Jharkhand University of Technology, Ranchi

B. Tech. First Year

Revised

Branch: Mech, Civil, Metal, Chem, Prod, Mining,

Fashion Technology

Semester: I

Session: 2023-2024

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S. No.	Course Code	Course Title	L	T	P	J*	Cr	Categorisation
01	BSM01	Engineering Mathematics I	3	1	0	06	4	BSC
02	BSC02	Engineering Chemistry	2	0	2		3	BSC
03	ESEM1	Engineering Mechanics	3	0	2		4	ESC
04	ESED2	Engineering Drawing & Computer Graphics	1	0	4		3	ESC
03	ESBE1	Basics of Electrical & Electronics Engineering	3	0	2		4	ESC
06	HSM02	Communication Skills#	0	0	2		1	AEC
07	CCA01	Sports/NSS/NCC/YOGA/Painting/Music/Classical dance	0	0	2		1	CCA
08	VSMP1	Manufacturing Practices I	0	0	2		1	VSEC
Total			13	01	16	06	21	

Semester II

S. No.	Course Code	Course Title	L	T	P	J*	Cr	Categorisation
01	BSP01	Engineering Physics	3	0	2	06	4	BSC
02	BSM02	Engineering Mathematics II	3	1	0		4	BSC
03	BSB02	Biology for Engineers	2	0	0		2	BSC
04	ESPP1	Programming for Problem Solving	2	0	2		3	ESC
05	ESME2$	Materials Engineering	2	0	0		2	ESC
06	PCME2$$	Basic Mechanical Engineering	2	0	2		3	PCC
07	HSM02	Indian Knowledge System	2	0	0		2	IKS
08	CCA02	Sports/NSS/NCC/YOGA/Painting/Music/Classical dance	0	0	2		1	CCA
09	INT02	Summer Internship	Min 4 Weeks				2	VSEC
Total			15	01	8	06	23	

L: Lecture, T: Tutorial, P: Practical/Field Survey/Summer training/Internship/Physical activity/ co-curricular activity etc, J: GD/Seminar/Workshop/Personality development/Soft skills/Studio activity (alternate day), Cr: Credit

* Department will assign a faculty under J.

$ Different syllabus for civil engineering and fashion technology.

One faculty of Humanities and one faculty of concerned department.

@ For every 20 students one faculty will assign by the concerned department.

$$ Different syllabus for Civil, Metal, Chem, Prod, Mining & Fashion Technology.

Note:

Exit option to qualify for Certification (Any three skill based courses):

EOCAD: Computer Aided Design Lab (3 Credits)

EOMLP: Metallurgical Lab Practice (3 Credits)

EORAI: Basics of Robotics & AI (3 Credits)

EOCNC: CNC Lab Practice (3 Credits)

BSM01 Engineering Mathematics I

Course Outcomes:

Students should be able to

1. **Apply** concepts of linear algebra in physical and engineering problems.
2. **Develop** the essential tool of matrices and linear algebra in a comprehensive manner.
3. A**nalyze** the dynamics of real world problem using concept of Differential Calculus of two or more variables.
4. **Evaluate** the volume and surface area of the solid using double and triple integral.
5. **Familiarize** the students with line, surface and volume integral using Green's, Gauss and Stoke's theorem in different field of Science and Engineering such as electromagnetic theory and fluid dynamics.

Unit 1

Matrices and Linear Algebra:

Matrices: Elementary operations, Gauss Elimination, Rank of matrices: Echelon form, Normal form, Determinants, Consistency and solution of system of linear equations, Eigen values, Eigen vectors, Caylay-Hamilton theorem. Vector space, subspace, linearly independent and dependent of vectors. Basis and Dimensions, Rank-Nullity theorem.
S: Basic properties of matrices, Elementary transformation, Determinants.

Unit 2

Differential Calculus:

Expansions of function of one variable using Taylor's and Maclaurin's series, Asymptotes, Curve tracing, Limit and continuity of two variables, Partial and Total derivatives, chain rule, Jacobian, Taylor's theorem, Maxima and minima of two variables, Method of Lagrange's multipliers.
S: Higher order derivatives, Limit and continuity of two variables, Jacobian.

