Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING & EXAMINATION

BE (Metallurgical Engineering) III Semester

Sl. No.	Board of Study	Subject Code	Subject	Periods per week			Scheme of Exam			Total Marks	Credit L+(T+P)/2
							Theory/ Pract.				
				L	T	P	ESE	CT	TA		
1	Applied Mathematics	338351(14)	Mathematics – III	4	1	-	80	20	20	120	5
2	Metallurgical Engg.	338352(38)	Introduction to Materials Science	3	1	-	80	20	20	120	4
3	Metallurgical Engg.	338353(38)	Geology of Minerals & Ore Dressing	4	-	-	80	20	20	120	4
4	Applied Chemistry	338354(11)	Chemical Characterization of Materials	3	1	-	80	20	20	120	4
5	Metallurgical Engg.	338355(38)	Thermodynamics & Kinetics	3	1	-	80	20	20	120	4
6	Metallurgical Engg.	338356(38)	Introduction to Physical Metallurgy	3	1	-	80	20	20	120	4
7	Applied Chemistry	338361(11)	Chemical Characterization of Materials Lab	-	-	3	40	-	20	60	2
8	Metallurgical Engg.	338362(38)	Geology of Minerals & Ore Dressing Lab	-	-	3	40	-	20	60	2
9	Metallurgical Engg.	338363(38)	Physical Metallurgy Lab	-	-	3	40	-	20	60	2
10	Metallurgical Engg.	338364(38)	Materials Science Lab	-	-	3	40	-	20	60	2
11	Humanities	338365(46)	Value Education	-	-	2	-	-	40	40	1
12			Library	-	-	1	-	-	-	-	-
Total				**20**	**5**	**15**	**640**	**120**	**240**	**1000**	**34**

L: Lecture, T: Tutorial, P: Practical, ESE: End Semester Exam, CT: Class Test, TA: Teachers Assessment

Note: Duration of all theory papers will be of Three Hours.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Introduction to Materials Science**	Code:	**338352(38)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To present the basic fundamentals of materials science and engineering.
2. To expose different classes of materials, their properties, structures and imperfections present in them.
3. To highlight important concepts of each topic covered in the subject.
4. To provide opportunity of self-evaluation on the understanding of the subject matter.

UNIT- I Introduction and classification of engineering materials; Crystal structure; Crystalline and noncrystalline materials; Classification of crystal; Bonding in solids; Effect of bonding and crystal structure on properties of materials; Liquid crystal; Quasi crystal; Imperfection in crystals; Diffusion in solids; Solution and Alloys.

UNIT-II Electron theory of solids: Electrical conduction and classification of conducting materials, Free electron theory, Classical free electron theory - Advantages and Disadvantages; Thermal conductivity; Band theory of solids; Semiconductors; Element and compound semiconductors; Intrinsic and extrinsic semiconductors; Band theory of semiconductors; Hall Effect; p-n junction; Energy band diagram of p-n junction; Solar cell.

UNIT- III Superconductors: Types and properties; Bardeen, Cooper and Schrieffer (BCS) theory of superconductivity; High Temperature Superconductivity; Application of superconductors; Optical properties of materials: Refraction, Reflection, Dispersion, Absorption in Metal, Traps, Luminescence - Principle and classification.

UNIT-IV Dielectric materials: Dielectric parameters and properties, Types; Dielectric constant; Dielectric loss and breakdown; Insulating materials; Magnetic materials: Dia, Para and Ferro magnetic materials, Theory of magnetism, Ferrimagnetic materials and Antiferromagnetism; Applications: Magnetic recording materials, Magnetic principle in computer data storage.

UNIT-V Polymeric Materials: Types, Mechanism of Polymerization, Classification, Structure, Applications; Ceramic Materials: Types, Structures, Properties and applications; Composite Materials: Fiber Reinforced composite, continuous and short fiber composites, Influence of fibre length on mechanical characteristics, Tensile stress-strain behaviors, Classification based on matrix materials; Nanomaterials: Synthesis, Characterization, Properties and Application.

