summing Amplifier and their applications, Basic feedback theory; positive and negative feedback; Oscillator, Waveform generator using Op-Amp for Square Wave, Triangular Wave, Wien Bridge Oscillator for sinusoidal waveform. n

Chapter - 6: Digital Electronics (10 Hours)

Number systems, Binary arithmetic, Logic gates: OR, NOT, AND, NOR, NAND, XOR, XNOR gate; Truth tables, Multiplexers, De-mux, Encoder, Decoder, Latch, flip-flop: S-R flip-flop, JK flip-flop, Master-Slave flip-flop; D-flip flop, Sequential circuits: Generic block diagram; Shift registers; Counters.

Reference Books:

1. Basic Electronics, S. Biswas, Khanna Publishing House
2. All in One Electronics Simplifies, A.K. Maini, Khanna Publishing House
3. Basic Electrical Engineering, Ritu Sahdev, Khanna Publishing House
4. Basic Electrical Engineering, Pradeep Kumar, Khanna Publishing House

Basic mechanical engineering (MTT1.3)

Marks : 50 **Credits: 2**
Contact Hrs. 30

Chapter – 1: Strength of Materials & Power Transmission

Stress, strain, elastic constraints, stress in circular shaft subjected to pure torsion only, Riveted and bolted joints.

Shear Force & Bending Moment

Elementary idea of Shear force and bending moment for concentrated, uniformly Distributed loads on simply supported beam cantilever and overhanging beam, Simple Shear force and bending moment diagrams, Relationship between shear forces and bending moment

Chapter – 2: Power Transmission:

Pulleys, Gears & Shaft Classification of Pulleys, Types of Belts, Simple calculation of pulley diameter, Classification of Gears, Simple calculation of number of teeth and speed, Power transmission by solid and hollow shaft

Chapter – 3: IC ENGINES

Basics of Thermodynamics:- Basic definition of heat, work, Thermodynamic process, parameters of working body and their units, Equation of state, Universal gas constant, External & internal combustion engines, working of diesel and petrol engine, horse power of IC engines

Steam Generators & Condensers Construction and working of Babcock & Wilcox boiler, Cochran boiler, Steam condenser & its types

Chapter – 4: Hydraulics & Hydraulic Machines

Properties of fluids, pressure of fluid and its measurement. Flow of fluids, velocity and discharge, Bernoulli's theorem and its application in venturimeter, flow through pipe, head loss due to friction

Water Turbines & Pumps: - Capacity & Working of Turbines- Pelton and Reaction, reciprocating and centrifugal pump

Chapter – 5: Energy Sources and Power Plants

Definition, Various forms of energy, Classification of energy sources, Conventional and Nonconventional energy sources, Various types of non-conventional energy sources, Advantages of non-conventional energy sources, Energy sources and overall energy demand,

Availability of energy sources, Energy consumption in various sectors and its changing pattern, projected energy demands. Example :Various power plants and their working.

Reference Books:

1. Basic Mechanical Engineering, M.P. Poonia & S.C. Sharma, Khanna Publishing House
2. Strength of Materials, D.S. Bedi, Khanna Publishing House
3. General Mechanical Engineering: Jk Kapoor
4. Mechanical Engineering: Khurmi & Gupta

Electronics & mechanical lab (MTP1.4)

Marks : 100 **Credits : 4**
Contact Hrs :60

List of Practical's:

1. Familiarization with passive components
2. Verification of Ohm's Law
3. Study of series resistive circuits
4. Study of parallel resistive circuits
5. Study of series and parallel connection of cells in circuits
6. Charging and Discharging of a capacitor
7. Study of current and voltage measurement using Ammeter and Voltmeter
8. Study of current, voltage and resistance measurement using of Multi-meter
9. Function generator and Oscilloscope
10. Study of working principle of Signal Generator and measurement of amplitude, time period and frequency of signal using Oscilloscope
11. Study CE, CB & CC configuration for NPN and PNP transistors
12. Diode characteristics, rectifiers, Zener diodes
13. Bipolar junction transistor characteristics
14. Voltage amplifiers using op-amp, Comparators, Schmitt
15. Wave generators using op-amp
16. Study of Basic Gate (AND, OR & NOT)
17. Study of Universal Gates (NAND & NOR)
18. Study of different types of constrained motions
19. Study of different belt and chain drives
20. Study of different gears
21. Study of Simple and Compound gear train
22. Study of different cam and follower arrangements

