MA10501–Mathematics–II

Marks(L/P)		L	T	P	CREDITS		TOTAL
CW/SW	END	3	1	0	T	P	CREDITS
30/0	70				4	0	4

COURSE OBJECTIVES

CO #1 Able to perform matrix operations and learn to solve systems of linear equations and their application problems.

CO #2 Ability to solve linear differential equations and using the concepts of ordinary differential equations to model and solve real-world problems.

CO #3 Understand the basic concepts of probability theory and distributions, and apply selected probability distributions to solve problems.

CO #4 Provide the basic knowledge of complex numbers and their applications.

COURSE CONTENTS

Unit-1. Matrices: Review of matrices, elementary operation on rows and columns, Inverse of matrix. Normal forms, Linear dependence, Rank, Application to theory of solutions of system of linear equations, linear transformation. Orthogonal, Unitary andHermitian matrices. Characteristic equation. Eigen values and Eigen vectors, Cayley-Hamilton theorem.

Unit-2. Ordinary Differential Equations: Formation of Differential Equations, Differential Equations of first order and first degree (Variable separable, Homogeneous, Linear and Exact). Linear Differential Equations with constant coefficients.

Unit-3. Ordinary Differential Equations (continued):Linear differential equations with variable coefficients, Simultaneous differential equations, Method of variation of parameters, Application to simple problems.

Unit-4.Probability and Statistics: Binomial, Poisson and Normal distributions and their Mean and Variance, Methods of least squares and curve fitting.

Unit-5. Complex Numbers: Algebra of complex numbers, Exponential function of a complex variable, Circular function of a complex variable, Hyperbolic function and inverse hyperbolic functions. Logarithmic function of complex variable. Summation of series by C+iS method.

Text Books

1.B.V.Ramana,HigherEngineeringMathematics,TataMcGrawHill PublishingCompany Ltd.,NewDelhi,2006.

2.H.K.Dass,AdvancedEngineeringMathematics,S.ChandandCompanyLtd.,New-Delhi,2009.

Reference books

3.ZafarAhsan,DifferentialEquationandtheirApplications,PrenticeHallofIndiaPvt.Ltd.,NewDelhi, 2004.
4.M.Ray,H.S.SharmaandSChaudhary,MathematicalStatistics,RamPrasadandSons,Agra,2004.
5.SPalandS.C.Bhunia,EngineeringMathematics,OxfordUniversityPress,NewDelhi,2015.

Department of Applied Chemistry & Chemical Technology

SGS Institute of Technology and Science, Indore
BE 1st YEAR
CH 10506: CHEMISTRY

Subject Code	Subject Nomenclature	Contact Hrs.			Maximum Marks						Credits			
		L	T	P	CW	End	Total	SW	End	Total	L	T	P	Total
CH10506	Chemistry	3	1	2	30	70	100	20	30	50	3	1	1	5

Course Outcomes (COs): This course aims at imparting extensive knowledge of the subject to the students for making them understand the role of chemistry in the field of engineering. The focus is on developing analytical capabilities of students for the characterization and application of various materials in engineering. The course will enable student to

1. Understand the implications of hard water in industry and its treatment.
2. Conceptualize the applications of different types of industrially important materials such as polymers, lubricants, nano materials.
3. Rationalize bulk properties and processes using thermodynamic considerations.
4. Consider the chemical aspects of corrosion.
5. Understand the ranges of the electromagnetic spectrum, and principle & applications of spectroscopic techniques in engineering.

UNIT I

Water
Source, Types of impurities and their effects, Hardness, its expression and determination, Boiler troubles and their causes, treatment of water industrial and domestic purposes, Alkalinity and its determination, Numerical problems.

UNIT II

(a) Lubricants
Types of lubricants and principles of lubrications, properties (test) of lubricants, greases, graphite, cooling liquids and cutting fluids.
(b) Corrosion
Principle of corrosion, types of corrosion and methods of protection.

UNIT III

Use of Free Energy in Chemical Equilibria
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Use of free energy considerations in metallurgy through Ellingham diagrams.