Text Books:

1. Material Science: M. S. Vijaya and G. Rangarajan: Tata McGraw Hill Education Pvt. Limited.
2. Materials Science: V. Rajendran and A. Marikani, Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. Material Science and Engineering: W. D. Callister Jr., Wiley India Pvt. Ltd.

Reference books:

1. Material Science and Engineering: W.F.Smith, Javed Hashemi and Ravi Prakash, Tata McGraw Hill Publishing Company Pvt. Ltd.
2. Engineering Materials and their Applications: Richard A. Flinn and P. K. Trojan, Jaico Pub. House.
3. Elements of Materials Science: L. H. Van Vlack, Addison-Wesley.
4. The Science and Engineering of Materials: Donald R. Askeland and Pradeep P. Phule, Thomson.

Course Outcomes:

1. The students are expected to enhance the technical knowledge on materials & its applications.
2. The students are expected to possess ability to identify, formulate and solve engineering problems.
3. The students are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
4. Work effectively as an individual and as a member of a multidisciplinary team.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Mathematics – III**	Code:	**338351(14)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To make the student familiar with the concept of Fourier series and Harmonic Analysis
2. To make the student to understand the concept of Laplace Transform & its Engineering Applications.
3. To introduce the student to Partial Differential Equations and their applications.
4. To make the student familiar with the theory of analytic functions and complex integration.
5. To make the student to understand the concepts of random variables and probability distributions.

UNIT- I **FOURIER SERIES:** Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

UNIT-II **LAPLACE TRANSFORM:** Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by tn, Division by t, Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT- III **PARTIAL DIFFERENTIAL EQUATION:** Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT-IV **COMPLEX VARIABLES:** Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

UNIT-V **STATISTICS:** Random variables, Discrete & continuous probability distributions, Expectation, Mean & Standard Deviation, Moments & moment generating function, Distributions- Binomial, Poisson and Normal distributions.

Text Books:

1. Higher Engg. Mathematics by Dr. B.S. Grewal– Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

Reference Books:

1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P. N. Wartikar & J.N. Wartikar. Vol- II– Pune Vidyarthi Griha Prakashan, Pune.
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.

Course Outcomes:

1. The students will able to find the Fourier series representation of periodic functions.
2. The students will be able to find the Laplace Transform and inverse Laplace Transform of functions and to use them to find the solution of ordinary differential equations.
3. The students will be able to formulate and solve first order and higher order partial differential equations.
4. The students will be able to determine the analytic functions and compute the complex contour integrals along the real line.
5. The students will be able to find the mean and variance of random variables and will be able to fit the Binomial, Poisson & Normal distributions to the given data.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Geology of Minerals & Ore Dressing**	Code:	**338353(38)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**NIL**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To familiarize the students with fundamentals of minerals.
2. To understand the distribution of minerals deposits in different forms.
3. To understand the basics of mineral beneficiation.
4. To understand the physical and chemical properties of different ores and minerals.
5. To understand the application of mineral beneficiation techniques in metal extraction processes.

UNIT- I A brief idea of the Origin and Age of the Earth; Internal structure of the Earth; Physical, Chemical and Optical Properties of Minerals; Origin of Minerals; Definition, Origin, Classification, Texture, Structure and Petrographic description of Igneous, Sedimentary and Metamorphic Rocks.

UNIT-II Processes of mineral deposits formation; Distribution and utilization of minerals including coal and petroleum deposits of India; Industrial uses of important metallic and non-metallic minerals; Mineral deposits and status of mineral dressing industries in India.

UNIT- III Ore dressing; Sampling of ore by different methods; Theory of comminution; Laws of crushing and grinding; Jaw and Gyratory crushers; Roll crusher and their performance; Ball mills; Rod mills; Tube mills; Pot mills and Pebble mills; Open and closed circuit grinding; Energy relationship and work index; Types of screens; Screen analysis; Factors affecting performance of screens; Classification- Sizing and sorting classifiers.

UNIT-IV Movement of solids in fluids; Stoke's law and Newton's law; Terminal velocity and its relation with size; Free and hindered settling ratio; Ratio of concentration; Recovery; Selectivity index; Jigging and Tabling: Mechanism, types of units, and factors affecting the operations; Magnetic; and electrostatic separation- principles, units and operations.