Personality Development (MTT1.5)

Marks : 50 **Credits 2**

Contact Hrs. : 30

Introduction to Personality Development

1. The concept of personality
2. Aspects of Personality
   Physical, Emotional, Intellectual, Spiritual
3. Body language – Aspects of Positive Body language
   Eye contact, gesture, posture
4. Problem-solving
5. Traits of Personality
6. SWOT analysis

(Activities based on topics like games, group discussion)

Developing Positive Attitude

1. Positive Attitude towards Life
2. Concept
3. Positive attitude
4. Advantages of Positive Attitude
5. Ways to develop positive attitude
6. Interact with positive people and positive environments, be helpful to others, get pleasures from small things in life, develop hobbies
7. Self-Image & Self Esteem

3.0 Life Skills

8. Problem-solving
9. Conflict and Stress Management
10. Decision-making skills
11. Leadership and qualities of a successful leader
12. Character building and image Building
13. Team-work
14. Time management
15. Work ethics
16. Good manners and etiquette

(Activities based on topics like games, group discussion)

1. Assignment based on Life skills.
2. Assignment based on Personality Development.
3. Assignment based on Time Management.
4. Assignment based on Team Building and Leadership.
5. Assignment based on Problem Solving and Decision Making skills
6. Assignment based on Effective Communication.

MTT 1.6 Environmental Awareness

Course Category: Value Education Course Course Credit: 02

Theory 1+ Practical 1 Max. Marks: 50

Objective:

To create awareness between the students about our ecosystem, related problems and our role in that. The course also aims to encourage students to solve the environment related problems

Learning Outcomes

Chapter 1: 10 hours

Recognize the need for learning the topic and develop foundational knowledge on the environmental studies.

Multidisciplinary nature of environmental studies: Natural Resources, Natural resources and associated problems; Forest, Water, Mineral, Food, Energy, Land resources; soil erosion and desertification; Role of an individual in conservation of natural resources.

Chapter 2: 10 hours

Think on ecosystem and environment problems; make people aware about environment problems

Ecosystems: Ecosystem: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession; Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem.

Chapter 3: 12 Hours

Appreciate the need of biodiversity conservation in the context of various developmental pathways. Biodiversity and its conservation: Ecosystem diversity; Biogeographically classification of India; Value of biodiversity; Biodiversity at global, National and local levels; India as a mega-diversity nation; Threats to biodiversity; Conservation of biodiversity.

Chapter 4: 8 hours

Suggests ways for hygiene, health, managing waste, disaster/emergency situations and protecting/saving resources Environmental pollution: Types, causes, effects and controls; Air, water, soil and noise pollution, Nuclear hazards and human health risks; Swach Bharat Abhiyan, Solid waste management.

Chapter 5: 5 hours

Understand the Environmental Pollution and identifying hazards and assessing risk Fundamentals: Global warming, Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act.

Field work

1. Visit to a local area to document environmental assets river/forest/grassland/hill/mountain

2. Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural
3. Study of common plants, insects, birds.
4. Study of simple ecosystems-pond, river, hill slopes, etc.

Recommended Books:

1. E- book:https://ugc.ac.in/oldpdf/modelcurriculum/env.pdf
2. Industrial Safety and Health management" Pearson Prentice Hall,2003 by C. Ray, Asfahl
3. National Safety Council, "Accident Prevention Manual for Industrial Operations", N. S. C. Chicago, 1988.
4. Industrial Accident Prevention" McGraw-Hill Company, New York,1980 by Heinrich

MTT 1.7 Communicative English language

Course Category: Value Education Course — Course Credit: 02
Hours: 30 hrs — Max. Marks: 50

Course overview:

The aim of the syllabus is to prepare students to use English for their professional studies and professional needs in real life and work.