UNIT IV

Materials Chemistry
(a) Polymers and Polymerization
Introduction, Classification, Types, mechanism, methods of polymerization. Structure-property relationships, compounding, general applications of polymer materials of industrial importance: PVC, Nylon66, Poly-ester, Bakelite, Kevlar, Teflon, Synthetic and natural rubbers. Concept of Biodegradable polymers.
(b) Nanomaterials
Introduction, synthesis, properties, nano-structured materials and their application.

UNIT V

Spectroscopic Techniques and Applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques: Diffraction and scattering.

Books and References recommended:

Text Books:

1. Palanna O.P. , Engineering Chemistry (Mc Graw Hill)
2. Dara S.S., Engineering Chemistry (S. Chand publishing)
3. Maheswaramma K.S., Engineering chemistry (Pearson Education)
4. Sulabha K. Kulkarni, Nanotechnology: Principles and Practices (Capital Pub)

Reference Books:

1. Rajaram & Kuriacose, Chemistry in Engineering and Technology Vol. -II (McGraw Hill)
2. Agrawal C.V., Chemistry of Engineering Materials. (B.S. Publications)
3. C. N. Banwell, Fundamentals of Molecular Spectroscopy (McGraw Hill)
4. T. Pradeep, Nano: The Essentials (Tata McGraw Hill Education)
5. D. Braun, Polymer Synthesis: Theory and Practice: Fundamentals, Methods, Experiments (Springer)

HU 10651 TECHNICAL ENGLISH

I Year BE (4YDC) COMMON TO ALL BRANCHES

Marks (L/P)			L	T	P	Credits		Total Credits
CW/SW/P	END	TOTAL				T	P	
30/20/30	70	150	3	--	2	3	1	04

COURSE OBJECTIVES:

The objective of this course is to enable the students to recognize the relationship of effective communication skills to succeed in academic, work and social environments and to develop both written and oral communication skills to produce clear, complete and accurate messages. This course also intends to impart business correspondence and improve English phonetics enabling the students to speak and write English correctly and with confidence.

COURSE OUTCOMES:

After successful completion of the course, *students will develop competency in the following areas:*

CO1: Understand how to apply technical information and knowledge in practical documents.
CO2: Collect, analyze, document, and report information clearly, concisely and logically.
CO3: Comprehend a particular piece of information effectively.
CO4: Possess sound language skills with correct pronunciation.

UNIT I: Communication Skills

(i) Meaning & Process
(ii) Significance of Effective communication.
(iii) Presentation Strategies: Techniques of Oral Presentations, Defining the Purpose, Analyzing the Audience, Establishing the main idea, Selecting the Appropriate Channel and Medium. Public speaking.
(iii) Communication approaches during Interviews.
(iv) Group Discussion.

UNIT II: Application of Linguistic Ability

(a) English IPA (Types of speech sounds.)
(b) Monophthongs
(c) Diphthongs.
(d) Consonants.
(e) Phonetic Transcription

UNIT III: Advanced Writing Skills:

(i) Composition :
(a) Meaning & Significance
(b) Exercise on free essay writing on technical and current topics with particular emphasis on clear expressions.
(ii) Precis
(a) Reading and Comprehension
(b) Basic rules and practice of writing précis.

UNIT IV: Technical Report Writing:

(i) Meaning & Significance
(ii) Features & Principles
(iii) Structure & Format
(iv) Samples & Models for practice

UNIT V: Business Correspondence

(i) Business & Official letters
(ii) Structure & Layout of Business letters
(iii) Types of Letters: Job Application, Letters of enquiry, Quotations, Orders and Complaints.

BOOKS RECOMMENDED:

1. Sharma, R.C. and Krishna Mohan, *Business Correspondence and Report Writing*, New Delhi: Tata McGraw-Hill, 2009.
2. Raman, Meenakshi and Sangeeta Sharma, *Technical Communication*, New Delhi: Oxford Univ. Press, 2011.
3. Kapoor A.N., *Business Letters for Different Occasions*, New Delhi: S. Chand & Co. Pvt. Ltd., 2012.
4. Thomson, A.J. and A.V.Martinent, *A Practical English Grammar*, New Delhi: Oxford University Press, 1986.

