3.1 ENGINEERING MATERIALS

L	P
3	2

RATIONALE

Lot of development has taken place in the field of materials. New materials are being developed and it has become possible to change the properties of materials to suit the requirements. Diploma holders in this course are required to make use of different materials for various applications. For this purpose, it is necessary to teach them basics of metal structure, properties, usage and testing of various ferrous and non ferrous materials and various heat treatment processes. This subject aims at developing knowledge about the characteristics, testing and usage of various types of materials used in industries.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Distinguish between metals and non metals and ferrous and non ferrous materials.
- Analyze microstructure and changes in microstructure due to heat treatment.
- Carryout various heat treatment processes such as annealing, normalizing. tempering and hardening.
- Draw and interpret iron-carbon diagram.
- Classify various types of plastics and rubber.
- Explain properties and applications of composites, ceramics and smart materials.
- Select suitable material to be used for various engineering applications.

DETAILED CONTENTS

1. Introduction (05 hrs)

   Material, History of Material Origin, Scope of Material Science, Overview of different engineering materials and applications, Classification of materials, Thermal, Chemical, Electrical, Mechanical properties of various materials, Present and future needs of materials, Various issues of Material Usage- Economical, Environment and Social.

2. Crystallography (05 hrs)

   Fundamentals: Crystal, Unit Cell, Space Lattice, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, Atomic Packing Factor.
   Deformation – overview of deformation behavior and its mechanism

3. Metals and Alloys (14 hrs)

   Ferrous Materials: Different iron ores, Raw materials in production of iron and steel, Basic process of iron-making and steel-making, Classification of iron and steel.

Cast Iron: Different types of Cast Iron, manufacture and their use. Classification of Grey cast iron and S.G. iron

Steels: Steels and alloy steel, Classification of plain carbon steels, Properties and usage of different types of Plain Carbon Steels, Effect of various alloys on properties of steel, Uses of alloy steels (high speed steel, stainless steel, spring steel, silicon steel)

Non Ferrous Materials: Properties and uses of Aluminium, Copper and Zinc and their alloys

4. Heat Treatment (08 hrs)

Purpose of heat treatment, Solid solutions and its types, Formation and decomposition of Austenite, Martensitic Transformation – Simplified Transformation Cooling Curves. Various heat treatment processes- hardening, tempering, annealing, normalizing, Case hardening and surface hardening, Hardenability of steels, Selection of case carburizing and induction hardening steels. Types of heat treatment furnaces (only basic idea)

5. Plastics (04 hrs)

Important sources of plastics, Classification-thermoplastic and thermoset and their uses, Various trade names of plastics, Plastic coatings, food grade plastics. Applications of plastics in automobile and domestic use.

Rubber classification - Natural and synthetic. Selection of rubber

6. Advanced Materials (03 hrs)

Composites-Classification, properties, applications
Ceramics-Classification, properties, applications
Adhesives – Classification, properties and applications
Smart materials - properties and applications.

7. Miscellaneous Materials (04 hrs)

Overview of -Tool and Die materials, Materials for bearing metals, Refractory materials. Overview of Biomaterials and semi-conducting materials,

8. Corrosion and its Control (2 hrs)
Corrosion and factors affecting corrosion rate, Corrosion control – metal coatings, inorganic coatings, organic coatings, internal corrosion preventive measures

LIST OF PRACTICALS

1. Classification of about 25 specimens of materials/machine parts into
   (i) Metals and non metals
   (ii) Metals and alloys
   (iii) Ferrous and non ferrous metals
   (iv) Ferrous and non ferrous alloys
2. Given a set of specimen of metals and alloys (copper, brass, aluminium, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them.
3. a) Study of heat treatment furnace.
   b) Study of a thermocouple/pyrometer.
4. Study of a metallurgical microscope and a specimen polishing machine.
5. To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of following materials:
   i) Brass ii) Copper iii) Grey iv) Malleable v) Low carbon steel vi) High carbon steel vii) HSS
6. To anneal a given specimen and find out difference in hardness by analyzing microstructure as a result of annealing.
7. To normalize a given specimen and to find out the difference in hardness by analyzing microstructure as a result of normalizing.
8. To harden and temper a specimen and to find out the difference in hardness by analyzing microstructure due to tempering.

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect samples of various materials available in the market. Visits to industry should be planned to demonstrate use of various types of materials or Heat Treatment Processes in the industry.

RECOMMENDED BOOKS

1. Rajput, R.K., "Text book of Material Science", Katson Pubs, Ludhiana.
2. Manchanda, V.K., "Text book of Material Science", India Publishing House, Jalandhar.
3. Gupta, A.R., "Introduction to Material Science", Satya Prakashan, New Delhi.
4. Hazra, Chaudhary, S. K., "Material Science and Processes", Indian Book Distributing Co.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	05	05
2.	05	06
3.	14	16
4.	08	10
5.	04	04
6.	03	03
7.	04	04
8.	02	02
Total	**45**	**50**

ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

L	P
2	2

RATIONALE

The objective of this subject is to impart fundamental knowledge and skills regarding basic electrical and electronics engineering, which diploma holders will come across in their professional life. This course will provide the students to understand the basic concepts and principles of D.C. and A.C. fundamentals, electromagnetic induction, batteries, transformer, motor and generator, transmission and distribution system, domestic installation, electrical safety etc. The students will also learn basic electronics including diodes and transistors and their applications.

LEARNING OUTCOMES

After completing the course the student should be able to:

- Measure basic electrical quantities.
- Measure and improve power factor in a given circuit.
- Explain the construction, working principle, performance and applications of transformer.
- Draw layout of generation, transmission and distribution system.
- Explain the working and applications of electric motor and generator.
- Follow electrical safety measures.
- Describe the characteristics and applications of diode, rectifier, inverter and transistor.