UNIT-V Flotation and heavy media separation: Principal requirements, different processes as applied to metallic ores and coals; Application of flotation to concentration of important ores; Efficiency of flotation; Factors affecting flotation. Simplified flow sheets with reference to Indian deposits.

Text Books:

1. Mineral Processing Technology: B.A. Will and T. J. Napier-Munn, Butterworth Heinemann.
2. Text Book of Geology: G.B. Mahapatra, CBS Publishers and Distributers.
3. Text book of Engineering Geology: Prabir Singh.

Reference Books:

1. Principles of Mineral Dressing: A.M. Gaudin, Tata McGraw Hill Edition.
2. A Text Book of Geology: P. K. Mukherjee, The World Press Private Limited.
3. Igneous and Metamorphic Petrology, Francis J. Turner and John Verhoogen, CBS Publisher.
4. Principles of Mining Geology: V.M. Banar.

Course outcome:

1. Students will be able to understand the characteristics of different ores and minerals.
2. Students will be familiar with the different ore dressing processes utilized in industrial practices.
3. The students will be able to use the techniques, skills, and modern engineering tools necessary for industrial practices.
4. Students will be able work effectively as an individual and as a member of a multidisciplinary team.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Chemical Characterization of Materials**	Code:	**338354(11)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To provide students with knowledge of chemical characterization techniques that is appropriate or unique to inorganic material analysis, what these techniques measure and the underlying scientific principles on which they are based.
2. The course provides BE students with tools to relate characterization methods back to the relevant science and forward to what technique is appropriate to the solution of a given problem.
3. To develop the ability to relate/choose characterization data relevant to the process-structure-property-performance behavior of inorganic material in use.
4. To give knowledge of the various wet analysis and spectroscopic techniques those are utilized to analyze the chemical composition of synthetic and inorganic materials.
5. To understand the classical and quantum mechanical principles from the techniques.

UNIT- I Numerical Problems based on all types of analysis; Fundamentals of Quantitative analysis and theoretical Principles; Sampling, Classification of errors & their minimization; Accuracy & Coefficient of Variation; Common Techniques of Classical methods of analysis; Chemical & Ionic Equilibria; Acids & Bases.

UNIT-II Volumetric & Gravimetric analysis; Neutralization titration; Redox titration Complexometry; Theory of indicators; Purity of precipitate; Fractional Precipitation; Organic Precipitations.

UNIT- III Electro Analytical Methods. Potetiometry; Conductometry; Coulormetry; pH measurement.

UNIT-IV Separative Techniques. Solvent Extraction; Chromatography; Ion exchange.

UNIT-V Optical methods of Analysis. Absorption Methods: Visible U.V. & I.R. Spectrophotometry. Atomic absorption Spectroscopy. Emission methods; Emission spectrography. Flame Photometry. Fluorimetry.

Text Books:

1. Chatwal – Anand – Instrumental Methods of Chemical Analysis.
2. B.K. Sharma – Instrumental Methods of Chemical Analysis.

Reference books:

1. I. Vogel's – Text book of Quantitative Inorganic Analysis.
2. B. Stuart – Modern Infrared Spectroscopy
3. G.E. Johnson, H.E. Taylor and R.K. Skogerboe- Analytical Chemistry.
4. I.M. kolthoff and P.J. Elving – Treatice on analytical Chemistry. Part-I Volume – 4.
5. Wilson and Wilson's – Comprehensive analytical Chemistry Vol- II A.
6. T. Meites and L Meites – Analytical Chemistry.

Course Outcomes:

1. Students upon completion of course will be in a position to choose techniques for the solution of a given problem and will be capable of discussing chemical characterization issues.
2. Students will be able to understand the basic principles of chemical characterization equipments.
3. Students will be able to develop novel analytical process as per product requirements.
4. Students will be able to analyze the chemical composition of products.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Thermodynamics & Kinetics**	Code:	**338355(38)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To understand the principles of Thermodynamics & Kinetics which are the key parameter for metallurgical engineers?
2. This will be useful in the extraction of metals and alloys.
3. To understand the phase change and product development.
4. To give proper idea of the control parameters during processing of materials.

