Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur
(Approved by AICTE, New Delhi, Recognized by Government of Maharashtra &
Affiliated to BATU University, Lonere)
NBA Accredited Programs, Accredited By NAAC 'A' Grade,
ISO 9001:2015 Certified

Teaching and Evaluation scheme for F Y B. Tech.

(Common for all branches)

Department of Basic Sciences and Humanities

Semester: I &II

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Teaching and Evaluation scheme for F Y B. Tech.

(Common for all branches)

Department of Basic Sciences and Humanities

Semester: I &II

Abbreviations

L: Lecture

T: Tutorial

P: Practical

CA1- Continuous Assessment 1

CA2- Continuous Assessment 2

MSE: Mid Semester Exam

ESE: End Semester Exam

BSC -Basic Science Courses

ESC: Engineering Science Courses

HSMC: Humanities and Social Sciences including Management courses

PRJ: Mini Project

Shri. Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Group- A

Department: Department of Basic Sciences and Humanities

Rev: Course Structure/00/2020-21

Class: F.Y. B.Tech.

Semester: I

Course Code	Type of Course	Name of the course	Teaching Scheme			Evaluation scheme				Credit
			L	T	P	CA1	CA2	MSE	ESE	
BSH11	BSC1	Engineering Mathematics- I	3	1	0	10	10	30	50	4
BSHA12	BSC2	Engineering Physics	3	0	0	10	10	30	50	3
BSHA13	HSMC1	Communication Skills	3	0	0	10	10	30	50	3
BSHA14	ESC1	Engineering Graphics	2	0	0	10	10	30	50	2
BSHA15	ESC2	Basic Civil Engineering	1	0	0	5	5	15	25	1
BSHA16	ESC3	Basic Mechanical Engineering	1	0	0	5	5	15	25	1
BSHA12L	BSC2	Engineering Physics Laboratory	0	0	2	15	15	0	20	1
BSHA13L	HSMC1	Communication Skills Laboratory	0	0	2	15	15	0	20	1
BSHA14L	ESC1	Engineering Graphics Laboratory	0	0	2	15	15	0	20	1
BSHA17	ESC4	Workshop Practices	0	0	4	15	15	0	20	2
Total			13	1	10	110	110	150	330	19

Course Category	HSMC	BSC	ESC	PCC	PEC	OEC	PROJ	MC
Credits	4	8	7	--	--	--	--	--
Cumulative Sum	4	8	7	--	--	--	--	--

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Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Group- A

Department: Department of Basic Sciences and Humanities

Rev: Course Structure/00/2020-21

Class: F.Y. B.Tech. **Semester:** II

Course Code	Type of Course	Name of the course	Teaching Scheme			Evaluation scheme				Credit
			L	T	P	CA1	CA2	MSE	ESE	
BSH21	BSC3	Engineering Mathematics-II	3	1	0	10	10	30	50	4
BSHA22	BSC4	Engineering Chemistry	3	0	0	10	10	30	50	3
BSHA23	ESC5	Engineering Mechanics	3	0	0	10	10	30	50	3
BSHA24	ESC6	Computer Programming in C	3	0	0	10	10	30	50	3
BSHA25	ESC7	Basic Electrical Engineering	1	0	0	5	5	15	25	1
BSHA26	ESC8	Basic Electronics Engineering	1	0	0	5	5	15	25	1
BSHA22L	BSC4	Engineering Chemistry Laboratory	0	0	2	15	15	0	20	1
BSHA23L	ESC5	Engineering Mechanics Laboratory	0	0	2	15	15	0	20	1
BSHA24L	ESC6	Computer Programming in C Laboratory	0	0	2	15	15	0	20	1
BSHA25L	ESC7	Basic Electrical Engineering Laboratory	0	0	2	15	15	0	20	1
BSHA26L	ESC8	Basic Electronics Engineering Laboratory	0	0	2	15	15	0	20	1
BSHMP	PRJ01	Mini Project-I	0	0	2	25	25	0	0	Audit
Total			14	1	12	150	150	150	350	20

Course Category	HSMC	BSC	ESC	PCC	PEC	OEC	PROJ	MC
Credits	--	8	12	--	--	--	--	--
Cumulative Sum	4	16	19	--	--	--	--	--