This preparatory course will further give the students the opportunity to speak on general topics, to communicate in Business environment and to understand texts on business in the English speaking world. The Basic User course incorporates 3 basic components:

1. General English
2. Professional (English for Specific Purposes) English

The course aims at developing a wide range of skills:

- Language Development, which involves grammar
- Writing skills
- Reading of general and business related texts
- Listening and comprehension
- Communication skills, which cover communication situations

Course objectives:

The main objectives of the syllabus are:

- to develop the students' reading skills
- to develop the students' writing skills based on specified task (140-160 words)
- to develop the students' listening skills to enable them to understand and apply specific information from the to develop the students' speaking skills to enable them to use general, social and professional language (within the framework of Breakthrough level);

- to develop the students' general capacity to a level that enables them to use English in their professional and academic environment

Methods of assessment:

- Individual and group oral presentations
- Oral interactions
- Written tests
- Essays
- Listening/ viewing
- Comprehension of simple reading passages

Course Outline

Part I: Basic English Grammar (1 Credit)

1. Sentence Development:
    a. Subject and Predicate
    b. Subject Verb Agreement
    c. Capitalization
    d. Punctuation
    e. Tenses: Present, Past and Future Tense
2. Parts of Speech
    a. Nouns and Verbs
    b. Adjectives and Adverbs
3. Modifiers and their uses
    a. Dangling and misplaced modifiers
4. Prefixes and Suffixes

Part II: Skills Development

Students are taught to develop their skills in:

Reading which includes:

Detailed reading, guessing unknown words from context, understanding text organization, recognizing argument and counter-argument; distinguishing between main information and supporting detail, fact and opinion, summarizing and note-taking.

Writing includes:

- Essay content and structure (patterns of organization, paragraphing, coherence and cohesion, punctuation).
- Punctuation

Listening includes:

- General comprehension (listening for detailed information, evaluating the importance of information).

Speaking includes:

- Presentation skills (introductions and stating the purpose, highlighting key points, summaries, conclusions).

Topics and activities

- My family. Myself.
- Meeting people. Making Contacts.
- A city
- Travelling.
- At a hotel.
- Making a phone call.
- Discussing business.

MTT 1.8 Health and Wellbeing

Course Category: Co Curricular — Course Credit: 02

Max. Marks: 50

Objective:

The course aims at creating consciousness among the students towards health, fitness and wellness and in developing and maintaining a healthy lifestyle.

Learning Outcomes:

1. The students will be able to understand the importance of a healthy lifestyle
2. The students would familiarize with physical and mental health
3. The students would become aware of various lifestyle related diseases
4. The students would build an understanding of stress management

Chapter 1: Introduction to health and wellness

Define and differentiate health and wellness. Importance of health and wellness Education. Local, demographic, societal issues and factors affecting health and wellness.

Chapter 2: Modern lifestyle and Health

Body systems and common diseases. Sedentary lifestyle and its risk of disease. Stress, anxiety, and depression. Factors affecting mental health. Identification of suicidal tendencies. Substance abuse (Drugs, Cigarette, Alcohol), de-addiction, counselling and rehabilitation.

Chapter 3: Diet and nutrition for health & wellness

Essential components of a balanced diet for healthy living with specific reference to the role of carbohydrates, proteins, fats, vitamins & minerals. Malnutrition, undernutrition and overnutrition. Processed foods and unhealthy eating habits.

Chapter 4: Management of health and wellness

LIFESTYLE/Hypo-kinetic Diseases and its Management - Diabetes - Hypertension - Obesity - Osteoporosis - CHD - Back pain Health related Physical Fitness and Assessment Body mass Index, Pulse Rate, Blood Pressure, Health Related Physical Fitness Test.

Books Recommended

1. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell.

2. Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021.

3. Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu & Jeff Lumiri, 2018.

Reference Books:

1. Corbin.Charles Beetal. C.A., (2004) Concepts of Fitness and Welfare Boston McGraw Hill.
2. Principles of Physical Education: Com. Philadelphia: W.B.Sounders · Puri. K.Chandra.S.S. (2005).
3. Health and Physical Education. New Delhi: Surjeet Publications

Semester - II

Subject Code	Course Name	Course Type	Type of Course	Credits	Internal Marks	External Marks	Total
MTT 2.1	Measurement systems	Department Specific Core-	Theory	2	25	25	50
MTT 2.2	Basic material science	Department Specific Core-	Theory	2	25	25	50
MTT 2.3	Manufacturing Technology I	Department Specific Core-	Theory	2	25	25	50
MTT 2.4	Mechanical Workshop and Measurement	Vocational Skills Course (Dept Subject based on Major & Minor)	Practical	2	25	25	50
MTT 2.5	Software Tools Engineering Drawing	Skills Enhancement Course **(Basket)**	Theory/Practical	1+1	25	25	50
MTT2.6	Basic Computer Skills	Value Education Course	Theory + Practical	1+1	25	25	50
MTT2.7	Entrepreneurship Development	Ability Enhancement Course (AEC)	Theory	2	25	25	50
MTT2.8	Yoga Education/	Co-Curricular		2	25	25	50
MTT2.9	Other Faculty Basket	General /Open Elective (Other Faculty)	Theory	2	25	25	50
MTT2.10	Other Faculty Basket	General/ Open Elective (Other Faculty)	Practical	2	25	25	50
MTT2.11	Other Faculty Basket	Indian Knowledge System **(Basket)**	Theory	2	25	25	50
Total				22 Credits	275	275	550

Measurement systems (MTT2.1)

Marks : 50 **Credits 2**

Contact Hrs. : 30

Chapter - 1: Introduction to Metrology 7 Hrs.