UNIT- I Definition of thermodynamic terms; Concept of states; Simple equilibrium; Equation of states; Extensive and intensive properties; Homogeneous and heterogeneous systems; Internal energy; Heat capacity; Enthalpy; Isothermal and adiabatic processes; First and Second law of thermodynamics; Entropy; Degree of reversibility and irreversibility; Criteria of equilibrium.

UNIT-II Auxiliary functions; Combined statements; Maxwell's relations, Transformation formula, Gibbs-Helmoltz equation; Concept of Third law of thermodynamics, Temperature dependence of entropy; Statistical interpretation of entropy; Debye and Einstein concept of heat capacity; Relation between C_p and C_v; Consequences of third law.

UNIT- III Fugacity; Activity; Equilibrium constant; Use of S-functions; Controlled atmospheres; Homogeneous and heterogeneous equilibria; Ellingham - Richardson diagrams; Phase stability diagrams; Solutions: partial molal quantities, ideal and non-ideal solutions, Raoult's and Henry's law, Gibbs – Duhem equation, Regular solution, Quasi-chemical approach to solution.

UNIT-IV Chemical potential; Phase relations and phase rule – its applications; Free energy – composition diagrams for binary alloy systems; Determination of liquidus, solidus and solvus lines; Effect of pressure on phase transformation and phase equilibria; Equilibria in two phase systems; Vant Hoff and Clausuis Clayperon equations; Equilibria in three phase systems.

UNIT-V Basic concepts of reaction rates; Arrhenius equation in reaction kinetics; Mechanism of reactions and rate controlling steps; Activated complex and its thermodynamic and kinetic aspects; Kinetics of heterogeneous reactions.

Text Books:

1. Introduction to the Thermodynamics of Materials: D. R. Gaskell; Taylor and Francis.
2. Introduction to Metallurgical Thermodynamics: R. H. Tupkary; tu publishers, Nagpur.
3. Textbook of Materials and Metallurgical Thermodynamics: A. Ghosh; Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Problems in Applied Thermodynamics: C. Bodsworth and A.S. Appleton; Longmans, Green and Co. Ltd.
2. Chemical and Metallurgical Thermodynamics – Part I & II: M. L. Kapoor.
3. Kinetics of Metallurgical Reactions: H. S. Ray; Oxford and IBH Publishing Co.
4. Problems in Metallurgical Thermodynamics & Kinetics by G.S. Upadhyay & R.K.Dube; Pergamon Press.

Course Outcomes:

1. Students will appreciate the science behind most of the metallurgical phenomena.
2. It will introduce them the topics related to general thermodynamics
3. The important concept of statistical thermodynamics will be introduced which will help them to appreciate the link that exist between lattice and thermodynamics.
4. Students will be able to understand single and multi components system.
5. Students will be able to employ their analytical skills and aptitude in solving problems.
6. It can also help them to understand the concepts of phase transformation in alloy systems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Introduction to Physical Metallurgy**	Code:	**338356(38)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
Class Tests:	**Two (Minimum)**	Assignments:	**Two (Minimum)**
ESE Duration:	**Three Hours**	**Maximum Marks: 80**	**Minimum Marks: 28**

Course Objectives:

1. To understand the atomic and crystal structures of metals.
2. To understand the bonding and defects in metals.
3. To understand components and phases in different metallic systems and laws governing the same.
4. To understand the solidification, deformation and kinetics of phase transformation.
5. To study the phase diagrams of some metallurgical system and their applications.

UNIT- I Characteristic properties of metals; Bonding in solids; Crystal and amorphous structure in metals; Crystal systems and Bravais lattices; Common crystal structure of metals; Unit cell and space lattice; Crystallographic planes and directions; Atomic packing in crystals; Calculation of packing density; Voids in crystal structures.

