Uttarakhand Technical University, Dehradun

Scheme of Examination as per AICTE Flexible Curricula

Evaluation Scheme & Syllabus

I Year (Common to All Branches)

W.E.F. Academic Session 2020-21

Uttarakhand Technical University, Dehradun
New Scheme of Examination as per AICTE Flexible Curricula
Bachelor of Technology (B. Tech.) I Year
W.E.F. Academic Session - 2020-21

I Semester - GROUP A: (Branches for Group "A" to be decided by the Institutes)

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
Mandatory Induction Program (First three weeks)				Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations									
Fourth week onwards classes will start													
1.	BAST 101 BASP 101	BSC-1	Engineering Chemistry	100	30	20	30	20	200	3	1	2	5
2.	BAST 102	BSC-2	Mathematics-I	100	30	20	-	-	150	3	1	-	4
3.	BAST 103 BASP 103	HSMC-1	English for Communications	100	30	20	30	20	200	3	-	2	4
4.	BEET 101 BEEP 101	ESC-1	Basic Electrical Engineering	100	30	20	30	20	200	3	1	2	
5.	BCST 101 BCSP 101	ESC-6	Fundamentals of Computers & Programming in C	100	30	20	30	20	200	3	1	2	5
6.	BMEP 101	ESC-3	Manufacturing Practices / Workshop	-	-	-	30	20	50	1	-	2	2
7.	BASP 102	DLC-1	Internship-I (60 Hrs Duration) at the Institute level	To be completed during or at the end of the second semester. Its evaluation/credit to be added in third semester.									
8.	BASP 105	DLC-2	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach				15	10	25*	-	-	4	-
			Total	**500**	**150**	**100**	**150**	**100**	**1000**	**16**	**4**	**10**	**25**

*It is non credit course. Student must clear it to be promoted in II Year; Marks will not be added to the total

Note: The Meaning of last Character of Subject Code (T – Theory and P – Practical)

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

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I Semester - GROUP B: (Branches for Group "B" to be decided by the Institutes)

S.No .	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	BAST 104 BASP 104	BSC-3	Engineering Physics	100	30	20	30	20	200	3	1	2	5
2.	BAST 102	BSC-2	Mathematics-I	100	30	20	-	-	150	3	1	-	4
3.	BMET 102 BMEP 102	ESC-4	Basic Mechanical Engineering	100	30	20	30	20	200	3	1	2	5
4.	BECT 101 BECP 101	ESC-5	Basic Electronics Engineering	100	30	20	30	20	200	3	1	2	5
5.	BMEP 103	ESC-2	Engineering Graphics	-	-	-	50	25	75	1	-	2	2
6.	BASP 106	HSMC-2	Language Lab & Seminars	-	-	-	50	25	75	1	-	2	2
7.	BEST 101	BSC	Environmental Studies	70	Not Credit Course. Student must clear it to complete the degree.			30 (Field & Project Work)	100	3	-	-	-
8.	BASP 102	DLC-1	Internship-I - (60 Hrs Duration) at the Institute level	To be completed during first/second semester. Its evaluation/credit to be added in third semester.									
			Total	**470**	**120**	**80**	**190**	**140**	**1000**	**17**	**4**	**10**	**23**

Note: The Meaning of last Character of Subject Code (T – Theory and P – Practical)

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

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II Semester - GROUP A: (Branches for Group "A" to be decided by the Institutes)

S.No .	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	**BAST 104 BASP 104**	BSC-3	**Engineering Physics**	100	30	20	30	20	200	3	1	2	5
2.	**BAST 105**	BSC-4	**Mathematics-II**	100	30	20	-	-	150	3	1	-	4
3.	**BMET 102 BMEP 102**	ESC-4	**Basic Mechanical Engineering**	100	30	20	30	20	200	3	1	2	5
4.	**BECT 101 BECP 101**	ESC-5	Basic Electronics Engineering	100	30	20	30	20	200	3	1	2	5
5.	**BMEP 103**	ESC-2	**Engineering Graphics**	-	-	-	50	25	75	1	-	2	2
6.	**BASP 106**	HSMC-2	**Language Lab & Seminars**	-	-	-	50	25	75	1	-	2	2
7.	**BEST 101**	**BSC**	**Environmental Studies**	70	Not Credit Course. Student must clear it to complete the degree.			30 (Field & Project Work)	100	3	-	-	-
8.	**BASP 102**	DLC-1	**Internship-I - (60 Hrs Duration) at the Institute level**	**To be completed during first/second semester. Its evaluation/credit to be added in third semester.**									
			Total	**470**	**120**	**80**	**190**	**140**	**1000**	**17**	**4**	**10**	**23**