Metrology Basics: Definition, objectives and Categories of metrology, Need of inspection, Sources of errors, Factors affecting accuracy, Precaution, least count, uncertainty in measurement, linear and angular measuring instruments and their applications. Calibration: Concept and procedure.

Gauge R&R Standards and Comparators: Definition, line standard end standard, Wavelength standard, Slip gauge, Classification & use of comparators, Working principle of comparators, Sigma comparator, Pneumatic comparator- high pressure differential type, Electrical (LVDT), Relative advantages and disadvantages.

Chapter - 2: Limits, Fits, Tolerances and Gauges 5 Hrs.

Concept of Limits, Fits and Tolerances, Selective Assembly, Interchangeability, Hole and Shaft Basis System, Taylor's Principle, Design of Plug, Ring Gauges, IS919-1993 (Limits, Fits & Tolerances, Gauges IS 3477-1973), Study of relation gauges, concept of multi-gauging and inspection.

Chapter - 3: Advance Metrology 5 Hrs.

Angular Measurement: Concept, Instruments for Angular Measurements, Screw thread Measurements: ISO grade and fits of thread, Errors in threads, Pitch errors, measurement of different thread elements, method of thread measurements, Gear Measurement,, Measurement of Surface Finish: Surface texture, Parameters for measuring surface roughness, Contact & non-contact type surface roughness measuring instruments, Machine Tool Testing: Parallelism, Straightness, Squareness, Coaxiallity, roundness, run out, alignment testing of machine tools such as lathe, milling machine and drilling machine as per IS standard procedure. Study of optical flat for flatness testing

Unit 4: Electrical Measurements 5 Hrs

Basic Electric Measurement devices- Ammeter: DC Ammeter, Multi range Ammeter, Voltmeter, Multi Range Voltmeter; Loading, Calibration of Instruments. Multimeter: Multimeter operating instructions. Digital Voltmeter: Introduction, Resolution and Sensitivity of Digital meter, General specification of DVM. Oscilloscope: Introduction, Basic principle, Block diagram of Oscilloscope, Simple CRO.

Unit 5: Flow, Pressure and temperature Measurement 8 Hrs

Flow measurement - Flow: Definition, Types of Flow – Laminar, turbulent , Reynolds number Classification of flow measuring transducers : Variable head flow meter- Venturimeter, orifice plate meter, Variable area flow meter – Rota meter, Electromagnetic Flow meter,

Pressure measurement - Pressure: Definition, Types - Absolute, Gauge, Atmospheric, Vacuum (Definition, Units), Classification of Pressure measuring devices; Non elastic pressure transducer: U tube, Inclined Tube, Well type manometer; Elastic pressure transducer: Bourdon Tube, Bellows, Diaphragm, Capsule; Strain Gauge,

Temperature Measurement: Various types of thermometers, thermocouples, pyrometers

References:

1. D. S. Kumar, Mechanical Measurements & Control, Metropolitan Publications, New Delhi
2. R. K. Jain, Mechanical & Industrial Measurements, Khanna Publications, New Delhi
3. A. K. Sawhney, Mechanical Measurements & Instrumentation, Dhanpat Rai & Sons, New Delhi
4. R.V. Jalgaonkar, Mechanical Measurement & Control, Everest Publishing House, Pune
5. C.S. Narang, Instrumentation Devices & Systems, Tata McGraw Hill Publications
6. B. C. Nakra and K. K. Chaudhary, Instrumentation, Measurement and Analysis, Tata McGraw Hill Publication

Basic of Material Science (MTT2.2)

Marks : 50 **Credits 2**

Contact Hrs. : 30

Chapter - 1: General

Brief introduction to the subject metallurgy, their chemical thermal, electrical, magnetic, mechanical and technological properties and their selection criteria

STRUCTURE OF METALS AND THEIR DEFORMATION:

Structure of metals and its relation to their physical, mechanical and technological properties, Elementary idea of arrangement of atoms in metals, molecular structures, crystal structures and crystal imperfections, Deformation of metals, effects of cold and hot working operations over them. Recovery re-crystallization and grain growth, solid solutions, alloys and inter metallic compounds, effect of grain size on properties of metals.