DETAILED CONTENTS

1. Basic Electrical Quantities (2 hrs)

   - Definition of voltage, current, power and energy with their units
   - Difference between ac and dc
   - Advantages & application of electrical energy over other types of energy

2. AC Fundamentals (5 hrs)

   - Alternating emf, Definition of cycle, frequency, and amplitude and time period.
   - Instantaneous, average, r.m.s and maximum value of sinusoidal wave. Form factor and Peak Factor. Concept of phase and phase difference
   - Concept of resistance, inductance and capacitance in ac circuits containing resistor only, capacitor only and inductor only
   - Power factor and improvement of power factor by use of capacitors.

3. Transformer (6 hrs)

- Construction, principle and working of single phase transformer.
- Transformer ratio, emf equation, losses and efficiency, cooling of transformer
- Concept of three phase system, star and delta connection voltage and current relationship (No derivation),
- Difference between three-phase and single-phase supply
- Isolation transformer, CVT, auto transformer (brief idea), applications.

4. Transmission & Distribution System (5 hrs)

- Basic Idea of Transmission and Distribution system.
- Layout of Generation, Transmission and Distribution system
- Three phase three & three phase four wire system with neutral & earth wire.
- Basic idea on line voltage, line current, phase voltage, phase current in star and delta connected three phase system

5. Electric Motor & Generators (6 hrs)

- Basic idea on DC generator & DC motor.
- Brief idea on separately excited & series excited dc generator, applications of DC motors.
- Fundamental of AC generator (synchronous generator).
- Basic idea of three phase induction motor & single phase induction motor and their applications.
- Motors used for driving pumps, compressors and Submersible pumps.
- Applications of stepper motor.

6. Electrical Safety (2 hrs)

- Electrical shock and precautions against shock, treatment of electric shock, concept of fuses and their classification, selection and application,
- Concept of earthing and various types of earthing,
- Applications of MCB's and ELCBs

7. Basic Electronics (4 hrs)

- Basic idea of semiconductors – P and N type; diodes, Zener diode and their applications,
- Basic idea & applications of rectifier and inverters.
- Transistor PNP and NPN, their characteristics and uses.

LIST OF PRACTICALS

1. Use of instruments used for measuring electrical quantities and its connections in an electric circuit.
2. Connection of a three-phase motor and starter with fuses and reversing of direction of rotation.
3. Connection of a single-phase induction motor with supply and reversing of its direction of rotation.
4. Connection and reading of an electric energy meter.
5. Use of ammeter, voltmeter, wattmeter and multi-meter.
6. Measurement of power and power factor in a given single phase ac circuit
7. Connections with different types of switches, fuses, MCB's and ELCBs in electrical circuit.
8. Draw V-I characteristics of Zener diode.
9. Practice of earthing for electrical equipment.
10. To draw V-I characteristics of NPN transistor.
11. Working of stepper motor.

INSTRUCTIONAL STRATEGY

The teacher should give emphasis on understanding of concept and various terms used in the subject. Practical exercises will reinforce various concepts.

RECOMMENDED BOOKS

1. Dhogal, PS, "Basic Electrical Engineering", Tata McGraw Hill Publishers, New Delhi.
2. Thareja, BL, "A Text Book of Electrical Technology, Vol. I and II", S Chand and Co., New Delhi.
3. Dargan, C R, "Elements of Electrical Engineering", Dhanpat Rai Publications, Delhi.
4. Mehta, VK, "Basic Electronics", S Chand and Co., New Delhi.
5. Bhargava, NN, "Basic Electronics and Linear Circuits", Kulshreshtha, Tata McGraw Hill, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allocation (Out of 50)
1.	02	4
2.	05	8
3.	06	10
4.	05	8
5.	06	10
6.	02	4
7.	04	6
TOTAL	**30**	**50**

METROLOGY AND INSTRUMENTATION

L	P
3	2

RATIONALE

Metrology is the science of measurement, Diploma holders in this course are responsible for ensuring process and quality control by making measurements and carrying out inspection of various parameters. For this purpose, knowledge and skills about various measuring instruments are required. The aim of this subject is to develop knowledge and skills regarding various measuring instruments amongst the students.

LEARNING OUTCOMES

After undergoing the subject, students will be able to :

- Use vernier calliper, micrometer, height gauge for linear internal and external measurement.
- Use bore gauge, radius gauge, taper gauge, plug gauge, ring gauge, snap gauge for measurements.
- Use bevel protector, sine bar, slip gauge, dial indictor, angle dekkor, dial indicator for angular measurements.
- Measure spur gear characteristics using gear tooth vernier, outside diameter over dovel pins.
- Use tool makers microscope
- Measure surface roughness parameters.
- Use profile projector and angle dekkor.
- Select and measure variables using electrical and electronics comparators and measuring instrument, sensors, transducers.
- Select and use non destructive testing methods.
- Explain the use of coordinate measuring machine.

DETAILED CONTENTS

1. Introduction (06 hrs)

   Definition of metrology
   Standard of measurement
   Types of Errors - Controllable and random errors
   Precision, accuracy, sensitivity, hysteresis, response time, repeatability,calibration, uncertainty of measurement, interchangeability.
   Standardization and standardizing organizations

2. Linear Measurement (12 hrs)

   Construction features and use of instruments for non precision linear measurement: steel rule, callipers, surface plate, angle plate, V-block.

Construction features and use of instruments for precision measurements :vernier calipers, vernier height and depth gauges, micrometers.
Slip gauges, Indian standards of slip gauges, sets of slip gauges, use of slipgauges. Cylinder bore gauges, feeler and wire gauges. Checking flatness,roundness and squareness
Comparators – Characteristics, uses, working principles of different types of comparators: mechanical, electrical, electronics and pneumatic .

3. Angular Measurement (06 hrs)

Construction and use of instruments for angular measurements: bevel protector, sine bar, angle gauges, clinometer, angle dekkor. Optical instruments for angular measurement, auto collimator.

4. Measurement of Surface Finish (06 hrs)

Terminology of surface roughness.
Concept of primary texture and secondary texture.
Factors affecting surface finish.
CLA, RMS and RA value.
Principle and operation of stylus probe instruments. Tomlinson surface meter and Taylor surface talysurf.