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Group- B

Department: Department of Basic Sciences and Humanities

Rev: Course Structure/00/2020-21

Class: F.Y. B.Tech. **Semester:** II

Course Code	Type of Course	Name of the course	Teaching Scheme			Evaluation scheme				Credit
			L	T	P	CA1	CA2	MSE	ESE	
BSH21	BSC3	Engineering Mathematics- II	3	1	0	10	10	30	50	4
BSHB22	BSC4	Engineering Physics	3	0	0	10	10	30	50	3
BSHB23	HSMC1	Communication Skills	3	0	0	10	10	30	50	3
BSHB24	ESC5	Engineering Graphics	2	0	0	10	10	30	50	2
BSHB25	ESC6	Basic Civil Engineering	1	0	0	5	5	15	25	1
BSHB26	ESC7	Basic Mechanical Engineering	1	0	0	5	5	15	25	1
BSHB22L	BSC4	Engineering Physics Laboratory	0	0	2	15	15	0	20	1
BSHB23L	HSMC1	Communication Skills Laboratory	0	0	2	15	15	0	20	1
BSHB24L	ESC5	Engineering Graphics Laboratory	0	0	2	15	15	0	20	1
BSHB27	ESC8	Workshop Practices	0	0	4	15	15	0	20	2
BSHMP	PRJ01	Mini Project-I	0	0	2	25	25	0	0	Audit
Total			13	1	12	135	135	150	330	19

Course Category	HSMC	BSC	ESC	PCC	PEC	OEC	PROJ	MC
Credits	4	8	7	--	--	--	--	--
Cumulative Sum	4	16	19	--	--	--	--	--

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Group- B

Department: Department of Basic Sciences and Humanities

Rev: Course Structure/00/2020-21

Class: F.Y. B.Tech. **Semester:** I

Course Code	Type of Course	Name of the course	Teaching Scheme			Evaluation scheme				Credit
			L	T	P	CA1	CA2	MSE	ESE	
BSH11	BSC1	Engineering Mathematics-I	3	1	0	10	10	30	50	4
BSHB12	BSC2	Engineering Chemistry	3	0	0	10	10	30	50	3
BSHB13	ESC1	Engineering Mechanics	3	0	0	10	10	30	50	3
BSHB14	ESC2	Computer Programming in C	3	0	0	10	10	30	50	3
BSHB15	ESC3	Basic Electrical Engineering	1	0	0	5	5	15	25	1
BSHB16	ESC4	Basic Electronics Engineering	1	0	0	5	5	15	25	1
BSHB12L	BSC2	Engineering Chemistry Laboratory	0	0	2	15	15	0	20	1
BSHB13L	ESC1	Engineering Mechanics Laboratory	0	0	2	15	15	0	20	1
BSHB14L	ESC2	Computer Programming in C Laboratory	0	0	2	15	15	0	20	1
BSHB15L	ESC3	Basic Electrical Engineering Laboratory	0	0	2	15	15	0	20	1
BSHB16L	ESC4	Basic Electronics Engineering Laboratory	0	0	2	15	15	0	20	1
Total			14	1	10	125	125	150	350	20

Course Category	HSMC	BSC	ESC	PCC	PEC	OEC	PROJ	MC
Credits	--	8	12	--	--	--	--	--
Cumulative Sum	--	8	12	--	--	--	--	--

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Engineering Mathematics-I

BSH11	BSC1	Engineering Mathematics-I	3-1-0	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Tutorial: 1hr/week	CA1- 10 Marks CA2- 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: HSC Mathematics

Course Objectives:

1	Understand linear algebra and its applicability in different engineering fields.
2	Provide in depth Knowledge of the complex number useful in problems related To Electric Circuits, Mechanical Vibrating System etc.
3	Compute partial derivatives of functions of several variables.
4	Find the solution of partial differential equations and its applications to find maxima. & minima, to expand Taylor series.
5	Understand the concept of basic mathematical methods for reduction formulae and curve tracing.
6	Find the value of integration and its applications to finding the area of curves, length of arc, volume of solid revolution, surface area of revolution etc.

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

CO1	Apply the concept of linear transformation to solve the linear equations, find the Eigen values and Eigen vectors and use Cayley-Hamilton theorem to find inverse of the matrix.
CO2	Make use of characteristics of complex numbers in problems pertaining to electric circuit, Mechanical system etc.
CO3	Apply the concept basic laws of derivatives in partial differentiation to solve first &
CO4	Apply the concept of partial derivative, to find Jacobin, series expansion and maxima
CO5	Apply the reduction formula to evaluate definite integral and develop the ability to trace the curve for a given equation of curve and its nature.
CO6	Apply the concept of change of variable and change of order of integration to evaluate multiple integral and their usage in computing area and volumes.

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Course Contents:

Unit 1: Linear Algebra [7]

Matrices: Elementary row and column transformations on a matrix; Rank of a matrix-normal form & Echelon form; Consistency and solutions of systems of linear equations using elementary transformations; Eigen values and Eigen vectors; Properties of Eigen values and Eigen vectors; Cayley Hamilton's theorem (without proof) and its applications.