Note: The Meaning of last Character of Subject Code (T – Theory and P – Practical)

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II Semester - GROUP B: (Branches for Group "B" to be decided by the Institutes)

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
Mandatory Induction Program (First three weeks)				Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations									
Fourth week onwards classes will start													
1.	**BAST 101 BASP 101**	BSC-1	**Engineering Chemistry**	100	30	20	30	20	200	3	1	2	5
2.	**BAST 105**	BSC-4	**Mathematics-II**	100	30	20	-	-	150	3	1	-	4
3.	**BAST 103 BASP 103**	HSMC-1	**English for Communication**	100	30	20	30	20	200	3	-	2	4
4.	**BEET 101 BEEP 101**	ESC-1	**Basic Electrical Engineering**	100	30	20	30	20	200	3	1	2	5
5.	**BCST 101 BCSP 101**	ESC-6	**Fundamentals of Computers & Programming in C**	100	30	20	30	20	200	3	1	2	5
6.	**BMEP 101**	ESC-3	**Manufacturing Practices / Workshop**	-	-	-	30	20	100	1	-	2	2
7.	**BASP 102**	DLC-1	**Internship-I (60 Hrs Duration) at the Institute level**	**To be completed during or at the end of the second semester. Its evaluation/credit to be added in third semester.**									
8.	**BASP 105**	DLC-2	Swachh Bharat Summer Internship Unnat Bharat Abhiyan (100Hrs)/ Rural Outreach				15	10	25*	-	-	4	-
			Total	**500**	**150**	**100**	**150**	**100**	**1000**	**16**	**4**	**10**	**25**

*It is non credit course. Student must clear it to be promoted in II Year; Marks will not be added to the total

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1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

BAST-101 BASP-101	Engineering Chemistry	3 1 2	05 Credits

Course Contents:

Periodic Properties (5 Lectures)

Effective Nuclear Charge, Atomic & Ionic sizes, Electron affinity, Electro negativity, Ionization Potential, Ploarizability, Oxidation States & Hydrogen Bonding.

Phase equilibrium (5 Lectures)

Gibbs Phase Rule, Phase diagram of single component system (Water & Sulphur) Phase diagram of Binary Eutectic System (Cu-Ag.)

Water Analysis - (8 Lectures)

Soft and Hard Water, Degree of Hardness, Determination of hardness by EDTA method (related numerical problems), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods), Alkalinity & It's determination.

Boiler Feed Water, Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement.

Polymers (8 Lectures)

Introduction, Types of polymerization, Classification, Thermoplastic & Thermosetting polymers Elementary idea of Biodegradable polymers, Conducting Polymers & Nano Particles, Preparation, properties & uses of the following polymers - PVC, PMMA, Teflon, Nylon 6, Nylon 6:6, Polyester & Bakelite, Rubbers, Vulcanization of Rubber.

Corrosion (4 Lectures):

Introduction, Dry Corrosion, Wet Corrosion, Mechanism of Corrosion, Factors affecting corrosion and Prevention of corrosion.

Lubricants (6 Lectures)

Introduction, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points, Aniline & Mixed Aniline Points, Acid Number, Saponification Number.

Spectroscopic techniques and application (4 Lectures)

Principle and Applications of UV – visible, IR, Raman & NMR, Spectroscopy.

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

Practical List

NOTE: Choice of 10-12 experiments of the following core experiments must be performed during the session.

1. Determination of hardness of water using EDTA method (Complexometric Titration).

2. Determination of alkalinity of water.
3. Determination of chloride content of water (Mohr's Method)
4. Determination of viscosity of unknown sample using Ostwald's viscometer
5. Determination of surface tension of unknown sample using stalagmometer.
6. Determination of saponification value of oil sample
7. Determination of acid value of oil sample
8. Synthesis of a polymer.
9. Determination of percentage moisture content in a coal sample.
10. Determination of percentage volatile matter in a coal sample.
11. Determination of ash content in a coal sample.
12. Separation of binary mixture by thin layer chromatography.
13. Separation of binary mixture by ascending paper chromatography.
14. Determination of adsorption isotherm of acetic acid on charcoal.
15. Determination of percentage purity of ferrous ammonium sulphate and copper sulphate.
16. Chemical analysis of salt (mixture of one acidic and one basic radical)

Reference Books :