5. Thread and Gear Measurements (08 hrs)

Measurement of screw threads- Introduction, measurements of external and core diameters, checking of pitch and angle of threads with gauges.
Measurements of gears (spur) – Measurement of tooth thickness, PCD, addendum and dedendum
Profile projector, Coordinate Measuring Machine (CMM), Tool maker's microscope.

6. Instrumentation (07 hrs)

Various types of instruments used for mechanical quantities such as displacement, velocity, acceleration, speed and torque. Use of transducers and electronic counters, stroboscope, vibrating reeds and tachometers.
Strain gauge use of strain gauge and load cells

Note: There should be a visit to established metrology lab to familiarize students with purpose and need of metrology.

LIST OF PRACTICALS

1. Internal and external measurements with vernier calliper and micrometer (mechanical and digital)
2. Measurement of linear dimensions with height gauge and depth gauge.
3. Measurement of flatness, concentricity with dial indicator
4. Use of feeler gauge, wire gauge, radius gauge and fillet gauges for checking of standard parameters.
5. Use of plain plug and ring gauge, taper plug and ring gauge, thread plug and ring gauge and snap gauges.
6. Measurement of Angle using;
   i) Cylindrical rollers and spherical balls and slip gauges
   ii) Bevel protector
   iii) Sine Bar/Sine Table , Slip Gauges, Height Gauge and dial indicator.
   iv) Angle dekkor
7. Measurement of spur gear characteristics.
8. Measurement of thread parameters by using tool maker's microscope.
9. Measurement of effective diameter of external threads by 2-wire and 3-wire method.
10. Measurement of cylindrical bore using cylinder bore gauge for bore diameter, ovality and taper.
11. Measurement of surface roughness using surface roughness tester.
12. Measurement of co-ordinates of two or more than two holes using surface plate, angle plate, Height Gauge, dial indicator and slip gauges.
13. Measurement of a profile using profile projector.
14. Measurement of rotational speed of a shaft using stroboscope.

INSTRUCTIONAL STRATEGY

1. Demonstrate use of various measuring instruments while imparting theoretical instructions.
2. Stress should be laid on correct use of various instruments.

RECOMMENDED BOOKS

1. Jain, RK, "Engineering Metrology", Khanna Publishers, New Delhi.
2. Sharma, RC, "A Text Book of Production Engineering", S Chand and Company, New Delhi.
3. Adithan, M, and R Bahl, "Metrology Laboratory Manual", NITTTR, Chandigarh.
4. Rajput, RK, "Engineering Metrology", SK Kataria and Sons, Ludhiana.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	06	06
2	12	14
3	06	07
4	06	06
5	08	10
6	07	07
Total	**45**	**50**

MECHANICAL ENGINEERING DRAWING-I

L	P
-	6

RATIONALE

Diploma holders in Mechanical Engineering are required to interpret drawings and therefore it is essential that they have skills of preparing drawings and sketches of mechanical components. This subject aims at development of drawing skills in the students.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Interpret different limits and fits of components
- Draw intersection of cylinders and their profile
- Draw different kind of machine components like bearings, brackets, pulleys, pipe joints and lathe tool holder.
- Draw electrical circuit diagram of simple household electrical circuits and home appliances
- Read and interpret drawings of mechanical components

DETAILED CONTENTS-CUM- PRACTICAL EXERCISES

1. Limits, Fits and Tolerances (03 sheets)

   Maximum limit of size, minimum limit of size, tolerance, allowance, deviation, upper deviation, lower deviation, fundamental deviation, clearance, maximum clearance, minimum clearance. Fits -clearance fit, interference fit, transition fit. Hole basis system, shaft basis system, tolerance grades, calculating values of clearance, interference, hole tolerance, shaft tolerance with given basic size for common assemblies like $H_7/g6$, $H_7/m6$, $H_8/p6$.

2. Intersection of following solids:- (02 sheets)

   (a) Cylinder with cylinder (equal and different diameters; axis at right angels)
   (b) Cylinder with cylinder (axis inclined)

3. Drawing of the following with complete dimensions, tolerances, materials and surface finish marks.
   Universal coupling (Assembly) (01 Sheets)
   Bearings (05 sheets)

   Bushed Bearing (Assembled Drawing)
   Ball Bearing and Roller Bearing (Assembled Drawing)
   Plummer Block (Detailed Drawing)
   Plummer Block (Assembled Drawing)
   Foot step Bearing (Assembled Drawing)

Bracket	(01 sheets)
Wall bracket (orthographic views)	
Pulleys(03 sheets)	
Stepped Pulley V. Belt Pulley Fast and loose pulley (Assembled Drawing)	
Pipe Joints	(02 sheets)
Expansion pipe joint (Assembly drawing) Flanged pipe and right angled bend joint (Assembly Drawing)	
Lathe Tool Holder (Assembly Drawing)	(01 sheets)
Reading of mechanical component drawing	(01 sheets)
Sketching practice of bearings, bracket and pulleys.	(02 sheets)

Note:- (1) First angle projection should be followed, 20% of drawings may be prepared in third angle projection.
(2) SP-46-1988 should be followed
(3) The drawing should include discussion with tolerances, whenever necessary and material list as per BIS / ISO specifications.

INSTRUCTIONAL STRATEGY

1. Teachers should show model or realia of the components/part whose drawing is to be made
2. Emphasis should be given to cleanliness, dimensioning, layout of sheet
3. Teachers should ensure use of IS codes related to drawing
4. Focus should be on the proper selection of drawing instrument and its proper use

RECOMMENDED BOOKS

1. Gill, P.S., “Machine Drawing”, S.K. Kataria and Sons, Ludhiana.
2. Dhawan, R.K., “A Text Book of Machine Drawing”, S. Chand and Co. Ltd New Delhi.
3. Bhatt, N.D., “Machine Drawing”, Charotar Book Depot. Anand.