PROPERTIES AND USAGE OF: (1) Metals: (a) Ferrous Metals (b) Non Ferrous Metals (2) Non-metallic Materials.

Chapter - 2: Metals-Ferrous Metals

(a) Classification of iron and steel. (b) Cast iron types as per I.S. - White, malleable, Grey (c) Steels: Classification of steels according to carbon content and according to use as per I.S. Mechanical properties of various steels and their uses. Availability of steel in market, Its forms and specifications (d) Alloy Steel: Effect of alloying various elements, viz Cr, Hi, Co, V,W, Mo, Si, and Mn, on mechanical properties of steel, Common alloy steels, viz, Ni-steel, Ni-Cr-steel, Tungsten steel, Cobalt steel, Stainless Steel, Tool steel- High Carbon Steel, High Speed steel, Tungsten Carbide, Silicon manganese steel, Spring Steel, Heat Resisting alloy Steels etc.

Chapter - 3: Non-Metallic Materials

(a) Plastic and Other Synthetic Materials: Plastics-Important Sources-Natural and Synthetic, Classification, thermo-set and thermoplastic, Various trade names, Important Properties and engineering use of plastics. Market forms of Plastics

(b) Paints, Enamels, Varnishes and Lacquers: Paints and Enamels-types, its purpose, essential ingredients and their role, characteristics of a good paints and enamel, trade names of some important types of products. Varnishes-types purpose of varnish, essential ingredients and their role, characteristics, preparation, trade names storage of varnish, Lacquer- characteristics, preparation and uses

Chapter - 4: Non-Metallic Materials

(c) Heat Insulating Materials: Classification of Heat Insulating material, properties and uses of China clay, Cork, Slag wool, Glass Wool, Thermocole, Puff, Properties and uses of asbestos as filler material.

(d) Hardware: General specification, uses and methods of storage of G.I. and C.I. steel, Copper, A.C. pressure conduits, R.C.C. spun, P.V.C. Pipes and their uses. General sheets

specification (I.S.) and uses, Method of storage of G.I. sheets, M.S. sheets, General specification of pipe fitting

Reference Books:

1. MATERIAL SCIENCE: RS Khurmi & RS Shedha
2. A Text-Book of Material Science and Metallurgy (O. P. Khanna)
3. Materials Science and Engineering by V. Raghavan.
4. Engineering Materials Properties and Selection, Budinski & Budinski, PHI
5. Material Science & Engineering, R. Balasubhramanium, Wiley India

Manufacturing Technology (MTT2.3)

Marks : 50 **Credits 2**

Contact Hrs. : 30

Chapter - 1: General Introduction:

(a) Scope of subject "Workshop Technology" in engineering (b) different shop activities and broad division of the shops on the basis of nature of work done such as (i) Wooden Fabrication-carpentry (ii) Metal Fabrication (shaping and Forming, Smithy, sheet metal and Joining-welding, Riveting, Fitting and Plumbing).

(B) Carpentry: (a) Fundamental of wood working operations (b) Common Carpentry Tools and Their classification, size, specification (name of the parts and use only): (i) Marking and measuring tools (ii) Holding and supporting tools: (iii) Cutting and Sawing Tools: (iv) Drilling and Boring Tools (v) Striking Tools-Mallet and Claw hammer (vi) Turning Tools & Equipment(vii) Miscellaneous Tools

Chapter - 2: Metal Casting

Introduction to Foundry, Steps involved in casting, advantages, limitations and applications of casting process, Pattern types, allowances for pattern, pattern materials, color coding and storing of patterns, Sand castings, pressure die casting, permanent mould casting, centrifugal casting, precision investment casting, shell Moulding, CO2 Moulding, continuous casting-squeeze casting, Fettling and finishing, defects in Castings.