1 Chemistry in Engineering and Technology - Vol.1 &2 Kuriacose and Rajaram , McGraw Hill Education
2 Fundamental of Molecular Spectroscopy C.N. Banwell , McGraw Hill Education
3 Engineering Chemistry – B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
4 Basics of Engineering Chemistry – S.S. Dara & A.K. Singh, S. Chand &Company Ltd., Delhi.
5 Applied Chemistry – Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd. Publishers, New Delhi.
6 Elementary Spectroscopy ,Y .R. Sharma , S. Chand Publishing
7 Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, New Age International Pvt. Ltd
8 Advanced Inorganic Chemistry, G.R. Chatwal, Goal Publishing house
9 Engineering Chemistry (NPTEL Web-book) B.L. Tembe, Kamaluddin and M.S. Krishna
10 Advanced Physical Practical Chemistry by JB Yadav.

BAST-102	MATHEMATICS-I	3 1 0	04 Credits

OBJECTIVES: The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.

To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.

To familiarize the student with functions of several variables that is essential in most branches of engineering.

To develop the essential tool of vector spaces, matrices and linear algebra in a comprehensive manner.

Course Contents:

Module 1: Calculus: (10 hours): Rolle's theorem, Mean Value theorems, Expansion of functions by Maclaurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables), Method of Lagranges Multipliers.

Module 2: Calculus: (8 hours): Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration.

Module 3: Vector Calculus : (10 hours) : Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems (without proof).

Module 4: Vector Spaces (6 hours): Vector Space, Vector Sub Space, Linear Combination of Vectors,Linearly Dependent, Linearly Independent, Basis of a Vector Space,Linear Transformations.

Module 5: Matrices (6 hours): Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BAST 103 & BASP 103	English for Communication	3L-0T-2P	4 Credits

COURSE CONTENTS:

Unit-I

Identifying Common errors in writing: Articles, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure.

Unit-II

Vocabulary building and Comprehension:

Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension.

Unit-III

Communication:

Introduction, Meaning and Significance, Process of Communication, Oral and Written Communication, 7 c's of Communication, Barriers to Communication and Ways to overcome them, Importance of Communication for Technical students, nonverbal communication.

Unit-IV

Developing Writing Skills:

Planning, Drafting and Editing, Precise Writing, Précis, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of Trouble, Laboratory Report, Progress Report.

Unit-V

Business Correspondence:

Importance of Business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for writing Resume, Calling/ Sending Quotation, Order, Complaint, E-mail and Tender.

Books Recommended:

1. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
2. 'Effective Business Communication', Krizan and merrier (Cengage learning)
3. 'Communication Skill, Sanjay Kumar and pushlata, OUP2011
4. "Practical English Usage Michael Swan OUP, 1995.
5. "Exercises in spoken English Parts I-III CIEFL, Hyderabad, Oxford University Press
6. On writing well, William Zinsser, Harper Resource Book 2001.
7. Remedial English Grammar, F.T. Wood,Macmillan2007.

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Communicative Language Laboratory:

Course objective: The language laboratory focuses on the practice of English through audio-visual aids and Computer software. It intends to enable the students to speak English correctly with confidence and intends to help them to overcome their inhibitions and self –consciousness while speaking in English.

Topics to be covered in the Language laboratory sessions:

1. Listening Comprehension.
2. Pronunciation, Intonation, Rhythm
3. Practising everyday dialogues in English
4. Interviews.
5. Formal Presentation

Final Assessment should be based on assignment, assessment, presentation and interview of each candidate.

BEET 101 & BEEP 101	Basic Electrical Engineering	3L-1T-2P	5 Credits

Course outcomes:

The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Electrical Engineering subjects.

The topics covered under this subject will help to enhance the basic understanding of Electrical machines and power systems and basic electronics.

Course Contents:

UNIT 1 :

DC Circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin , Norton Theorems and maximum power transfer theorem . Star to Delta conversion. Time-domain analysis of first-order RL and RC circuits.

UNIT 2:

AC Circuits (8 hours)

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, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections and power measurement

UNIT 3:

Transformers (6 hours)

Magnetic circuits and materials, BH characteristics, Basic laws of electromagnetism, single phase transformer. ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT 4:

Electrical Machines (8 hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor construction and workings . Construction, working, torque-speed characteristic and speed control of separately and self excited dc machines . Construction and working of synchronous generators

Unit 5:

Electrical Installations (6 hours)

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing methods. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

References

1. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.
2. S.N. Singh , Basic Electrical Engineering, P.H.I.,2013
3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press, 2012
5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
6. B.L. Theraja & A.K Theraja Textbook of Electrical Technology - Vol. 1, S. Chand Publication
7. E. Hughes & I.M. Smith Hughes Electrical Technology Pearson
8. Vincent Del Toro Electrical Engineering Fundamentals

List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

2. Measurement of steady-state and transient response of R-L, R-C, and R-L.
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L- C circuits.
4. Verification of Network theorems.
5. To perform Load test on single phase Transformer.
6. To study the Starting and reversal of 3 phase induction motor.
7. Study of Speed control of a DC shunt Motor by Field Control Method.
8. Study the characteristic of DC Motor.
9. Study the characteristic DC generator.