WORKSHOP TECHNOLOGY-1

L	P
3	6

RATIONALE

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various manufacturing processes is required to be imparted. Hence the subject of workshop technology.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Fabricate welding joints using gas welding arc welding, TIG, MIG/MAG welding of mild steel and stainless steel materials.
- Select suitable (most appropriate) process electrodes, various parameters of process for given job.
- Explain principle of operations of modern welding processes.
- Inspect various welding joints, castings, forgings.
- Prepare pattern for given job.
- Select material and type of patterns, cores.
- Prepare sand moulds manually and on machine.
- Select type of moulding sand, adhesives, compact, strength and parameters of sand for given job.
- Cast a mould.
- Identify a suitable furnace, alloying elements
- Carry out deburring of castings.
- Test the properties of moulding sand (permeability, Strength, refractoriness, adhesiveness, cohesiveness).
- Operate forging machine, press, and spinning machine.
- Explain the principle of rolling, extrusion and drawing process.

DETAILED CONTENTS

1. Welding (18 hrs)

Welding Process

Principle of welding, Classification of welding processes, Advantages and limitations of welding, Industrial applications of welding, Welding positions and techniques, symbols & welding standards. Safety precautions in welding.

Gas Welding

Principle of operation, Types of gas welding flames and their applications, Gas welding equipment - Gas welding torch, Oxy acetylene cutting torch, Blow pipe, Pressure regulators, Filler rods and fluxes. Oxy-Acetylene gas welding, Oxy-Acetylene gas cutting.

Arc Welding

Principle of operation, Arc welding machines and equipment, A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation, Electrodes: Classification, B.I.S. specification and selection, Flux for arc welding. Requirements of pre heating, post heating of electrodes and work piece. Welding defects and their testing methods.

Other Welding Processes

Resistance welding: Principle, advantages, limitations, working and applications of spot welding, seam welding, flash butt welding, projection welding, Shielded metal arc welding, submerged arc welding, welding defects and their remedies, inspection of welded joints.

Modern Welding Methods

Methods, Principle of operation, advantages, disadvantages and applications of Tungsten inert gas (TIG) welding, Metal inert gas (MIG) welding, Thermit welding, Electro slag welding, Electron beam welding, Ultrasonic welding, Laser beam welding, Plasma arc welding, Friction welding, Robotic welding,

2. Pattern Making (03 hrs)

Concept of Pattern, Types of pattern, Pattern material, Pattern allowances, Pattern codes as per B.I.S, Introduction to cores, purpose of making cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores

3. Moulding and Casting (16 hrs)

Moulding Sand

Properties of moulding sand, their impact and control of properties viz. permeability, refractoriness, adhesiveness, cohesiveness, strength, flow ability, collapsibility, Various types of moulding sand, Testing of moulding sand. Different hazards associated with foundry practice and safety precautions to be followed.

Mould Making Process and Equipment

Types of moulds, Step involved in making a mould, Moulding boxes, hand tools used for mould making, Moulding processes: Bench

molding, floor moulding, pit moulding and machine moulding, Moulding machines squeeze machine, jolt machine, jolt squeeze machine and sand slinger.

Casting Processes and Equipment

Charging a furnace, melting and pouring both ferrous and non-ferrous metals, cleaning of castings, Principle, working and applications of Die casting: hot chamber and cold chamber, Investment and lost wax process, Centrifugal casting.

Gating System

Elements of gating system, Pouring basin, sprue, runner, gates, Types of risers, location of risers, Directional solidification

Melting Furnaces

Construction and working of Pit furnace, Cupola furnace, Crucible furnace –tilting type, Electric furnace

Casting Defects

Different types of casting defects, Testing of defects: Visual inspection, radiography, magnetic particle inspection and ultrasonic inspection.

4. Metal Forming Processes (5 hrs)

Press Working - Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping

Forging - Open die forging, closed die forging, Press forging, upset forging, roll forging, Cold and hot forging, Forging operations - swaging, upsetting, Fullering, bending, edging, drifting etc.

Rolling - Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies

Extrusion and Drawing - Type of extrusion- Hot and Cold, Direct and indirect. Type of drawing: Deep drawing, shallow drawing, bar drawing, Pipe drawing, tube drawing, wire drawing.

5. Plastic Processing (3 hrs)

Industrial use of plastics and situations where used.

Injection moulding-principle, working of injection moulding machine.

Compression moulding-principle, and working of compression moudling machine.

Principle, construction and working of Blow Moulding Machine.

LIST OF PRACTICALS

General introduction to hand tools used in welding, foundry and pattern making and metal forming shop.

Welding Shop

Job 1. Preparation of gas welding joint in vertical/horizontal position by M.S. flats
Job 2. Gas welding of cast iron and brass part or component.
Job 3. Preparation of a joint by spot welding.
Job 4. Preparation of a joint by Seam welding
Job 5. Preparation of a T joint by MIG welding while keeping in check the perpendicularity between the plates.
Job 6. Preparation of a T joint by TIG welding while keeping in check the perpendicularity between the plates.
Job 7. Preparation of MS pipe joint by arc welding. Or
Preparation of a joint by Flash Butt Welding.

Pattern making

Job 1. Preparation of solid/single piece pattern.
Job 2. Preparation of two piece/split pattern.
Job 3. Preparation of a pattern on woodworking lathe.
Job 4. Preparation of a self-cored pattern
Job 5. Preparation of a core box.

Foundry Shop

Job 1. Preparation of mould with solid pattern on floor or using cope.
Job 2 Preparation of a core and core prints.
Job 3. Preparation of floor mould of split pattern in cope and drag of moulding box.
Job 4. Preparation of a mould of step pulley with provision of core.
Job 5. Sand testing (Testing of moisture content, clay content, shatter index, green compressive strength etc.).

Forging Shop/Fitting Shop/Sheet Metal Shop

Job 1. Preparation of single ended spanner by hand/machine forging.
Job 2. Preparation of simple die
Job 3. Demonstration of grinding process on lathe machine and grinding a job on a lathe machine
Job 4. Preparation of drilling Jig.
Job 5. Preparation of utility item out of G.I. sheet.
Job 6. Demonstration of spinning process on lathe and spinning a bowl on a spinning lathe machine.
Job 7 Preparation of a job by hand moulding machine.

Note : A visit to cast iron foundry should be arranged to have first hand knowledge of cast iron melting pouring and casting.