REFERENCES RECOMMENDED:

5. Lesikar, Petlit, and Flatley, *Lesikar's Basic Business Communication*, New Delhi: Tata McGraw-Hill, 1999.
6. Bhatia, R.C., *Business Communication*, New Delhi: Ane Books Pvt. Ltd., 2012.
7. Magan, Sangeeta, *Business Communication*, New Delhi: Biztantra Publications, 2010.

DEPARTMENT OF COMPUTER ENGINEERING

B. E. 1st Year (Common to all Branches of Engineering and Technology)

SUBJECT CODE	SUBJECT NAME	Hours per Week			Credits		MAXIMUM MARKS				
		L	T	P	Th.	Pr.	Theory		Practical		Total
							Th.	CW	SW	Pr.	Total
CO 10504	COMPUTER PROGRAMMING	3	-	2	3	1	70	30	20	30	150

Course Objectives

The purpose of this course is to introduce to students to the field of programming using C language. The students will be able to enhance their analysing and problem solving skills and use the same for writing programs in C.

1. Develop ability to write a computer program to solve specified problems.
2. Develop skills in algorithmic problem-solving, expressed in a programming language like C.
3. Students will learn what computer science is about, especially hardware, data representations, algorithms, encodings, forms of programming.
4. Understand fundamentals of programming such as variables, conditional and iterative statement, function and its execution etc.
5. Understand the limitation of the structure programming, and how it overcome by object oriented program.

Course Outcomes

1. To translate the algorithms/flowchart/idea to programs (in C language).
2. To test and execute the programs and correct syntax and logical errors.
3. To implement conditional branching, iteration and recursion with using of arrays, pointers and structures to formulate algorithms and programs.
4. Solving real life problems using programming.
5. To decompose a problem into classes and objects using object oriented concept.

Theory:

1. Block Schematic of digital computer and its working. Introduction to computer hardware and software, Different number systems. Flowchart and algorithm.
2. Structure of C programs, key words and identifiers, constants, variables, Data types, enumerated data types, Strings. Declarations of variables, scope and life of variables. Various types of operators and expressions. Programming errors and their handling.
3. Decision making and Branching: if-else, switch-case, Looping: While-do, for, do-while etc., nesting of loops.
4. Introduction to Arrays, Structures, Pointers, Files , Functions, Recursion.
5. Introduction to Object oriented Programming paradigm, Comparison of Procedural and Object Oriented Programming paradigm.

COURSE ASSESSMENT

The following methods shall be adopted for the assessment of this course:

1. **Theory of examination** (70 marks) on the basis of end term theory paper examination.
2. **Class Work** (30 marks) on the basis of regular evaluation of assignments, two mid semester tests and class attendance.
3. **Sessional work** (20 marks) on the basis of internal viva and continuous laboratory journal assessment and laboratory attendance. Course coordinator may ask student to submit at least six imperial drawing sheets/computer aided drawing print.
4. **Practical examination** (30 marks) on the basis of evaluating practical knowledge, quiz and viva-voce.

Text Books

1. W. Kernighan and Dennis M. Ritchie, "The C Programming Language", PHI
2. Herbert Schildt, "C: The Complete Reference" 2nd edition", Tata McGraw Hill.

Reference Books

1. Yashavant Kanetkar, "Let Us C", BPB Publication
2. Peter V. Linden "Expert C Programming: Deep C Secrets", Pearson
3. M.Chandwani, A. Jain and N.S. Chaudhary, "Elements of Computer Science", Jain Publishers.
4. B.S. Gottfried, "Programming with C", 2nd edition, Tata McGraw Hill
5. Dietal and Dietal, " C++ How to Program", PHI
6. Matthias Felleisen, Robert Bruce Findler, Matthew Flatt and Shriram Krishnamurthi "How to Design Programs: An Introduction to Programming and Computing", MIT Press.