Institute can add upto two experiment of their own choice.

BMET 105	Engineering Graphics	1L-0T-2P	2 Credits

Course Objective:

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

Goals & Outcomes:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

Course Contents:

UNIT 1: Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Orthographic Projections covering, Principles of Orthographic Projections- Conventions - Projections of Points

UNIT 2: Projection of lines inclined to both planes; vertical and horizontal traces. Projections of planes - Auxiliary Planes; Projections of Regular Solids in simple position, projection of solids with base on ground and axis perpendicular to HP, Projection of solids with axis parallel to both the principal planes. Projection of solids inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning.

UNIT 3: Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Frustums and truncated solids. Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only) . Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Isometric axes, Conventions; Isometric Views of solids, Box method, coordinate method, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT 4: Introduction of CAD in engineering drawing. Overview of Computer Graphics covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area

(Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable),

UNIT 5: Customization & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits Applying various ways of drawing circles; ; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing of lines, circles, polygons using CAD technique. Introduction of solids. Multi views.

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
   B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
4. (Corresponding set of) CAD Software Theory and User Manuals

BMEP 101	Manufacturing Practices/Workshop	1L-0T-2P	2 Credits

Course Objective:

Manufacturing is fundamental to the development of any engineering product. The course on Engineering Workshop Practice is intended to expose engineering students to different types of manufacturing / fabrication processes, dealing with different materials such as metals, ceramics, plastics, wood, glass etc. While the actual practice of fabrication techniques is given more weightage, some lectures and video clips available on different methods of manufacturing are also included.

Course Outcomes:

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

- Understanding different manufacturing techniques and their relative advantages/ disadvantages with respect to different applications.
- Selection of a suitable technique for meeting a specific fabrication need.
- Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design & fabricate small components for their project work and also to participate in various national and international technical competitions.
- Introduction to different manufacturing methods in different fields of engineering.
- Practical exposure to different fabrication techniques.
- Creation of simple components using different materials.
- Exposure to some of the advanced and latest manufacturing techniques being employed in the industry.

Course Contents:

Lectures & videos: (10 hours)

1. Manufacturing Methods- casting, forming, machining, joining, Introduction to Lathe, Drilling etc. **(3 lectures)**
2. CNC machining, Additive manufacturing **(1 lecture)**
3. Fitting operations & power tools **(1 lecture)**
4. Electrical &Electronics **(1 lecture)**
5. Carpentry **(1 lecture)**
6. Plastic moulding, glass cutting **(1 lecture)**
7. Metal casting **(1 lecture)**
8. Welding (arc welding & gas welding), brazing **(1 lecture)**

(ii) Workshop Practice:(60 hours)

1. Machine shop **(10 hours)**
2. Fitting shop **(8 hours)**
3. Carpentry **(6 hours)**
4. Electrical & Electronics- Soldering, Brazing, Winding etc.**(8 hours)**
5. Welding shop **(8 hours (Arc welding 4 hrs + gas welding 4 hrs)**
6. Casting **(8 hours)**
7. Smithy **(6 hours)**
8. Plastic moulding/ Glass Cutting/ Sheet Metal Shop (6 hours)

Note: Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

BAST 104 & BASP 104	Engineering Physics	3L-1T-2P	5 Credits

Course Contents:

Module 1: Wave nature of particles and the Schrodinger equation (8 lectures)

Introduction to Quantum mechanics, Wave nature of Particles, Free-particle wave function and wave-packets, Group Velocity and Phase Velocity and relation, Uncertainty principle, wave function, Born interpretation of wave function, operators, Time-dependent and time-independent Schrodinger equation for wave function, Application: Particle in a One-dimensional Box.

Module 2: Wave optics (8 lectures)

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach- Zehnder interferometer.

Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Module 3: Introduction to solids (8 lectures)

Free electron theory of metals, Fermi level of Intrinsic and extrinsic, density of states, Bloch's theorem for particles in a periodic potential. V-I characteristics of PN junction, Zener diode, Solar Cell, Hall Effect, concept of zero resistivity and superconductivity, Meissner effect, Type - I and Type - II superconductors, applications of superconductivity.