Unit 3

Integral Calculus:

Beta and Gamma function, Evaluation of Double integrals in Cartesian and Polar co-ordinates, Change of order of integration, Evaluation of Triple integrals in Cartesian, Spherical and Cylindrical co-ordinates, Change of Variables, Applications to Area, Volume, surface area and Center of Mass. Vector differentiation, Gradient, Divergence and Curl, Line Integrals and Arc Length Parameterization, Surface Integral, Volume Integral, Path independence, Statements and illustrations of theorems of Green, Stokes and Gauss, applications.
S: Beta and Gamma function, Area, Volume, Surface area.

Textbooks:

1. Advanced Engineering Mathematics (10th edition) by Erwin Kreyszig, Wiley Eastern Ltd.

Reference Books:

1. Serge Lang, "Linear Algebra" Springer , 3rd edition
2. Gilbert Strang," Linear Algebra and its applications", Cengage Learnings RS, 4th edition
3. Howard Anton and Chris Rorres ,"Elementary Linear Algebra ",John Wiley, and sons, 10th edition
4. K. D. Joshi , "Calculus for Scientists and Engineers" , CRC Press
5. Sudhir Ghorpade and Balmohan Limaye , "A course in Calculus and Real Analysis"1st edition, Springer-Verlag, New York.

BSC02 Engineering Chemistry

Course Outcomes:

Students should be able to

2. Impart an understanding of Engineering chemistry's fundamental concepts, analytical methods and technological features.
2. Develop the capacity to analyze engineering problems based on the knowledge of chemistry.
3. Develop problem-solving ability.
4. Keep students abreast of the newest advancements and uses of contemporary materials

Unit 1

Analytical Techniques for Engineers:

- Role of materials in engineering fields.
- Quality control and assurance in engineering contexts.
- Qualitative and quantitative analysis
- Emerging trends and applications of analytical techniques for engineering.
- Instrumental methods of analysis: spectroscopy (UV and IR), chromatography (GLC and HPLC), Microscopy: SEM, Thermo-gravimetry: TGA

Unit 2

Corrosion and material protection

- Introduction to corrosion and its impact on engineering materials
- Mechanism, Types/forms of corrosion, Factors that enhance corrosion and choice of parameters to mitigate corrosion.
- Corrosion prevention techniques, advanced surface coatings and corrosion inhibitors
- Case studies and real-world applications in corrosion prevention

Unit 3

Electrochemical energy systems

- High energy electrochemical energy systems: Lithium-ion batteries principle, construction, working, advantages and applications, Na-ion Battery, fiber battery
- New emerging Fuel cells-working principles, advantages, applications
- Solar cells, Types Importance of silicon single crystal, polycrystalline and amorphous silicon solar cells-working principles, characteristics and applications
- Green hydrogen technology

Unit 4

Nanomaterials for electronics

- Nanomaterials, classification, Nanoscale phenomena and quantum effects
- Top-down and bottom –up approach, Synthesis methods: ball milling, RF sputtering, pulsed laser deposition, thin film deposition
- Applications of nanomaterials in electronics
- Fundamentals of Sensors and materials used in sensors, Synthesis of a sensor.
- Fundamentals of Super capacitor and materials used in super capacitor, Synthesis of a super capacitor.

List of Recommended Books:

1. Willard Dean, Merrittee, "Instrumental Methods of Chemical Analysis",Tata McGraw Hill Limited.
2. Gurdeep R. Chatwal,"Instrumental Methods of Chemical Analysis",Himalaya Publishing House.
3. Jain and Jain "A textbook of Engineering Chemistry", Dhanpatrai Publication.
4. S. S. Dara , "A textbook of Engineering Chemistry", S. Chand Publication 2010 ed.
5. Shashi Chawla, "A textbook of Engineering Chemistry", Dhanpatrai Publication.
6. Prof. Jianmin Ma, "Battery Technologies: Materials and Components", Wiley
7. Charles P. Poole, Frank J. Owens "Introduction to Nanotechnology"
8. Shripad Revankar, Pradeep Majumdar , "Fuel Cells"
9. Fuel Cell Fundamentals-Ryan O'Hayre, Suk-Won Cha
10. Suddhasatwa Basu, "Recent Trends in Fuel Cell Science and Technology"

BSCP2: Engineering Chemistry Laboratory

Course Outcomes:

Students will demonstrate the ability to

1. Apply theoretical knowledge for practical use and solve engineering problems.
2. Design and carry out scientific experiments, accurately record and analyze the results of experiments.