Unit 2: Complex Numbers: [8]

De-Moivre's theorem(without proof); Roots of complex numbers by using De-Moivre's theorem; Expansion of $sinn\theta \& cos\, n\theta$ in powers of $\sin\theta \& \cos\theta$; Circular functions of complex variable – definition; Hyperbolic functions; Relations between circular and hyperbolic functions; Real and imaginary parts of circular and hyperbolic functions; Logarithm of Complex quantities.

Unit 3: Partial Differentiation: [6]

Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem; Total derivative; Change of variables; Differentiation of implicit function.

Unit 4: Application of Partial derivative: [6]

Jacobians - properties; Taylor's & Maclaurin's theorem for functions of one & two variables; Errors and approximations; Maxima and minima of functions of two variables.

Unit 5: Reduction Formulae and Curve Tracing: [7]

Reduction formulae for $\int_0^{\frac{\pi}{2}} sin^n x\, dx, \int_0^{\frac{\pi}{2}} cos^n x\, dx \& \int_0^{\frac{\pi}{2}} sin^m x cos^n x dx$; Tracing of the curves given in Cartesian & polar forms; Rectification of plane curves (Cartesian and Polar form).

Unit 6: Multiple Integrals & its application: [8]

Double integration in Cartesian and polar co-ordinates; Evaluation of double integrals by changing the order of integration and changing to polar form; Triple integral; Area enclosed by plane curves; Mass of a plane lamina.

Text Books:

1. P. N. Wartikar & J. N. Wartikar: A Text Book of Applied Mathematics. (Vol-I & II), Pune Vidyarthi Griha Prakashan, Pune
2. N. P. Bali: A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.
3. Peter O" Neil: A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd., Singapore

Reference Books:

1. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers.
2. Erwin Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons.
3. B. V. Ramana: Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi
4. C. R. Wylie & L. C. Barrett: advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd.

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Engineering Physics

BSHA12/B22	BSC2/4	Engineering Physics	3-0-0	3 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	CA1- 10 Marks CA2- 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basic concepts of optics, solid state physics and modern physics.

Course Objectives:

1.	Study the basic of interference, diffraction, polarization.
2.	Comprehend the utilization of laser technology and optical fibers in various disciplines.
3.	Know the basic concepts of quantum mechanics.
4.	Know the knowledge of crystallography to study various engineering materials.
5.	Study the basic concepts of semiconductors and dielectrics.
6.	Know the basic concepts of nanotechnology and nanomaterials.

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

CO1	Apply the basic of interference, diffraction, polarization for their engineering applications.
CO2	Make use of laser technology and optical fibre in various disciplines.
CO3	Explain the basic concepts of quantum mechanics.
CO4	Apply the knowledge of crystallography to study various engineering materials
CO5	Solve the problems by applying the basics of semiconductors and dielectrics.
CO6	Summarize the basic knowledge of nanotechnology and Nano-materials.

Course Contents:

Unit 1: Interference, diffraction and polarization **[6]**

Introduction, Interference of light in thin film, Newton's rings, Diffraction grating construction theory, Derivation of measurement of wavelength using diffraction grating, Polarization of light, Methods of production of polarized light, Huygens theory of double refraction, Lorentz half shade polarimeter.

Unit 2: LASER and fibre optics **[7]**

Introduction, Principle of laser, Characteristics of laser, Einstein's coefficient, Types of laser (Ruby

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& He-Ne), Population inversion and pumping, Applications of laser, Introduction of optical fibre, Structure of optical fibre, Propagation mechanism of light through optical fibre, Types of optical fibre and its applications.

Unit 3: Quantum Mechanics **[6]**

Introduction, Wave particle dualism, De-Broglie hypothesis, Phase velocity, Group velocity, Relation between phase velocity and group velocity, Physical significance of wave function, Schrodinger's time dependent and time independent wave equation, Heisenberg's uncertainty principle.

Unit 4: Crystallography **[6]**

Introduction, Space Lattice and Crystal Structure, Unit Cell, Bravais Space Lattices, Seven Crystal System, Properties of Cubic Unit Cell, Relation Between Lattice Constant and Density, Lattice Planes and Miller Indices, Interplanner Spacing For Cubic System, X-ray Diffraction, Bragg's Law, X-Ray Spectrum.

Unit 5: Semiconductor and dielectrics **[6]**

Introduction, Band theory of solids, Intrinsic and extrinsic semiconductor, Conductivity of semiconductor, Hall Effect, Application of semiconductor, Introduction of dielectrics, Dielectric parameters, Types of polarization, Dielectric materials, Frequency and temperature dependence of dielectric materials.

Unit 6: Nanophysics **[5]**

Introduction, Top down and bottom up approach for synthesis of nanomaterials, Scanning electron microscopy and High-resolution transmission electron microscopy, Properties and applications of nanomaterials, Carbon nanotubes (CNTs)- structure and types, Properties and applications of CNTs.