DEPARTMENT OF MECHANICAL ENGINEERING

B. E. 1st Year (Common to all Branches of Engineering and Technology)

Code ME- 10649 Fundamentals of Mechanical Engineering

CODE	SUBJECT NAME	L	T	P	MAXIMUM MARKS				
ME -10649	FUNDAMENTALS OF MECHANICALENGINEERING	3	-	2	Th.	CW	SW	Pr.	Total
					70	30	20	30	150

CO 1 Apply the fundamental knowledge of thermodynamic systems, states, processes and cycles, equilibriums, energies. State the laws used in thermodynamics along with their terminologies

CO 2 State and apply zeroth and first law of thermodynamics to open and closed systems. Apply fundamental knowledge of fluid mechanics and list important mechanical properties of materials

CO 3 Apply fundamental knowledge of air standard cycles, air standard efficiencies, work and heat transfer in basic engineering problems

CO 4 Classify IC Engines and explain the working of different types of engines and explain the working and constructional details of different parts of two and four stroke diesel and petrol engines. Explain stresses, strains, stress strain curve and Hooke's law

CO 5 Apply the fundamental knowledge of boiler and explain constructional details of different types of boilers as well as evaluate the properties and energies of steam using steam table and different thermodynamic diagrams.

UNIT I

Review of Thermodynamics: Units and Dimensions, type of systems Closed System, Open System and Isolated System, Homogeneous and Heterogeneous System, State Path Process and Cycle, Thermodynamic processes. Simple numericals .

UNIT II

(a) Zeroth law and first law Thermodynamics, S.F.E.E. Application of First Law to Closed & open systems.

(b) Fluid Mechanics: Introduction to Fluid Properties, Density, Specific Weight, Specific Gravity, viscosity, Kinematic Viscosity.

UNIT III

Air Standard cycles: Working of an ideal engine, Otto cycle, Diesel Cycle, Dual cycle. Work transfer, heat transfer and air standard efficiencies.

UNIT IV

(a) I.C. Engines: Classification, terminology used in I.C. engines. Working of two stroke and four stroke petrol and diesel engines. Function of different parts of I.C. engine. Comparison between two stroke and four stroke engine: petrol and diesel engine.

(b) Properties of materials : Strength, Hardness, Toughness, Brittleness, Ductility, Malleability, Elasticity, Plasticity, Rigidity, Machinability, Hardenability, Resilience, Fatigue, and Creep, Stess Strain Diagram.

UNIT V

(a) Steam Boilers : Classification of Boilers, construction and working of Simple vertical boiler, Cochran boiler. Boiler mountings and accessories.

(b) Properties of Steam : T-s diagram, Types of steam Critical point Measurement of Dryness Fraction, Simple Numerical on Enthalpy, specific volume and Internal Energy of steam.

COURSE ASSESSMENT

The following methods shall be adopted for the assessment of this course:

1. **Theory of examination** (70 marks) on the basis of end term theory paper examination.

2. **Class Work** (30 marks) on the basis of regular evaluation of assignments, two mid semester tests and class attendance.
3. **Sessional work** (40 marks) on the basis of internal viva and continuous laboratory journal assessment and laboratory attendance. Course coordinator may ask student to submit at least six imperial drawing sheets/computer aided drawing print.
4. **Practical examination** (60 marks) on the basis of evaluating practical knowledge, quiz and viva-voce.

Textbooks

1. Domkundwar, Kothandaraman, Thermal Engineering, Dhanpat Rai.
2. Yadav R., Thermodynamics, Standard publishers.

References

1. Nag P.K., Engineering Thermodynamics, Tata McGraw hill pvt. Ltd.
2. Wylen G.J.V. Sonntog, R.E., Fundamentals of classical Thermodynamics, Wiley Publisher.

IP10581: MANUFACTURING PRACTICES

PERIOD PER WEEK			CREDITS		MAXIMUM MARKS				
					THEORY		PRACTICAL		TOTAL MARKS
L	T	P	TH	PR.	CW	END SEM	SW	END SEM	
0	1	4	0	3	-	-	40	60	100

PRE-REQUISITES: NA

COURSE OUTCOMES:

1. Understanding nature of wood/timber for different wooden products along with proficiency to use different carpentry tools and perform operations related to wood working
2. Basic knowledge of casting process along with use of moulding tools for mould preparation as well as identifying casting defects and their causes during casting process
3. Basic knowledge and performing forging and welding operations using different tools/equipment along with understanding defects and their causes
4. Knowledge of fitting operation and using its tools as well as fundamentals of machining operations and conducting experiments on lathe, drilling, shaper and planner machine tool along with use of single point cutting tools and their materials.