List of Experiments (Minimum 8 to 10 experiments should be perform)

1. To prepare a solution of NaOH and find the concentration of a given solution of sodium hydroxide by titrating it with the standard solution of oxalic acid using phenolpthalein as indicator.
2. To find the concentration of a given solution of Hydrochloric acid by titrating it with the standard solution of $Na_2CO_3.10H_2O$ using methyl orange as indicator.
3. To find the concentration of a given solution of potassium permanganate by titrating it with the standard solution of Mohr's salt.
4. Synthesis of complex compound (copper ammonium complex).
5. Synthesis of polymer (Phenol formaldehyde/urea formaldehyde resin).
6. Synthesis of aspirin.
7. pH-metric analysis of a sample solution – soil, food stuff e.t.c.
8. Analysis of inorganic solution by spectroscopic method (Calorimetry)
9. Corrosion testing of electronic integrated circuits (anodic corrosion via Faradays law).
10. Finding the Calorific value of fuel by Bomb calorimeter (GCV, LCV)
11. Flash point-fire point and cloud point-pour point of fuel/lubricant
12. Synthesis of nanomaterials by green route (co-precipitation method)

Course Educational Objectives:

CEO1: To impart an understanding of Engineering chemistry's concepts, analytical methods and technological features.

CEO2: To acknowledge Laboratory Safety rules.

ESEM1 Engineering Mechanics

Course Outcomes:

Students should be able to

1. Apply Mechanics principles to find resultant and equilibrium of 2D force system
2. Evaluate forces in statically determinate trusses and cables using equations of static equilibrium
3. Apply laws of dry friction for engineering problems
4. Solve engineering problems on motion of a particle

Unit 1

Force system: Forces, Free-Body Diagrams, Moment, Couples, Resultant and Equilibrium of Two dimensional force System, Equivalent Force system

Unit 2

Structures in Equilibrium: Beams and Trusses, Dry Friction for inclined planes, Belt friction

Unit 3

Motion of a Point: Position, Velocity and Acceleration, Straight Line motion, Curvilinear Motion, Cartesian coordinates, normal & tangential coordinates and, polar coordinates. Relative motion

Unit 4

Forces, Mass and Acceleration: Newton's second law, Work-Energy Principle, Impulse- Momentum Principle, Direct central impact.

Textbooks:

1. Hibbeler R. C., "Engineering Mechanics - Statics", Prentice Hall, 14th Edition
2. Hibbeler R. C., "Engineering Mechanics - Dynamics", Prentice Hall, 14th Edition
3. Beer F. P., Johnston E. R. et al., "Vector Mechanics for Engineers: Statics Dynamics", McGraw-Hill Publication, 12th Edition

Reference Books:

1. Meriam J. L., Kraige L. G., "Engineering Mechanics - Statics ", John Wiley and Sons, 8th Edition
2. Meriam J. L., Kraige L. G., " Engineering Mechanics - Dynamics ", John Wiley and Sons, 8th Edition
3. Bedford and W. Fowler, "Engineering Mechanics - Statics and Dynamics", Pearson Publications

ESMM1: Engineering Mechanics Laboratory

Course Outcomes:

Students will demonstrate the ability to:

1. Verify principles of mechanics through experiments.
2. Solve simple engineering problems using graphical solution techniques.
3. Solve simple engineering problems using computer programs.

PART A: Experiments (Any six)

1. Verification of law of polygon of forces
2. Verification of law of moments
3. Study of Space force system
4. Determination of beam reactions
5. Belt friction
6. Determination of shear force and bending moment of beam
7. Verification of Newton's second law of motion
8. Moment of inertia of flywheel
9. Coefficient of friction
10. Simple machine (Screw Jack)
11. Stiffness of spring
12. Young's Modulus

PART B: Assignments

There will be six assignments, based on graphical and computer solutions of Engineering Mechanics problems. Each assignment shall have a minimum of two problems.