INSTRUCTIONAL STRATEGY

1. Teachers should lay special emphasis in making the students conversant with concepts, principles, procedures and practices related to various manufacturing processes.
2. Focus should be laid in preparing jobs using various machines/equipment in the workshop.
3. Use of audio-visual aids/video films should be made to show specialized operations.
4. Foreman Instructor should conduct classes of each Workshop explaining use of tools, jobs to be made and safety precautions related to each workshop prior to students being exposed to actual practicals.

LIST OF RECOMMEMDED BOOKS

1. Raghuvanshi, BS, "Workshop Technology Vol I and II", Dhanpat Rai and Sons, Delhi.
2. Choudhry, SK, and Hajra, "Elements of Workshop Technology", Asia Publishing House.
3. Aggarwal, RL, and T Manghnani, "Welding Engineering", Khanna Publishers, Delhi.
4. Sharma, PC, "A Text Book of Production Engineering", S Chand and Company Ltd., Delhi.
5. Rao, P. N., "Manufacturing Technology Vol I, II, III", McGraw Hill Publications, Noida, UP.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	18	20
2	03	4
3	16	16
4	05	6
5	03	4
Total	**45**	**50**

3.6 OPEN ELECTIVE

L	P
2	-

RATIONALE

Open Elective refers to a course that students can opt for in addition to their primary area of study. The open electives is from an unrelated discipline with the intention to provide exposure in that discipline. It provides the students the opportunity to select and learn a subject related to his/her interest, thus allowing them to explore their passion..

LIST OF SUGGESTED OPEN ELECTIVES

The student can opt one course out of the following :

1 Foreign Language
2 National Cadet Corps (NCC)
3 Yoga
4 First Aid
5 Creative Writing
6 Sketching, Drawing and Colour Studies
7 Gardening
8 Photography
9 Legal Studies
10 Event Management
11 Diet and Nutrition

Open elective can be offered online or offline.

FOREIGN LANGUAGE

(French, Japanese, German, Spanish)

L	P
2	-

RATIONALE

This course is an introduction to the specific language. Learning to understand and articulate oneself in day to day real life situations, and to begin to make sense of the language as a cultural space are the overall objectives of the course. The student should be able to grasp the basic sentence structure and build a good foundational vocabulary through this course.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Enhance the level of vocabulary in specific language.
- Manage situational communication in specific language.

DETAILED CONTENTS

1. Introduction (06 hrs)

   Self introduction, Numbers, Days, Months, Date, Time, and Counting

2. Vocabulary (06 hrs)

   My home, My family, My friend, Daily routine, Hobbies, Food, Greeting and Thanking

3. Grammar (12 hrs)

   Verb and Verb forms, Articles, Possessive pronouns, Auxiliary verbs, Questions, Present and Past tense

4. Theme (06 hrs)

   Means of transport, Basic directions, Food, Drink, Family, Groceries and Meals

RECOMMENDED BOOKS

1. Annie Berthet, Hugot et al, "Alter Ego - Méthode de Français", Hachette.
2. 3 A Corporation, "Minna no Nihongo", Goyal Publishers, New Delhi.
3. Stefanie Dengler, "NETZWERK Deutsch als Fremdsprache A1", Goyal Publishers, New Delhi.
4. Jaime Corpas et.al, "Aula International 1", Difusión, Madrid.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	06	10
2	06	10
3	12	20
4	06	10
Total	**30**	**50**

NATIONAL CADET CORPS (NCC)

L	P
2	-

RATIONALE

This course is structured to instil in the students qualities like nationalism, patriotism, discipline, team spirit, esprit-de-corps, leadership, self-confidence, national integration and improve their personality. The objective of the course is to expose the students to a regimental way of life, which is essential to inculcate in them the values of discipline, duty, punctuality, orderliness, smartness, and respect for authority, correct work ethos and self-confidence. In addition, it will inculcate defence services work ethos, which is characterized by hard work, sincerity of purpose, honesty, ideals of selfless service, dignity of labour, secular outlook, comradeship, spirit of adventure and sportsmanship.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Explain aims and objectives of NCC.
- Understand the importance of national integration.
- Assist Civil Administration in performance of selective duties during disasters.
- Perform drill without arms.
- Contribute towards nation building.
- Provide voluntary social service.

DETAILED CONTENTS

1. Introduction (08 hrs)

Aims and objectives of NCC, Organisation structure and training, NCC Song, National Integration and awareness, Religions, Culture, Traditions and Customs of India, National Integration: Importance and Necessity. Freedom Struggle and Nationalist Movement in India, Problems/ Challenges of national integration, Unity in diversity, Famous leaders of India, Images/ Slogans for national integration, Contribution of youth to nation building

2. Civil Affairs (04 hrs)

Civil Defence Organization and its duties/ NDMA, Types of emergencies/ Natural Hazards, Role of NCC during Natural Hazards/ Calamities

3. Drill Without Arms (08 hrs)

General and Words of Command, Attention, Stand at Ease and Stand Easy, turning and inclining at the halt, Sizing, forming up in three ranks and numbering, open and close order march and Dressing, Saluting at the halt, Getting on parade, dismissing and falling out, Marching, length of pace and time of marching in quick time and halt, slow march and halt, Turning on the march and wheeling, Saluting on the March Individual word of command

4. Personality Development and Leadership (04 hrs)

Personality development, self-awareness, Leadership, life/soft skills, time management
and character building.

5. Social Service (06 hrs)

Basics of Social service, and its needs, Social/ Rural Development Projects: MNREGA, SGSY, NSAP; Literacy enhancement and poverty alleviation, Social evils, Contribution of youth towards social welfare.