Chapter - 3: Sheet metal working-Tools and operation:

(1) Operations involved (Names and concept only) (2) Sheet metal joints(3) Tools and equipment used (Name, size, specifications for identification only) (4) Marking tools(5) Cutting and shearing Tools (6) Straightening tool(7) Striking Tools(8) Holding Tools(9) Supporting Tools(10) Bending tools(11) Punching-Piercing and Drafting tools (12) Burring Tools-Files (13) Defects Occurring & its remedy

Chapter - 4: Metal Joining During Fabrication-

(a) Permanent Joining: (i) Welding methods(ii) Electric welding (b) Soldering & Brazing: (i) Its concept, comparison with welding as joining method and classification (ii) Soldering operation(iii) Materials Used(iv) Defects Occurring & its remedy (B) Riveting- (i) Its

comparison with welding as joining method. (ii) Rivets and Materials. (iii) Operation involved(iv) Tools and equipment used(Names, Size, specification and uses)), Temporary Joining (Fasteners & their uses), General Idea about temporary fasteners & their uses (C) Familiarity with the Use of Various Tools Used in Mechanical Engineering Workshop (a)Marking & Measuring Tools (b) Holding Tools(c) Cutting Tools(d) Files(e) Thread Cutting Tools(h) Miscellaneous Tools They should be shown physically to each student for familiarity.

Reference Books:

6. Workshop Technology, Vol. I: BS Raghuvanshi
7. Production Technology, Vol. I: Hazra & Chaudhry
8. Karyashala Takniki: JK Kapoor

Mechanical Workshop and Measurement (MTP2.4)

Marks : 100 **Credits 4**

Contact Hrs. : 60

SHEET METAL WORKING AND SOLDERING:

(EX-1) Cutting, shearing and bending of sheet.

(EX-2) To prepare a soap case by the metal sheet

(EX-3) To make a funnel with thin sheet and to solder the seam of the same

(EX-4) To make a cylinder and to solder the same

FITTING SHOPWORK:

(EX-1) Hack sawing and chipping of M.S. flat

(EX-2) Filing and squaring of chipped M.S.job

(EX-3) Filing on square of rectangular M.S. Plate

(i) Drill a hole in MS Block & tapping the same (ii) Making a Bolt & Nut by Tap & Die set. (iii) Utility article-screw driver, Paper weight.

PLUMBING SHOPWORK:

(EX-1) Cutting and threading practice for using socket, elbow and tee etc and to fit it on wooden practice board.

SMITHY SHOP WORK:

(EX-1) To prepare square angular piece by M.S. rod

(EX-2) To Braze M.S. flat/Tipped tool on M.S. shank

(EX-3) To make a screw driver with metallic handle

WELDING SHOP WORK:

(EX-1) Welding practice gas & electric

(EX-2) Welding for lap joint after preparing the edge

(EX-3) Welding Butt joint after preparing the edge

Exp-4: Welding practice-gas and electric

Exp-5: Welding for lap joint after preparing the edge

Exp-6: Welding for Butt joint after preparation of the edge

Exp-7: `T' joint welding after preparation of edge.

Workshop Tools & Measuring Instruments
Marking and Measuring Tools, Hand Tools: Hammer, Screwdrivers, Allen keys, Spanners, Ratchets, Pliers and Circlip Pliers, Bearing pullers, Bench Vice, Files, Hacksaw, Drills, Taps and Dies, Hand Shears etc. Measuring Instruments: Vernier Calipers, Micrometers, Dial Indicators, Telescopic Gauges, Small Hole Gauges, Feeler Gauge, Screw Pitch Gauge.

Workshop Operations & Processes
Sawing, Filing, Threading, Scribing, Shearing, Soldering, Riveting, Drilling, Tapping & Dieing, Fasteners, Torque and Tightening methods, Tube Cutters, Gaskets and Seals, Adhesive Bonding.

Suggested Reading:

1. Workshop Technology, Vol. I: Hazra & Chaudhr
2. Elements of Workshop Technology Vol. I: BS Raghuwanshi
3. Workshop Technology, S. K. Hajara Chaudhary, Media Promotors and Publishers, New Delhi
4. Workshop Technology, B. S. Raghuwanshi, Dhanpat Rai and sons, New Delhi
5. Workshop Practice, H. S. Bawa, Tata McGraw Hill Publishers, New Delhi

Engineering Drawing (MTT2.5)

Course Category: Skills Enhancement Course **Marks: 50**
Credits: 2 **Contact Hrs : 30**