Module 4: Lasers (8 lectures)

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO_2), solid-state lasers (ruby, Neodymium), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine. Introduction to Optical fiber, acceptance angle and cone, Numerical aperture, V number, attenuation.

Module 5: Electrostatics in vacuum (8 lectures)

Gradient, Divergence and curl, Stokes' theorem, Gauss Theorem, Calculation of electric field and electrostatic potential for a charge distribution; Electric displacement, Basic Introduction to Dielectrics, Continuity equation for current densities; Maxwell's equation in vacuum and non-conducting medium; Poynting vector.

List of Experiment*

1. To determine the dispersive power of prism.
2. To determine the wave length of sodium light with the help of newton's Ring.
3. Resolving Power of Telescope.
4. YDSE (Young's double slit Experiment).
5. To determine the frequency of AC mains supply.
6. V-I Characteristics of P-N junction diode.
7. To determine the wave length of diode loses by single slit diffraction.
8. To determine the plank's constant with the help of photocell.
9. Hall's effect experiment.
10. Calibration of ammeter by using reference zener diode.

11. To study the effect of temperature on reverse saturation current in P-N junction diode and to determine the energy band gap.
12. To determine the wave length of sodium by using plane diffraction grating.
13. To determine the prominent lines of mercury source by plane diffraction grating.
14. To determine the numerical aperture of an optical fiber.
15. To determine wave length of given laser by plane diffraction grating.
16. To determine the variation of magnetic field along the axis of current carrying circular coil and the estimation the radius of coil. 1. To determine the resistivity and band gap by four probe method.
17. Use of Michelson-Morley interferometer for determining the wavelength of He-Ne laser
18. To determine the specific rotation of sugar solution using Loren's half shade polarimeter.
19. To calculate the dielectric constant of the given dielectric material.
20. To find the capacitance and permittivity of the given material.
21. Measurement of length (or diameter) using vernier calliper, screw gauge and travelling microscope
22. To determine g by bar pendulum and Kater's pendulum.
23. To determine g and velocity for a freely falling using digital timing technique.
24. To study the motion of a spring and calculate (a) spring constant (b) value of g
25. To determine the height of an object using a sextant.
26. Determination of the value of e/m of an electron by helical method/ Thomson method.

**** Minimum 15 experiment are mandatory to perform out of above list of experiments as well other than these experiments 3-4 more experiments can be considered as per their availability***

Suggested Reference Books

1. A. Ghatak, Optics.
2. O. Svelto, Principles of Lasers.
3. David Griffiths, Introduction to Electrodynamics.
4. D.J. Griffiths, Quantum Mechanics.
5. Halliday & Resnick, Physics.
6. HC Verma, Quantum Physics
7. MN Avdhanulu, PG Kshirsagar et all, Engineering Physics

BAST 105	MATHEMATICS-II	3L-1T-0P	4 Credits

OBJECTIVES: The objective of this course is to familiarize the prospective engineers with techniques in Ordinary and partial differential equations, complex variables and vector calculus. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:

- To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
- To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.
- To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.
- To develop the tool of Series and Fourier series for learning advanced Engineering Mathematics.

Course Contents:

Module 1:Ordinary Differential Equations I :(8 hours) : Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations.

Module 2:Ordinary differential Equations II:(8 hours) : Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Module 3: Partial Differential Equations : (8 hours) : Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients.

Module 4: Sequences and series: (8 hours): Convergence of sequence and series, tests for convergence; Comparison Test; Ratio Test; D'Alembert's Ratio Test, Raabe's Test, Logarithmic Test, Cauchy Root Test, Weierstrass M Test; Alternating Series, Uniform Conversions, Fourier series: Half range sine and cosine series, Parseval's theorem.

Module 5: Functions of Complex Variable :(8 hours) : Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle).

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BMET 102 **BMEP 102**	**Basic Mechanical Engineering**	**3L-1T-2P**	**5 Credits**

Course Contents:

UNIT-1:Fundamental Concepts and Definitions

Definition of thermodynamics, System, Surrounding and universe, Phase, Concept of continuum,Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature.Thermodynamic equilibrium, Property, State, Path, Process, Cyclic and non cyclic processes,Reversible and irreversible processes, Quasi static process, Energy and its forms, Enthalpy.

UNIT-2:

Zeroth law: Zeroth law, Different temperature scales and temperature measurement

First law: First law of thermodynamics. Processes - flow and non-flow, Control volume, Flow work and non-flow work, Steady flow energy equation, Unsteady flow systems and their analysis.