RECOMMENDED BOOKS

1 "Cadet Hand Book (Common Subjects)", published by DG, NCC.
2 "Grooming Tomorrow's Leaders", published by DG, NCC.
3 "Youth in Action", published by DG, NCC.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	08	14
2	04	06
3	08	14
4	04	06
5	06	10
Total	**30**	**50**

YOGA

L	P
2	-

RATIONALE

Yoga is a practice that connects the body, breath, and mind. It uses physical postures, breathing exercises, and meditation to improve overall health. It not only improves physical health but also mental and spiritual well -being, which are the foundations of life. The course is aimed at developing skills in yoga for strength, flexibility and relaxation.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Explain the importance of yoga and its effect on health
- Perform yoga in various forms and combinations
- Understand the philosophy of heartfulness meditation.
- Promote positive health and holistic wellness through yoga and meditation.

DETAILED CONTENTS

1. Yoga (4 hrs)

   Concept, need and importance, Yogic principles, Rules and precautions to be followed by yoga practitioners, Introduction to Ashtanga yoga and Yoga sutra

2. Asanas and Mudras (14 hrs)

   Basic asanas, Asanas in different postures - Sukshma Vayayam, Pawan Muktasan, Surya Namaskar, Hasta Utthanasana, Padahastasana, Tadasana, Vrikshasana,Tirayak Tadasana, Natarajasana, Vajrasana, Padmasana, Bhujangasana.
   Mudras - Concept, Important mudras - Prana Mudra, Varuna Mudra, Prithvi Mudra, Aakash Mudra, Gyana Mudra.

3. Pranayama (6 hrs)

Kapalbhati Pranayama, Nadi Shodhan Pranayama (Anulom Vilom), Bhastrika Pranayama, Ujjayi Pranayama.

4. Meditation (3 hrs)

Heartfulness meditation, Practice on meditation

5. Health Benefits of Yoga and Meditation (3 hrs)

Benefits and effect of Asanas, Mudras and Pranayama on various systems and organs of human body. Relaxation and wellness through meditation

RECOMMENDED BOOKS

1. Saraswati, Swami Satyananda, "Asana, Pranayama, Mudra and Bandha", Yoga Publication Trust, Bihar.
2. BKS Iyengar, "Light on Yoga", George Allen and Unwin.
3. Mudras by Heartfulness; Heartfulness Education Trust.
4. Kamlesh D Patel, "The Way of the Heart", Spiritual Hierarchy Publication Trust
5. Goel, Aruna, "Yoga Education: Philosophy and Practice", Deep & Deep Publications, New Delhi.
6. Nagendra, H R, and R Nagarathna, "Yoga for Promotion of Positive Health". Swami Vivekananda Yoga Prakashan.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	14	24
3	06	10
4	03	05
5	03	05
Total	**30**	**50**

FIRST AID

L	P
2	-

RATIONALE

First aid is a valuable and life-saving course. The objective of this course is to impart knowledge and skills to the students necessary in an emergency to help sustain life, reduce pain, and minimize the consequences of injury or sudden illness until professional medical help
arrives.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Administer basic life support skills including cardiopulmonary resuscitation
- Provide first aid of simple and multiple system trauma.

DETAILED CONTENTS

1. Basics of First Aid (4 hrs)

   First aid, importance of first aid, first aider, laws of first aid, contents of an ideal first aid kit, dealing with an emergency.

2. Emergency Response (10 hrs)

   CPR, steps for performing CPR,CPR for newborns and infants, recovery position, first aid in drowning, fractures of bones, causes and types of fractures, dislocation.

3. First Aid in Burns (4 hrs)

   Types of burns, danger of burns, first aid in dry burns and scalds, electrical burns, chemical burns, sunburn, heatstroke.

4. First Aid in Wounds and Injuries (6 hrs)

Types of wounds- small cuts and abrasions, Head injury- nose bleed, bleeding gums, bleeding from varicose veins, Shocks- causes of shock and its first aid.

5. First Aid in Poisoning (3 hrs)

Poisoning by swallowing, gases, injections, skin absorption, Animal bites, snake bites and insect stings.

6. First Aid in Foreign Objects Entering the Sense Organs: (3 hrs)

Foreign body in the eye, ear, nose, skin, swallowing of foreign objects.

Note : Persons from Civil Defence/ National Disaster Response Force (NDRF) etc. can be invited for conduct of first aid classes and demonstration of first aid practices.

RECOMMENDED BOOKS

1. Gauri Goyal, Dr. Kumkum Rajput, Dr. Manjul Mungali,, "First Aid and Health", SBPD Publishing House
2. Williamson, Swapna Naskar and Goswami Mala, "First Aid and Emergency Care", Kumar Publishing House, New Delhi.
3. Mahopatra, R., "First Aid for You and Me", Academic Publishers, New Delhi.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	10	18
3	04	06
4	06	10
5	03	05
6	03	05
Total	**30**	**50**

CREATIVE WRITING

L	P
2	-

RATIONALE

Creative writing is a written art form that uses the imagination to tell stories and compose essays, poetry, screenplays, novels, lyrics, and more. The objective of this course is to acquaint the students with ideas related to creative writing including art, craft and basic skills required for a creative writer.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Distinguish between literary genres.
- Practice various forms of creative writing.
- Write for various media.

DETAILED CONTENTS

1. Fundamentals of Creative Writing (06 hrs)

   Meaning and significance of creative writing, Genres of creative writing: poetry, fiction, Non-fiction, Drama and other forms, Research for creative writing

2. Elements of Creative Writing (10 hrs)

   Plot, Setting, Character, Dialogue, Point of view, Literary devices and figurative language, Elements of style, Grammar and the structure of language, Proof reading and editing

3. Traditional Forms of Creative Writing (10 hrs)

   Fiction: short story, novella and novel, Poetry, Drama, Essay, Fable, Biography, Memoire and autobiography, Travelogues, Diaries, Self-narrative writing

4. Writing for Media (04 hrs)

Print media, Broadcast media, Internet - Web content writing and blog writing, Advertising

RECOMMENDED BOOKS

1. Anjana Neira Dev. Anuradha Marwah, Swati Pal, "Creative Writing: A Beginner's Manual", Pearson Longman, Delhi
2. Robert Scholes, Nancy R. Comley, Carl H. Klaus, Michael Silverman, "Elements of Literature: Essay, Fiction, Poetry, Drama, Film", Delhi
3. Bell, Julia and Magrs, Paul, "The Creative Writing Course-Book", Macmillan, London
4. Gardner, John, "The Art of Fiction", Vintage, New York

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	**Time Allotted (Hrs)**	**Marks Allotted (Out of 50)**
1	6	10
2	10	16
3	10	16
4	4	08
Total	**30**	**50**

SKETCHING, DRAWING AND COLOUR STUDIES

L	P
2	-

RATIONALE

This course is aimed to develop aesthetic sense of students. It also encompasses training in sketching, drawing and colouring to develop their mental faculties of observation, imagination and creation.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Sketch common objects and various geometrical and non-geometrical forms found in life and nature.
- Use different medium and materials.
- Use colour judiciously in creation of visual work.
- Prepare collage using various paper and materials.