Planning of Assembly Drawings, size and layout of sheets, types of lines, scales, lettering, orthographic projections, isometric projections, Assembly dwg., Part drawing, method of Dimensioning, limit fit tolerances, symbols of welded joint, pipe joints, Machine Parts Symbols. Engineering drawing to includes information as under. a) Geometry (shape, size, and form of the part) b) Critical functional relationships c) Tolerances allowed for proper function d) Material (specifications), heat treatment, surface coatings e) Part documentation information (part number, revision level)

Basic Computer Skills (MTT2.6)

Course Category: Value Education Course Course Credit: 2
Contact Hrs.: 30 Marks: 50

Chapter 1: Computer and Internet basics:
Basic Parts of a Computer
Central Processing Unit (CPU), Hard Drive, Monitor, Mouse, Speakers, Printer:
Basic Parts of a Keyboard Arrow Keys, Enter/Return, Shift, Caps Lock, Backspace
Basic Internet Terms The Internet, The World Wide Web, Website, Homepage, Link/Hyperlink, Web Address/URL, and Address Box.

Chapter 2: MS Office

Most Popular Office Products Microsoft Word, Microsoft Excel, Microsoft PowerPoint Starting MS-Word, Document Window, Components of Document Windows, Creating Documents, Opening Documents, Save Documents, Protecting Documents, Manipulating Text, Getting Help With MS-Word

Assignment based on MS Office Word.

a) Text Manipulation Change the font size and type aligning and justification of text
b) Underlining the text Indenting the text
c) Usage of Numbering, Bullets, Footer and Headers Usages of Spell check and Find and
d) Replace
e) Table and Manipulations Creation, Insertion, Deletion (Columns & Rows) and usage of Auto Format.
f) Picture Insertion and alignment.
g) Creation of documents using templates Creation of templates.
h) Mail Merge concepts.
i) Copying text and picture from Excel.
j) Any relevant assignments based on syllabus.

Chapter 3: MS Office Excel

Starting Excel, Excel Worksheet, Navigating Worksheets, Entering Data, Entering Text, Entering Numbers, Entering Date and Time, Entering Formulas, Excel Functions, Selecting Cell Ranges Creating Text, Number and Data Series, Creating Text Series, Using the Autofill Feature, Editing Worksheet Data, Clearing a Cell, Copying Data, Cut and Paste, Inserting and Deleting Rows, Column and Cell Ranges, Worksheets, Formatting, Numeric Formatting, Custom Formats, Data and Time Format, Changing Column Width and Row Height, Changing Column width, Change Row Height

Assignment based on MS Office Excel

a. Type the data in excel worksheet and save it as first.xls
b. Type the data in excel worksheet and save it as second.xls.
c. Enter the data and save it in grade.xls
d. Using grade.xls to perform the various formatting operations
e. Generates an average report based on the data in excel worksheet.
f. Any relevant assignments based on syllabus.

Chapter 3: MS Office Power Point

Assignment based on MS Office Power Point.

a) Create a PowerPoint presentation adding the guidelines for each slide
b) Create a PowerPoint presentation using custom animation effects.
c) Create a PowerPoint presentation Adding a piece of clip-art
d) Create a PowerPoint presentation with Add a sound to entrance effect.
e) Any relevant assignments based on syllabus.

Chapter 4: MS Office Publisher

Assignment based on MS Office Publisher.

a. Setup an outlook Express E-mail Account
b. Insert E-mails Attachments and restore your outlook Express E-mail.
c. Take a backup of Emails and E-mail Account in Outlook Express.
d. Setup a Second outlook Express Account.

e. Add a Signature to all out going E-Mail.
f. Any relevant assignments based on syllabus.

Entrepreneurship Development (MTT2.7)

Course Category: Ability Enhancement Course(AEC) Course Credit: 2

Contact Hrs.: 30 Marks: 50

Chapter 1

Entrepreneur and Entrepreneurship: Definition, meaning and functions of an entrepreneur Need and importance of entrepreneurship, Problem of unemployment & important of wealth creation. Enterprise v/s Entrepreneurship, Self – employment v/s Entrepreneurship, Entrepreneurial career as an option

Chapter 2

Business Opportunity Identification and Preliminary Project Report (PPR): Opportunity search : Divergent Thinking Mode : Meaning and Objectives – Tools and Techniques : Environmental Scanning for business opportunity identification Opportunity Selection : Convergent Thinking Mode : Tools and Techniques : Market Survey – Preparation of Questionnaire – Concept of Survey – Data collection – Analysis and Interpretation – Preliminary Project Report (PPR)