UNIT-II Solidification: Homogeneous and heterogeneous nucleation, Cooling curves, Solidification of metals in ingot mould; Imperfections in crystals; Concept of plastic deformation of metals; Critical resolved shear stress; Dislocation theory; Deformation by Slip and Twin; Plastic deformation in polycrystalline metals; Yield point phenomena; Concept of cold working; Preferred orientation; Annealing; Recovery; Recrystallization and Grain Growth.

UNIT- III Concept of alloy formation; Types of alloys; Solid solutions; Factors governing solid solubility; Hume-Rothery Rules; Order-disorder transformations; Phase rule; Binary phase diagrams: Isomorphous, Eutectic, Peritectic, Eutectoid and Peritectoid systems; Allotropic transformation, Lever rule and its application; Interpretation of solidification behavior and Microstructures of different alloys to the above system; Effects of non equilibrium cooling; Coring and homogenization.

UNIT-IV Iron – iron carbide and iron - graphite phase diagrams; Microstructures of steels and cast irons; Types of cast irons; TTT diagram; Continuous cooling transformation diagram; Effect of common alloying elements on iron carbon equilibrium diagram; TTT and CCT diagrams.

UNIT-V Physical metallurgy of common non ferrous alloy systems: Cu-Zn, Cu-Sn, Cu-Al, Al-Si, Al-Mg, Al-Cu.

Text Books:

1. Introduction to Physical Metallurgy, Sidney H. Avner, Tata Mc Grow Hill Publishing Co.
2. Elements of Physical Metallurgy, Lakhtin., MIR Publication, Moscow.
3. Material Science & Engineering, W. D. CalisterJr. Willy India Pvt. Ltd.

Reference Books:

1. Principles of Physical Metallurgy, Robert Reed Hill, East-West publication.
2. Material Science & Engineering, W.F.Smith & Javed.Hashemi, Ravi Prakash, Tata Mc Grow Hill Publishing Co. Pvt. Ltd.
3. Phase Transformation in Metals and Alloys: David A. Porter, Kenneth E. Easterling and Mohamed Y. Sherif, CRS Press, Taylor and Francis Group.

Course Outcomes:

1. Students will be able to design the alloy system based on their knowledge of phase diagrams and metal characteristics.
2. The students will be able to understand the kinetics of phase transformation.
3. The students will be able to understand the defects in metallic system and their utilization.
4. Students will be able to employ their analytical skills and aptitude in solving problems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Chemical Characterization of Materials Lab**	Code:	**338361(11)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. Determination of Calcium & Magnesium by EDTA
2. Determination of Copper in Copper alloy by Iodometry.
3. Determination of Manganese in Steel by Potentiometer.
4. Determination of Chromium in Steel by Potentiometer.
5. To determine the Conductivity of an Electrolytic solution by Conductometer.
6. Conductometric Titration of a Strong acid with strong base
7. Determine the molarity of HCL, pH – metrically provided M/10 NaOH.
8. Determination of Iron in a Iron ore by Spectrophotometrty.
9. To determine max of a solution of Cobalt chloride.
10. Separation of Metal Cations using paper Chromatography. Estimation of Ni by DMG.

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Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Geology of Minerals & Ore Dressing Lab**	Code:	**338362(38)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. Petrographic description of Igneous, metamorphic and sedimentary rock.
2. Crushing of ore, using Jaw crusher
3. Crushing of ore, using roll crusher
4. Grinding of ore, using Rod mill.
5. Grinding of ore, using Ball mill
6. Concentration of ore with the help of Wilfley Table
7. Classification of ore using Akin's classifier
8. Concentration with the help of froth flotation cell
9. Laboratory sizing and sieve analysis.
10. Grinding of ore using Pot mill