COURSE CONTENTS

UNIT 1 Wood working: Applications of wood/timber as an engineering material, natural wood, their types, hard and soft wood. Conversion of wood into timber, seasoning of timber, introduction to wood working tools for various operations like saw, chisel, jack plane, marking and measuring tools. Types of joints and their use. Introduction to paints and varnishes for protection and decorative purposes.

UNIT 2 Foundry process: Introduction to moulding and casting processes. Moulding tools and their use, green sand moulding practice, bench and pit moulding, properties of moulding sand, use of patterns and their types, pattern materials. Use of cores and chaplets. Pouring of metal and removal of castings. Casting defects and their remedies.

UNIT 3 Forging process: Hot and cold working of metals, material suitable for forging operation, simple forging operation with use of tools like hammers, anvil, swage block, dies, tongs, punches, chisel, drifts etc. Forging operation like upsetting, bending and drawing out etc.

UNIT 4 Welding process: Introduction to welding practice and classification. Manual Metal Arc Welding (MMAW). AC and DC welding, tools and equipments used in electric arc welding. Types of welded joints, joints preparation and welding positions. Gas welding - Oxyacetylene welding. Gas cutting. Defects in welding.

UNIT 5 Machine shop: Working of simple machine tools like lathe, drill, shaper, planner. Single point cutting tool and their materials and various angles. Simple lathe operations like turning, facing, taper turning, boring, threading, knurling etc. Use of taps and dies, drills and center drills and reamers on lathe. Quick return mechanism used in shaper and planner.

UNIT 6 Fitting practice: Need of fitting shop, common measuring and marking tools. Use of inside, outside and odd leg callipers, micro meters and verniers, combination set, bevel protector. Use of files of material removal, their types in respect of length and cross section, single and double cut file, filling techniques.

IP10581: MANUFACTURING PRACTICES
PRACTICALS

LIST OF PRACTICALS

1. Prepare a job in fitting shop as per the drawing.
2. Prepare a job in machine shop as per the given dimensions.
3. Prepare a job in carpentry shop as per the drawing.
4. Prepare a job in the Foundry shop as per the given dimensions
5. Prepare a job in the Smithy shop as per the given dimensions.
6. Prepare a job in the Welding shop as per the given dimensions.

HU 10700: UNIVERSAL HUMAN VALUES

II BE (Mandatory Non –credit Course for all branches)

L	T	P	Credits			Marks			
			Theory	Practical	Total	Theory	CW	SW	Total
0	1	0	0	0	0	-	-	100-	100

Prerequisite: Universal Human Values – 1 (orientation through Induction Programme)

Course objectives:-

1. Sensitization of student towards issues in society and nature.
2. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
3. Strengthening of self reflection.
4. Development of commitment and courage to act.

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

1. Describe their surroundings, society, social problems and their sustainable solutions,
2. Compare human relationships and behave sensibly with commitment towards what they believe in (human values. Human relationships and human society).
3. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

COURSE TOPICS:

1. Ideas of self, pre-conditioning, natural acceptance; Harmony in the self, Understanding human being as co-existence of self and body, Identifying needs and satisfying needs of self and body. Self observations. Handling peer pressure.

2. Recapitulation on relationships. Nine universal values in relationships. Reflecting on relationships in family. Hostel and institute as extended family. Real life examples. Teacher-student relationship. Shraddha. Guidance, Goal of education.

3. Harmony in nature. Four orders of nature – material order, plant order, animal order and human order. Salient features of each. Human being as cause of imbalance in nature. Depletion of resources – water, food, mineral resources.

4. Prosperity arising out of material goods and understanding of self. Separation of needs of the self and needs of the body. Right utilization of resources.

5. Recapitulation on society. Five major dimensions of human society. Fulfillment of the individual as major goal. Justice in society. Equality in human relationships as naturally acceptable. Establishment of society with abhaya (absence of fear).

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
4. On Education - J Krishnamurthy