Chapter 3

Business Plan : Meaning and Importance – Objectives – Selections Contents – Marketing and Technical Feasibility – Financial Viability – Precautions to be taken by entrepreneur while preparing Business Plan Project Appraisal – Break – even Analysis and Ratio Analysis : Debt Service Coverage Ratio – Gross Profit : Net Profit Ration and Return on Investment (ROI)

Chapter 4

Institutional Support to New Venture : (Student are expected to study the assistance scheme of the following Institutions) District Industries Center (DIC) Maharashtra Center for Entrepreneurship Development (MCED) National Small Industries Corporation of India (NSIC) Maharashtra Industrial Development Corporation (MIDC) Micro Small and Medium Enterprises (MSME)

Chapter 5

Financial Assistance for small Enterprise Non-Institutional : own Fund – Family and Friends Institutional : (a) Bank Loans – Co-operative Banks- Nationalized Bank – Scheduled Banks

MTT 2.8 Yoga Education

Course Category: Co-curricular Course Credit: 2

Contact Hrs.: 30 Marks: 50

Objectives:

The purpose of the course is to provide fundamental knowledge and exposure to the concepts, theories and practices in the field of Yoga Education.

Learning Outcomes:

1. To understand concepts of Traditional Yoga i.e. (Yoga Sutra, Gita, Hathapradipika etc.) Panchikarana Prakriya & Concept of five elements. Limbs of Yoga and Kumbhka.
2. To summarize the concepts of Yoga & Wellness i.e. Mental Health & Hygiene, Yogic &

Medical Perspectives Yoga & Modern Psychology, Emotional disorders, conflicts, frustration, Personal & interpersonal adjustments through yoga, Prayer.

3. To make Use of Yogic Practices (Practical) i.e. Asanas, pranayama, bandhas and mudra & kriyas.

Chapter 1

Traditional Yoga: Literature of Yoga (Yoga Sutra, Gita, Hathapradipika etc.) Panchikarana Prakriya & Concept of five elements. Limbs of Yoga

Kumbhkas Meaning & Types Asthang Yoga

Chapter 2

Yoga & Wellness

Mental Health & Hygiene: Yogic & Medical Perspectives Yoga & Modern Psychology, Emotional disorders, conflicts, frustration

Personal & interpersonal adjustments through yoga

Prayer its significance in yogic practices

Meaning, yoga dimensions of health-related fitness

Chapter 3

Yogic Practices (Practical)

Asanas: Pavanmuktasana, Naukasana, Viparitakarani, Sarvangasana, Matsyasana, Halasana, Bhujangasana, Shalabhasana, Dhanurasana, Vakrasana,Ardha-Matsyendrasana, Paschimatanasana, Supta Vajrasana, Simhasana, Gomukhasana, Matsyendrasana, Mayurasana, Uttana Kurmasana, Ushtrasana,Baddha –padmasana, Uttanamandukasana, Chakrasana (Sideward), Chakrasana (Backward), Virkshasana, Tadasana, Padahastasana, Utkatasana, Parvatasana, Vajrasana, Padmasana, Siddhasana, Swastikasana, Shavasana, Makarasana, Brahmamudra, Kukkutasana

PRANAYAMA: - Anuloma-viloma, Suryabhedana, Ujjayi, Shitali

BANDHAS AND MUDRA: - Jalandhara Bandha, Uddiyana Bandha, JivhaBandha, Mula Bandha

KRIYAS: - Jala Neti, Nauli, Kapalabhati, Trataka

BOOKS FOR REFERENCE: -

1. Iyengar,B.K. (2005). Yoga Deepika. Orient Longman Pvt. Ltd. Mumbai
2. Swami, S.S. (2008). Asana, Pranayam. Mudra Bandha, Bhargava Bhushan Press, Varanasi
3. Iyengar, B.K. (2010). Light on the Yoga Sutras of Patanjali. Orient Longman Pvt. Ltd. Mumbai
4. Iyengar, B.K. (2008). Light on Yoga. Orient Longman Pvt. Ltd. Mumbai
5. Iyengar, B.K. (2008). Light on Pranayama. Orient Longman Pvt. Ltd. Mumbai
6. Gore,M.M. (2009). Anatomy & Physiology of Yogic Practices. Kanchan Prakashan
7. Bates, M. (2008). Health Fitness Management. Human Kinetics. USA.
8. Werner, V.K, Hoger, (2007). Fitness and Wellness. Wadsworth, Thomas learning