Second law: Limitations of first law of thermodynamics, Essence of second law, Thermal reservoir, Heat engines. COP of heat pump and refrigerator. Statements of second law and their equivalence,Carnot cycle, Carnot theorem, Thermodynamic temperature scale, Clausius inequality. Concept of entropy.

UNIT-3:

Properties of steam: Properties of steam, Phase transformation process and its graphical representation on P-V, T-V& T-s diagram, Mollier diagram and Steam Tables, Processes involving steam in closed and open systems.

Introduction to I.C. Engines: Two & four stoke S.I. and C.I. engines. Otto cycle, Diesel cycle, Dual cycle.

UNIT-4:Force system and Analysis

Basic concept: Review of laws of motion, transfer of force to parallel position, resultant of planer force system,Free Body Diagrams, Equilibrium. **Friction:** Introduction, Laws of Coulomb friction,Equilibriumof bodies involving dry fiction.

Structure Analysis

Beams: Introduction, Shear force and bending moment, Shear force and bending moment diagram for statically determinate and indeterminate beams.

Trusses: Introductio n, Simple Trusses, Determination of forces in simple truss members, Method of Joints and Method of section.

UNIT-5

Stress and Strain Analysis

Simple stress and strain: Introduction, Normal shear stresses, Stress-strain diagrams for ductile and brittle materials,Elastic constants, One dimensional loading of members of varying cross section, Strain energy,Thermal stresses.

Compound stress and strains: Introduction, State of plane stress, Principal stress and strain, Mohr's circle for stress and strain.

Pure Bending of Beams: Introduction, Simple bending theory, Stress in beams of different cross sections.

Torsion: Introduction, Torsion of Shafts of circular section, Torque and Twist, Shear stress due to Torque.

References:

1. Van Wylen G.J. & Sonntag R.E. : Fundamentals of classical thermodynamics, John Wiley &Sons, Inc.NY.
2. Holman, J.P. : Thermodynamics, Mc Graw Hill book Co. NY.
3. Singh Onkar, Bhavikatti S.S., Chandra Suresh : Introduction to Mechanical Engineering:
Thermodynamics, Mechanics and Strength of Materials, New Age International Publishers
4. Yadav R. : Thermodynamics and Heat Engines, Vol I & II (SI Editio n) Central Publishing
House Allahabad.
5. G. H. Ryder : Strength of Materials, Mc Millan Publishers India Ltd.
6. Timoshenko : Strength of Materials, D. Van Nostrand Company Inc.

MECHANICAL ENGINEERING LAB

List of Practical **L T P 0 0 2**

A minimum of 8 experiments from the following :

1. Study of Steam engine and steam turbine models.
2. Study of 2-stroke and 4 -stroke I.C.E. models.
3. Study of Fiat engine and/ or Diesel engine prototype.
4. Study of a vapour compression Refrigeration unit tutor/refrigerator.
5. Study of a window type air conditioner.
6. To conduct the tensile test on a UTM and determine ultimate Tensile strength, percentage elongation for a steel specimen.
7. To conduct the compression test and determine the ultimate compressive strength for a specimen.
8. To conduct the Impact test (Izod / charpy) on the Impact testing machine and to find the impact strength.
9. To determine the value of acceleration due to gravity by Atwood's Machine appratus.
10. To verify the principle of moment by Bell Crank Lever Appratus
11. To determine the moment of inertia of a flywheel apparatus about its axis of rotation.
12. To find out coefficient of friction by combined inclined plane & friction slide apparatus.

BecT 101 **BECP 101**	**Basic Electronics Engineering**	**3L-1T-2P**	**5 Credits**

Course

Contents:

Module	Basic Electronics(BECT101,BECP101)	Hr
1.	**Semiconductor Diodes** Semiconductor materials- intrinsic and extrinsic types , Ideal Diode , Terminal characteristics of diodes: p-n junction under open circuit condition p-n junction under forward bias and reverse bias conditions p-n junction in breakdown region , Diode small signal model Zener diode and applications , Rectifier Circuits, Clipping and Clamping circuits	**8**
2	**DIODE APPLICATIONS:** Rectifiers and filter circuit: Half wave rectifier, Full wave rectifier, bridge rectifier and their analysis, L,C and Pi filters, Series and shunt diode clippers, Clipping at two independent levels, Clamping operation , Clamping circuit, Practical clamping circuits, Basic regulator supply using zener diode	**7**
3	**Bipolar Junction Transistors (BJTs)** Physical structure and operation modes, Active region operation of transistor, D.C. analysis of transistor circuits, Transistor as an amplifier, Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias, Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers, Transistor as a switch: cut-off and saturation modes , High frequency model of BJT amplifier	**10**
4	**Field Effect Transistor (FET**) ***Enhancement-type MOSFET***: structure and physical operation, current-voltage characteristics Depletion-type MOSFET , D.C. operation of MOSFET circuits, MOSFET as an amplifier, Biasing in MOSFET amplifiers , Basic MOSFET amplifier configuration: common source, common gate and common drain types , High frequency model of MOSFET amplifier , Junction Field-Effect Transistor (JFET)	**10**
5	**Operation Amplifier (Op-amps)** ***Ideal Op-amp Differential amplifier*****:** differential and common mode operation common mode rejection ratio (CMRR) , ***Practical op-amp circuits***: inverting amplifier, non -inverting amplifier, weighted summer, integrator, differentiator , Large signal operation of op-amps , Other ***applications of op-amps*****:** instrumentation circuits, active filters, controlled sources, logarithmic amplifiers, waveform generators, Schmitt triggers, comparators	**10**

TEXT BOOKS:

1. Integrated devices & Circuits by Millman & Halkias.
2. Electronics Devices and Circuit Theory by R. Boylestad.

REFERENCE BOOKS:

1. Electronics Devices and Circuits-II by A.P.Godre & U.A. Bakshi.
2. Electronics Devices and Circuit by G.K. Mithal.

Basic Electronics Lab

Sr.	Experiment
1	CRO-Applications
2	V-I Characteristics of Silicon & Germanium PN Junction diodes
3	V-I Characteristics of Zener Diode
4	Characteristics of BJT in Common Emitter Configuration
5	Characteristics of JFET in Common Source Configuration
6	Half Wave and Full Wave Rectifier With Filter
7	Common Emitter BJT Amplifier for audio signal amplification
8	Applications of Operational Amplifier as adder and Subtractor
9	Applications of Operational Amplifier as differentiator and integrator
10	All logic Gate's truth table validation

BCST 101 & BCSP 101	Fundamentals of Computer & Programming in C	3L-1T-2P	5 Credits

Course Objective

1. To learn basics of computers
2. To learn basics of Operating System
3. To learn basics of C Language
4. To learn basics of Programming

Course Outcomes:

1. The student will learn to formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

Detailed Contents

Module I

Introduction to Programming - Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm Flowchart/Pseudocode with examples.
From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

Module II

Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops,
Arrays - Arrays (1-D, 2-D), Character arrays and Strings

Module III

Basic Algorithms - Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)
Function - Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Module IV –

Recursion - Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.
Structure - Structures, Defining structures and Array of Structures

Module V

Pointers - Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)
File handling - (only if time is available, otherwise should be done as part of the lab)

Experiments

The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations Laboratory

Suggested Text Books

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill Suggested

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

13. WAP to illustrate constructor & Destructor
14. WAP to illustrate Object and classes.
15. WAP to illustrate Operator overloading
16. WAP to illustrate Function overloading
17. WAP to illustrate Derived classes & Inheritance
18. WAP to insert and delete and element from the Stack
19. WAP to insert and delete and element from the Queue
20. WAP to insert and delete and element from the Linked List

Recommended Text Books:

1. Fundamentals of Computers : E Balagurusamy, TMH
2. Basic Computer Engineering: Silakari and Shukla, Wiley India
3. Fundamentals of Computers : V Rajaraman, PHI
4. Information Technology Principles and Application: Ajoy Kumar Ray & Tinku Acharya PHI.

Recommended Reference Books:

1. Introduction of Computers : Peter Norton, TMH
2. Object Oriented Programming with C++ :E.Balagurusamy, TMH
3. Object Oriented Programming in C++: Rajesh K.Shukla, Wiley India
4. Concepts in Computing: Kenneth Hoganson, Jones & Bartlett.
5. Operating Systems – Silberschatz and Galvin - Wiley India
6. Computer Networks:Andrew Tananbaum, PHI
7. Data Base Management Systems, Korth, TMH

BASP 206	Language Lab and Seminars	0L-0T-2P	1 Credits

Course objective: This course intends to impart practical training in the use of English Language for Communicative purposes and aims to develop students' personality through language Laboratory.