ESED2 Engineering Drawing and Computer Graphics

Course Outcomes:

Students should be able to

1. Familiarize with different drawing tools, technical standards and procedures for construction of different geometries and engineering objects.
2. Develop the ability to visualize and communicate three dimensional shapes and their sections by representing three-dimensional objects into two-dimensional views using concept of orthographic projection.
3. Apply the visualization practices to draw isometric projection from a given orthographic views.
4. Draw the development of lateral surfaces of assembly and cut sections of different geometrical solids for engineering applications.
5. Draw 2D and 3D drawings using computer aided drafting tool

Unit 1

Introduction to Engineering Drawing: Drawing tools, conventions, lettering, systems and rules of dimensioning

Unit 2

Projection of Points and Straight Lines : Projection of points in different quadrants, Projection of straight lines in different orientations

Unit 3

Orthographic Projections: Principles of Orthographic Projections, types of orthographic projections–First angle and third angle projections, Obtaining orthographic projections of given solids and machine elements by using first angle projection method along with sectional views. Basic drawing commands and its applications to draw 2D views using CAD software

Unit 4

Isometric Projections: Principles of Isometric projection – Isometric and natural Scale, Isometric views of simple and compound solids, drawing isometric views from given orthographic views. Basic drawing commands and its applications to draw 3D views using CAD software

Textbooks:

- N.D.Bhatt, “Elementary Engineering Drawing”, Charotar Publishing House, Anand (India)
- M.L.Dabhade, “Engineering Graphics” I, Vision Publications, Pune
- Dhananjay Jolhe, “Engineering Drawing”, Tata McGraw Hill publishing company Ltd., New Delhi

Reference Books:

- Warren Luzzader, “Fundamentals of Engineering Drawing”, Prentice Hall of India, New Delhi.
- Shah, M.B. & Rana B.C. , “Engineering Drawing and Computer Graphics”, Pearson Education
- Agrawal B. & Agrawal C. M. , “Engineering Graphics”, Tata McGraw Publication
- Suraj Singh , “ Civil Engineering Building Practice ”,

ESDC2 Engineering Drawing and Computer Graphics Practical

To draw 02 examples on each assignment on A3 size drawing sheet

Assignment 1:

Draw projection of points and lines in different positions and in different quadrants.

Assignment 2:

Draw orthographic views of any machine elements along with sectional view.

Assignment 3:

Draw isometric view for given orthographic views.

Assignment 4: (Programme specific assignment, One example only)

- Draw a plan, elevation, section of single storey building.(For Civil Engineering)
- Conventional representation of piping layouts, pipe fittings, valves, joints. Stuffing box & glands, Expansion joints etc (For mechanical , Manufacturing , Metallurgy and Robotics and Automation)
- Engineering drawings such as complex circuits/schematic/layout drawings, process flow diagrams (PFDs), sensor diagrams (SDs) and piping and instrumentation diagrams (P & IDs) (For Electrical , Electronics and Instrumentation Engineering)

Complete the following assignment by using CAD software (04 examples each)

Assignment 1:

Draw orthographic views of any machine elements along with sectional view.

Assignment 2:

Draw isometric view for given orthographic views.(3D drawings)

Assignment 3: (Programme specific assignment, One example only)

- Draw a plan, elevation, section of single storey building. (For Civil Engineering)
- Conventional representation of piping layouts, pipe fittings, valves, joints. Stuffing box & glands, Expansion joints etc(For mechanical , Manufacturing , Metallurgy and Robotics and Automation) (For Electrical , Electronics and Instrumentation Engineering)
- Engineering drawings such as Complex circuit/schematic/layout drawings, process flow diagrams (PFDs), sensor diagrams (SDs) and piping and instrumentation diagrams (P&IDs)

ESBE1 Basics of Electrical and Electronics Engineering

Course Outcomes:

After the completion of the course the student will be able to

1. Analysis of AC and DC circuits.
2. Apply the principles of electric and magnetic circuits to solve engineering problems.
3. Analysis and acquire knowledge about transformer.
4. Understand the principles and characteristics of the Semiconductor devices and BJT.
5. Understanding of Digital Binary System, logic Gates and Op-amp.

Unit 1

DC Circuits: Electrical circuit elements (R, L, and C), voltage and current sources, Kirchhoff's laws, analysis of simple DC circuits: Superposition, Thevenin and Norton theorems, Maximum Power Transfer theorem, Star-Delta transformation

Unit 2

AC Circuits:

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, R-L, R-C, R-L-C combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections, three-phase power.