DETAILED CONTENTS

1. Sketching of Objects and Nature (8 hrs)

   Sketching of objects at home like cup, plate, glass, book, pencil box etc.
   Sketching of tree, mountain, hills, vegetables flower etc. for Nature study using Pencil, colour Pencil

2. Drawing of Human and Animal Figures (10 hrs)

   Drawing of Human and animal form with the help of Basic Geometrical shapes

3. Collage Making (4 hrs)

   Creating Collage with the help of coloured cut out papers, picture from a magazine or any easily available materials

4. Colours (8 hrs)

Water colour, Poster colour, Colour theory – Colour system, Colour wheel, Colour dimensions, Drawing with oil pastel colour and dry pastel.

RECOMMENDED BOOKS

1. Betty Edwards, "Color: A Course in Mastering the Art of Mixing Colors", Penguin Group Inc., New York
2. Feisner, E., "Colour Studies", Fairchild Publications, USA

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	08	14
2	10	16
3	04	06
4	08	14
Total	**30**	**50**

GARDENING

L	P
2	-

RATIONALE

Gardening activities are fantastic for helping students engage in a way that is more difficult in the classroom. Watching plants grow is a fun and educational experience for them. Their enormous curiosity and excitement over anything new makes them natural for gardening. Growing plant seeds teaches them how nature works and adds to their interest in environmental sustainability.

LEARNING OUTCOMES

At the end of the course, the students will be able to :

- Explain various techniques of gardening, cultivation, multiplication, raising of seedlings of garden
- Discuss new and modern techniques of plant propagation.
- Develop interest in nature and plant life.

DETAILED CONTENTS

1. Gardening (6 hrs)

   Definition, objectives and scope. Different types of gardening - landscape and home/ terrace gardening, parks and its components. Plant materials and design.

2. Gardening Operations (14 hrs)

   Soil laying, manuring, watering, management of pests and diseases and harvesting.

3. Sowing/Raising of Seeds and Seedlings (10 hrs)

   Structure and types - Seed dormancy; causes and methods of breaking dormancy. Seed storage: Seed banks, factors affecting seed viability, genetic erosion Seed production technology. Seed testing and certification. Transplanting of seedlings.

RECOMMENDED BOOKS

1. Bose T.K., Mukherjee, D., "Gardening in India", Oxford & IBH Publishing Co. New Delhi.
2. Kumar, N., "Introduction to Horticulture", Rajalakshmi Publications. Nagercoil, Tamil Nadu.
3. Sandhu, M.K., "Plant Propagation", New Age International Publishers.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	06	10
2	14	24
3	10	16
Total	**30**	**50**

PHOTOGRAPHY

L	P
2	-

RATIONALE

Photography is a unique and creative medium of self-expression that requires aesthetic sense as well as technical expertise. Students who are highly passionate about learning the workings of cameras and different technologies based on them can pursue this course. The objective of this course is to enable the candidates to understand the utility of different camera parts and the art of taking candid shots.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Explain the principles of photography.
- Handle various cameras for taking photographs.
- Apply aesthetics of photography.

DETAILED CONTENTS

1. Basic Photography (04 hrs)

   Meaning and definition of photography, Basic principle in the film and digital photography, History of photography.

2. Camera Function and Accessories (04 hrs)

   Basic camera, Different parts of camera and their basic functions, Camera Accessories

3. Main Controls of Camera (10 hrs)

   Parts of Camera, Types of lenses, Shutter, Diaphragm, Exposure, Film and digital image sensor, Depth of field, Lighting, Photography with flash, Filters in photography.

4. Digital Camera (05 hrs)

Process of digital imaging, Types of digital cameras, Menu operationsof digital cameras, Introduction to colors.

5. Aesthetics of Photography (07 hrs)

Definition of lighting, Principles of lighting, Reflection, Light characteristics, Color, Direct light and indirect light, Light and subject, Light as subject, Shadow as subject, Light sources, Natural light and artificial light, Principles of visualization, Composition guidelines

RECOMMENDED BOOKS

1. Dilwali, Ashok, "All about Photography", National Book Trust, New Delhi.
2. Sharma, O.P., "Practical Photography", Hind Pocket Books.
3. Freeman, "The Photographer's Guide to Light", John Collins & Brown

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

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SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	04	08
3	10	16
4	05	08
5	07	12
Total	**30**	**50**

LEGAL STUDIES

L	P
2	-

RATIONALE

The course introduces the students to Indian legal system, contracts management, and legal documentation. Further, the course familiarizes students with basic knowledge of labour laws that would be useful.

LEARNING OUTCOMES

At the end of the course, the students will be able to:

- Understand the Indian Legal System.
- Discuss Indian Contract Act.
- Explore labour laws and laws related to women.

DETAIL CONTENTS

1. Introduction to Indian Legal System (4 hrs)

   Constitution of India, Sources of Law and Judicial system.

2. The Indian Contract Act (6 hrs)

   Contract –meaning and kinds. Essentials of a valid contract, Discharge of a contract, Contract of Agency

3. Legal Documentation (10 hrs)

   Drafting of legal documents including Non-Disclosure Agreements (NDA), Request for Proposal (RFP), collaboration agreements, joint venture agreements, tendering and subcontracting

4. Labour Laws (6 hrs)

   Provident Fund, ESIC, Gratuity and Bonus

5. Legislation Related to Women (4 hrs)

Sexual harassment at Work place (Prevention, Prohibition and Redressal), Protection of Women from Domestic Violence Act, Criminal Law (Amendment) Act, The Indecent Representation of Women (Prohibition) Act.