Topics to be covered in the Language laboratory sessions:

1. Introducing oneself, family, social roles.
2. Public Speaking and oral skills with emphasis on conversational practice, extempore speech, JAM(Just a minute sessions), describing objects and situations, giving directions, debate, telephonic etiquette.
3. Reading Comprehension: Intensive reading skills, rapid reading, and reading aloud (Reading material to be selected by the teacher).
4. To write a book review. Standard text must be selected by the teacher.
5. Role plays: preparation and delivery topic to be selected by teacher/faculty.
6. Practice of Communication Skills using Language Lab

BEST 101	Environmental Studies	L - T - P 3 0 0	0 Credits

AS Per UGC Syllabus

Total Marks - 100

The structure of the question paper and Marks Distribution:

University Examination
- Part A - Short answer pattern - 20 marks
- Part B - Essay type with inbuilt choice - 50 marks

Internal Evaluation at Institute Level
- Part C - Field & Project Work - 30 marks

AIM of Environmental Studies Subject

The aim of E.V.S. (environmental studies) is to develop a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge ,Skills, attitudes ,motivations and commitment to work individually and collectively towards solutions of current problems and prevention of new ones. In view of this aim, environmental studies should form an integral part of the educational process, be centered in practical problems and be of an interdisciplinary/multidisciplinary character.

OBJECTIVES of Environmental Studies Subject

- Awareness: To help social groups and individuals acquire awareness of and sensitively to the total environment and it's allied problems.
- Knowledge: To help social groups and individuals gain a variety of experiences and acquire a basic understanding of environment and it's associated problems.
- Attitudes: To help social groups and individuals acquire a set of values and feelings of concern for environment.
- Skills: To help the individuals in acquiring skills for identifying and solving environmental problems.
- Participation: To provide social groups and individuals with an opportunity to be actively involved at all levels in working towards the resolution of environmental problems.

Detailed Content

Unit I –

Introduction: Introduction to environmental studies, Multidisciplinary nature of environmental studies; Scope and importance; the need for environmental education. Concept of sustainability and sustainable development.

Natural Resources:
Renewable and non-renewable resources: Natural resources and associated problems.
- Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

- Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit II : **Ecosystems**:

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :-
    - Forest ecosystem
    - Grassland ecosystem
    - Desert ecosystem
    - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit III: **Biodiversity and Conservation**

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- Inida as a mega-diversity nation
- Hot-sports of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit IV : **Environmental Pollution**

Definition

- Cause, effects and control measures of :-
    - Air pollution
    - Water pollution
    - Soil pollution
    - Marine pollution
    - Noise pollution
    - Thermal pollution
    - Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management : floods, earthquake, cyclone and landslides.

UNIT V - Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.

- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

UNIT VI - Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies. (6 lectures)

Note: Introduction and familiarize students with the following

Global Environmental Issues and Environmental Laws

Pollution Tragedies: Love canal, Bhopal Gas, Endosulfan, Minamata and Flint water. UN Initiatives and International agreements: Montreal and Kyoto protocols, Paris Climate Summit (2015) and Convention on Biological Diversity (CBD). Environment Laws: Environment Protection Act (1986); Air (Prevention & Control of Pollution) Act (1981); Forest Conservation Act (1980); Water (Prevention and control of Pollution) Act (1974); Wildlife Protection Act (1972).

Field work

1. Visit to a local area to document environmental assets river / forest / grassland / hill / mountain
2. Visit to a local polluted site-Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds.
4. Study of simple ecosystems-pond, river, hill slopes, etc.
5. Plantation at least 2 fruits tree in Surroundings. Pic is to taken.
6. Any useful daily good from waste materials.
7. Taken at least 5 pics of surrounding by mobile in relation to environmental/social issues.
8. Development of detailed list of flora and fauna of college campus.
9. Manufacturing of any technical prototype/model in relation to Climatic Change mitigation.

Note: Minimum Five activities shall be done by each class and reports shall submit to University after host institute verification.

Text Books:

1. Basu, M. and Xavier, S.,Fundamentals of Environmental Studies, Cambridge University Press, 2016.
2. Mitra, A. K and Chakraborty, R., Introduction to Environmental Studies, Book Syndicate, 2016.
3. Enger, E. and Smith, B., Environmental Science: A Study of Interrelationships, Publisher: McGraw-Hill Higher Education; 12th edition, 2010.
4. Basu, R.N, Environment, University of Calcutta, 2000.

Suggested Readings:

1. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
2. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London,Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
6. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
7. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
8. Ghosh Roy, MK, Sustainalble Development (Environment, Energy and Water Resources), Ane Books Pvt. Ltd., 2011.
9. Karpagam, M and GeethaJaikumar, Green Management, Theory and Applications, Ane Books Pvt. Ltd., 2010.
10. Bala Krishnamoorthy, Environmental Management, PHI learning PVT Ltd, 2012.