Unit 3

Magnetic Circuits and Transformers: Magnetic materials, B-H curve, hysteresis loop, series and parallel magnetic circuits, ideal and practical transformer, equivalent circuit, losses in transformers, regulation, and efficiency. Autotransformer and three-phase transformer connections

Unit 4

Semiconductor Diode: Depletion layer, V-I characteristics, ideal and practical Diodes, Diode Equivalent Circuits, Zener Diodes breakdown mechanism (Zener and avalanche).

Diode Application: Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator.

Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration.

Unit 5

Digital System and Binary Numbers: Number System and its arithmetic Signed binary numbers, Logic simplification and combinational logic design: Binary codes, code conversion, review of Boolean algebra.

Logic Gates: Different types of gate and truth table, adder and subtractor using logic gates. Introduction to Operational Amplifiers.

Text Books:

1. D P Kothari and I J Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D C Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. Chinmoy Saha, Arindham Halder and Debarati Ganguly, Basic Electronics - Principles and Applications, Cambridge University Press, 2018.
4. M.S. Sukhija and T.K. Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University Press, 2012.

Reference Books:

1. Del Toro V, "Electrical Engineering Fundamentals", Pearson Education.
2. T. K. Nagsarkar, M. S. Sukhija, "Basic Electrical Engineering", Oxford Higher Education.

ESPE1: Basic of Electrical and Electronics Engineering Lab

List of the Experiment (Any Ten)

1. Overview of the Basic Electrical Engineering Lab and safety precautions.
2. To verify Network Theorems: KCL & KVL.
3. To connect a simple DC circuit with two loops and more than one source to measure all the branch currents. (Superposition Theorems)
4. To verify Thevenin's and Norton's Theorems.
5. To verify the maximum power transfer in Electrical Network.
6. To measure voltage, current, and power in the R-L, R-C and R-L-C series circuits and observe the phase difference between voltage and current using CRO.
7. Identification and testing of PN- Junction Diode, Zener diode, LED, Photo Diode, Photo Transistor.
8. Measurement of Voltage and Current using Multimeter, and the Frequency and Amplitude of a signal with the help of CRO and Function Generator.
9. To study PN-Junction Diode's and Zener Diode's I-V Characteristics.
10. Assemble the Single phase Half Wave and Full Wave Bride Rectifier (only study of Waveforms).
11. Measurement & study of Input and Output Characteristics of a BJT in CE Configuration.
12. Analyze the Truth Table of Basic Digital Electronics Logic GATES
13. Verify the basic Laws of Boolean Algebra.

HSM02 Communication Skills

Course Outcomes:

At the end of the course, students will demonstrate the ability to

1. Recall and use basic language skills-listening, speaking, reading and writing and attempt tasks using grammar and vocabulary efficiently
2. Understand the concepts/ principles of communication skills and structure conversations effectively
3. Develop the knack to make their point of view clear to the audience and portray their communicative competence efficiently in front of a large audience on a variety of relevant situations
4. Analyze, apply and present themselves competently in all formal spheres