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Physical Metallurgy Lab**	Code:	**338363(38)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. Hot mounting and Cold mounting
2. Preparation of metallurgical sample for microscopic observations.
3. Study of metallurgical microscope and familiarity with its components.
4. Study of Etching process and Etching reagents.
5. Microstructures of pure metals.
6. Microstructures of Isomorphism alloys.
7. Effect of cold working on microstructure.
8. Grain size Measurements
9. Study of inclusions.
10. Study of microstructures of cast irons.
11. Study of microstructures of Brasses and bronzes.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	**Bachelor of Engineering**		
Branch:	**Metallurgical Engineering**	Semester:	**III**
Subject:	**Materials Science Lab**	Code:	**338364(38)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum Marks:	**40**	Minimum Marks:	**20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. Preparation of Crystal structure Models.
2. To find the Band Gap of semiconductor using four probe method.
3. Electrical conductivity measurement of metals.
4. To study the hysteresis loss by tracing a BH curves.
5. To measure the Hall coefficient by Hall Effect apparatus.
6. Computation of Molecular weight of Polymers.
7. Preparation of composite materials.
8. Property determination of Glass-fibre reinforced composites.
9. To study Mechano, Thermo and Photo Luminescence methods.
10. To find the Apparent Porosity of materials.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Metallurgical Engineering** Semester: **III**

Subject: **Value Education** Code: **338365(46)**

No. Of Periods: **2 Periods/Week** Total Tutorial Periods: **NIL**

Maximum Marks: 40 **Minimum Marks: 24**

Course Objectives:

1. This course is designed to provide the importance of education with why, what & how.
2. To impart students with an understanding of fundamental humanitarian viewpoint and its outcomes.
3. To provide the knowledge about whole existence and its impact on values.
4. To bring the awareness about life long exercise so that they can fulfill their responsibility towards themselves, the family, the society, the planet.

UNIT- I **Aim of Education and Necessity for Value Education:** Education in values/wisdom/etc and education in traits/technologies/etc as the two fundamental strands of education; Answer to the frequently asked questions such as "Why to do studies", "What studies to do in overall", "How to do studies in a proper way", "How to think systematically and talk systematically"

UNIT-II **Humanitarian Viewpoint and Basic Human Objective:** Meaning and concept of happiness, Need for a fundamental viewpoint to judge things in all cases of human concerns, Proposal of the natural path of humanitarian coexistentialism; Consciousness development and its expression; Fundamental want of sustainable happiness in human being; Understanding the distinct activities and needs of self (I) and body in human being; Fundamental goal of human being; Sustainable-solution in individual (At the place of delusion); Sustainable-prosperity in family (At the place of poverty); Sustainable-cooperation in society (At the place of competition); Sustainable-coexistence in planet (At the place of struggle)

UNIT- III **Elements of Holistic and Systematic Perspective:** Need for study of fundamental information categories to develop holistic perspective; Particular-time actions and general-time laws; Need for fundamental information sequence to develop systematic perspective, Some examples for systematic study sequence

UNIT-IV **Elements of Society-friendly and Environment-friendly Goals:** Elements of Knowledge of whole existence; Elements of Knowledge of human being; Elements of fundamental Values and Wisdom; Value spectrum with reference to general relationships and particular relationships of the objects in nature; Elements of History and Contemporarity used to set current goals; Elements of Sciences and Techniques to formulate methods to achieve goals; Elements of Motoricity and Mattericity to make actions to execute the methods

UNIT-V **Lifelong Exercise for All-round Sustainability:** Collecting information for sustainability issues; Motivating people towards sustainable life-style; Ability to identify and develop appropriate technologies and management patterns for society-friendly and environment-friendly systems for production /protection/ utilization/ experimentation ; Ability to establish and execute the fundamental five-fold system in order to ensure sustainable peace-and-prosperity worldwide.

Text Books:

Value Education for Consciousness Development by Dr P B Deshmukh, Radha K Iyer, and Deepak K Kaushik (2nd Edition, 2012, ISBN: 978-81-924034-0-3)

Reference Books:

1. International Research Handbook on Values Education and Student Wellbeing by Terence Lovat, Ron Toomey, Neville Clement (Eds.), Springer 2010, ISBN: 978-90481-86747
2. Values Education and Lifelong Learning: Principles, Policies, Programmes by David N Aspin and Judith D Chapman (Eds.); Springer 2007, ISBN: 978-1-4020-6183-7
3. Fundamentals of Ethics for Scientists and Engineers by E G Seebaur and Robert L Berry, 2000, Oxford University Press