RECOMMENDED BOOKS

1. Joseph Minattur, "Indian Legal System", Indian Law Institute, New Delhi.
2. Srivastava, S.C., "Industrial Relations and Labour Laws", Vikas Publishing House Pvt. Ltd.
3. Aggarwal, S K, "Business Law", Galgotia Publishers, Delhi.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	**Time Allotted (Hrs)**	**Marks Allotted (Out of 50)**
1	04	07
2	06	10
3	10	16
4	06	10
5	04	07
Total	**30**	**50**

EVENT MANAGEMENT

L	P
2	-

RATIONALE

Event Management is a course which deals with the planning, coordinating, and organising of events for people and communities. It is a part of the mass communication course which is offered by many prestigious colleges in India. Event management course aims to imbibe knowledge on analysing, marketing, planning and strategies in business administration to its students.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Explain the purpose of special events in an organization.
- Use techniques and strategies required to plan successful special events.
- Promote and conduct special events.
- Assess the quality and success of special events.

DETAILED CONTENTS

1. Principles of Event Management (04 hrs)

   Introduction to event management, size & type of event, event team, code of ethics, principles of event management, role of event manager – planning, organising, leading and controlling an event

2. Event Planning (08 hrs)

   Objective of event, use of planning tools, protocols, dress codes, staging, staffing.

3. Event Marketing (04 hrs)

   Advertising, publicity, event marketing process, even hospitality

4. Event Leadership (06 hrs)

Teambuilding & work distribution, managing team, managing meetings, written & verbal communication.

5. Event Safety and Security (04 hrs)

Role of Security, Safety, Crowd management, Risk management.

6. Event Accounting (04 hrs)

Budget, Cash flow analysis, Profit & loss statement, Balance sheet.

RECOMMENDED BOOKS

1. Singla, Sita Ram, "Event Management", ATH Publishers, New Delhi.
2. Sharma, Divakar, "Event Planning and Management", Deep & Deep Publication.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	**Time Allotted (Hrs)**	**Marks Allotted (Out of 50)**
1	4	06
2	8	12
3	4	08
4	6	10
5	4	08
6	4	06
Total	**30**	**50**

DIET AND NUTRITION

L	P
2	-

RATIONALE

The objective of this course is to help the students to understand the concept of diet and nutrients and provide knowledge about causes and symptoms of Nutrition-related disorders.

LEARNING OUTCOMES

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

- Comprehend the nutritional value of different food items.
- Explain the need of nutrition during the normal stages of life.
- Calculate normal dietary requirements and balanced diet.

DETAILED CONTENTS

1. Introduction (04 hrs)

   Basic concepts of health, Nutrition, Nutrients, Nutrition requirement, Balanced diet. Relationship between health & nutrition, Assessment of nutritional status.

2. Nutrients (16 hrs)

   Nutrients & their classification. Macro Nutrients –Sources, Functions and Effects on the Body; Micro nutrients - sources, Functions and effects on the Body; Fat soluble nutrients - sources, Functions and effects on the body, Water soluble nutrients - Sources, Functions and effects on the body, Digestion, Absorption of carbohydrates, Lipids, Proteins and energy.

3. Energy and Nutrition-related Disorders (06 hrs)

   Basic concepts, Definition and components of energy requirement, Protein malnutrition, Iodine deficiency disorders, Disease and disorder caused by imbalance of nutrients, Food allergies.

4. Nutritional Needs (04 hrs)

Nutritional need during normal stages of life - Infancy, Childhood, Adolescence, Pregnancy, Lactation and Old age, Disease management with diet.

RECOMMENDED BOOKS

1. Antia, F.P., "Clinical Dietetics and Nutrition", Oxford University Press.
2. Swaminathan, "Essentials of Food and Nutrition", Ganesh and Co., Madras.
3. Subhangini Joshi, "Nutrition and Dietetics", McGraw Hill Publishers.
4. B.S. Narsinga Rao et al, "Nutritive Value of Indian Foods", National Institute of Nutrition, Hyderabad.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop necessary knowledge in the students for comprehending basic concepts and principles of the subject so that they may pursue their passion. As far as possible, the teaching of subject shall be supplemented by demonstration and practices to enhance the relevant skills.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	04	06
2	16	28
3	06	10
4	04	06
Total	**30**	**50**

ENERGY CONSERVATION AWARENESS CAMP

A diploma holder must have knowledge of various tips of energy conservation. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This camp covers the basic concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in household appliances and star rating. Lectures will be delivered on following broad topics. There will be no exam for this camp.

1. Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy

2. Introduction to energy management, energy conservation, energy efficiency and its need

3. Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance

4. Standards and Labeling

   - Concept of star rating and its importance
   - Types of product available for star rating

5. Salient Features of Punjab Energy Conservation Building Code (ECBC)

6. General Energy Saving Tips in:

   - Lighting System
   - Room Air Conditioners
   - Refrigerators
   - Water Heater
   - Computers
   - Fans, Heaters, Blowers and Washing Machines
   - Colour Television
   - Water Pumps
   - Kitchens
   - Transport

DRUGS USE AND ABUSE AWARENESS CAMP

This is to be organized at a stretch for two to three days during third semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Drugs Use and Abuse in Society
    b. Concept and overview
    c. Extent of the problem
    d. Drug use as a social problem
    e. Causes of Drug Use: Biological, Socio-cultural, psychological

2. Types of Dugs and identification of Abuse
    a. Familiar drugs: Tabacco, Caffeine, over the counter drugs
    b. Restricted Drugs: Opiates, Hallucinogens, Marijuana
    c. Reformance enhancing drugs
    d. Uppers and Downers: Stimulants and Depressants

3. Impact of Drug Abuse
    a. Individual level biological and psychological
    b. Family social, National

4. Management and Prevention of Drug Abuse
    a. Medical and psychological
    b. Role of family School , Media and Legislation