Unit 1		
Introduction to English for Engineers :Varieties and Registers of English, English for Specific Purposes (ESP): Business English	**:**	Idea of Sentences, Verbs, Parts of Speech, Voice, Narration, Transformation, Gerund, Participle, Non-finite, Modals, Articles, Punctuation, Common Errors, Sub-Verb Agreement, Noun-Pronoun Agreement. Vocabulary Building, Root Words, Words from Foreign Languages, Antonyms-Synonyms, Prefixes-Suffixes, Standard Scientific Abbreviations, Analysis and Synthesis of Sentences, Forms of Sentences, Transformation of Sentences, Sense of Syntax, Diction, Describing and Defining Scientific Objects/ Instruments. Business Correspondences – Daily/ Routine Workplace Correspondences, Business Letters, Resume/ CV Writing, Job Application/ Covering Letter, Preparing Agendas and Minutes of Meeting, Report Writing, Tender Writing, Notices etc
Unit 2		
Foundation of Communicative and Linguistic Ability Development: Types of Communication, Process of Communication, Barriers and ways to overcome them, Common Challenges: Phonological, Syntactic, Semantic and Pragmatic Errors	**:**	Foundation of Communicative & Linguistics Ability Development. Types of Communication – Oral, Written, use of symbols, body languages, facial expressions etc. Channels of Communication, Barriers of Communication, Strategies to tackle Barriers of Communication, Strategies for Effective LSRW Skills. Linguistics – Phonology, Morphology, Semantic, Syntactic, Vowels, Consonants, Dipthongs, Syllables, Phonetic and Phonemic Transcription of Words, Rhythm, Juncture, Pauses, Accentual Pattern.
Unit 3		
Advanced Speaking Skills: Nuances of Speaking Skills/ Public Speaking, Group Communication, Presentation Skills: The 4 P's of Presentation, Do's and Don'ts, Techniques for Effective Delivery	**:**	Accuracy and Fluency in Oral Communication, Clarity in Proper Articulation, Establish Connection with Audience, Understanding of British R.P. Conduct of Group Tasks including GDs, Debates, Extempore, Elocution etc Individual Tasks like Lecturettes. Basic techniques and tips for effective speaking and presentation. Understanding Presentation Skills – Projection, Pace, Pitch and Pauses, Supra Segmental Features
Unit 4		
Business Writing Development: Techniques of Writing: Note-making, Drafting, Editing, Paraphrasing and Proof-reading, Business Letters, e-mails and Brief Reports	**:**	Basic Mantra/ ABCs of Writing Skill – Accuracy, Brevity and Clarity. Internal and External Communication in an Organization, Note Making, Note of Action etc, Drafting letters, Different Elements of Letter Writing, Editing. Format, Layout, Spacing, numbering of paragraphs/ page numbers of letters, annexures & appendices of a letter. Avoiding use of Jargon and Cliches. Significance of Proof Reading, Paraphrasing etc. Letter to Civil Dignitaries, Formal and Informal Letters, Demi-Official Letters, writing e-mails, Tour Report and writing reports on various Visits, Inspections, Workshops, Seminars, Events in a flawless manner. Paragraph Writing, Essay Writing, Precis Writing, Importance of Organized and Effective Writing Business Correspondences.

(Activity and Exposure Oriented T & L Methodology)

Unit 1		
Foundation of Language Learning Skills	:	Receptive Skills: Listening and Reading; Productive Skills: Speaking and Writing; Grammaticality and Appropriateness; Vocabulary Development
Unit 2		
Listening Skills	:	Stages of Listening (Pre, While and Post), Strategies to Develop Active Listening Skills, Problematic Sounds for Indian Users
Unit 3		
Speaking Skills	:	Oral Communication, Sounds in English, Pronunciation, Stress, Intonation and Pauses, Formal and Informal Expressions, Situational Conversations, Group Discussion
Unit 4		
Reading and Writing Skills	:	Reading Techniques: Scanning and Skimming, Active Reading; Common Problems in Reading; Stages of Writing (Pre, While and Post), 7 Cs of Effective Communication; Letter/ e-mail Writing- Drafting, Editing, Summarizing

CCA01

Sports/NSS/NCC/YOGA/Painting/Music/Classical dance

VSMP1 Manufacturing Practices Lab

Course Outcomes:

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding
3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping
4. Welding and soldering operations
5. Apply basic electrical engineering knowledge for house wiring practice

LIST OF EXPERIMENTS

Machine shop:

- Study of machine tools in particular Lathe machine
- Demonstration of different operations on Lathe machine
- Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting.
- Study of Quick return mechanism of Shaper.

Fitting shop:

- Preparation of T-Shape Work piece as per the given specifications.
- Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
- Practice marking operations.

Carpentry:

- Study of Carpentry Tools, Equipment and different joints.
- Practice of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint

Electrical & Electronics

1. Introduction to House wiring, different types of cables. Types of power supply, types of motors, Starters, distribution of power supply, types of bulbs, parts of tube light, Electrical wiring symbols.
2. Soldering and desoldering of Resistor in PCB.
3. Soldering and desoldering of IC in PCB.
4. Soldering and desoldering of Capacitor in PCB

Welding:

- Instruction of BI standards and reading of welding drawings.
- Butt Joint
- Lap Joint
- TIG Welding
- MIG Welding

Casting:

- Introduction to casting processes

Smithy

- Sharpening any arc and edge.
- Preparing small arc and edge,
- Repair of agricultural implements and power plough, use of power hammer etc.

Suggested Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
3. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.