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Textbooks:

1. M. N. Avadhanulu and P.G. Kshirsagar, A Textbook of Engineering Physics, S Chand Publication 2007.
2. B. K. Pandey and S. Chaturvedi, Engineering Physics: – Cengage Publications.

Reference Books:

1. Geometrical & Physical optics by D. S. Mathur
2. Laser and Non-liner optics by B.B. Laud
3. S. O. Pillai, Solid State Physics
4. L. J. Schiff – Quantum Mechanics - Tata Mc. Graw Hills
5. R. K. Gaur and S. L. Gupta, Engineering Physics, Dhanpat Rai Publications.
6. C.M. Srivastava and C. Srinivasan, Science of Engineering Materials, Wiley publication.
7. Nanotechnology, Dr. Sulbha K Kulkarni, Capital Publishing Co, 2011, Second Ed

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Engineering Physics Laboratory

BSHA12L/B22L	BSC2/4	Engineering Physics Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	CA1- 15 Marks CA2- 15 Marks End Semester examination- 20 Marks

Pre-Requisites: Basic concepts of optics, solid state physics and modern physics.

Course Objectives:

1	Study the basic concepts of semiconductors.
2	Study the basic concepts of laser and optical fibers.
3	Study the basic concepts of half shade polarimeter, plane diffraction grating and crystal structure
4	Acquire the basic knowledge of Hall effect, Ultrasonic Interferometer and Newton's rings

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

CO1	Understand the I-V characteristic and band gap energy of semiconductor.
CO2	Understand the basic concept of LASER and Fibre optics.
CO3	Demonstrate the knowledge of half shade polarimeter, plane diffraction grating and crystal structure.
CO4	Develop the basic knowledge of Hall effect, Ultrasonic Interferometer and Newton's ring.

List of Practical: 2 hrs/ week

Minimum 8 practicals should be performed from the following list.

1. **Newton's rings:** To determine the wavelength of monochromatic light using Newton's rings.
2. **Resolving power of grating:** To determine resolving power of grating.
3. **Polarimeter:** To calculate specific rotation of sugar solution.
4. **LASER:** To determine the divergence and wavelength of He-Ne LASER beam.
5. **Numerical aperture of optical fibre:** To calculate numerical aperture of optical fibre by laser diode.
6. **Crystal plane:** To analyze crystal structure and miller indices of various planes.
7. **Hall Effect:** To determine the Hall coefficient of a given current carrying conductor.
8. **Band gap energy:** To determine band gap energy of given semiconductor.
9. **P-N Junction diode:** To study I-V characteristics of P-N junction diode.
10. **Ultrasonic interferometer:** To determine the velocity of ultrasonic waves through liquid.

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Communication Skills

BSHA13/B23	HSMC1	Communication Skills	3-0-0	3 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	CA1- 10 Marks CA2- 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basic knowledge of English language with grammar.

Course Objectives:

1	To know the nature, importance, process, types and barriers of communication.
2	To enhance reading and listening skills of students.
3	To introduce phonetic alphabets, its transcription, stress and intonation.
4	To improve oral skills of the students.
5	To apply grammar for proper sentence construction.
6	To utilize writing skills effectively.

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

CO1	Illustrate concept of communication and its process
CO2	Apply the knowledge of reading & listening skills
CO3	Develop the knowledge of phonetics through oral drilling.
CO4	Apply the knowledge of oral communication & presentation skills
CO5	Make use of grammar correctly.
CO6	Utilize the knowledge of written communication skills

Course Contents:

Unit 1: Fundamentals of Communication **[5]**

Introduction to communication skills (LSRW), nature and importance of communication, process of communication, verbal and non-verbal communication, types and functions of communication, barriers to communication, types and solutions to overcome it.

Unit 2: Effective Comprehension skills **[4]**

Listening: Importance of listening, Types of listening, Barriers to listening & techniques for effective listening.

Reading: Introduction to reading, Types of reading, Barriers to reading, Strategies for reading comprehension.

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Unit 3: Introduction to Phonetics [8]

Phonology of English, articulation of sounds in English, phonemic symbols (IPA), study of phonetic/phonemic transcription, pronunciation, stress and intonation

Unit 4: Oral Communication Skills [6]

Features of effective oral communication, appropriate use of non-verbal communication, Group discussion, Debate, Public speaking, Presentations, job interview, Telephonic etiquettes.

Unit 5: Basic English Grammar [7]

Parts of speech, Synonyms and Antonyms, Articles, Prepositions, Sentence formation and sentence structures, Aspects of tenses, Subject-Verb agreement, Use of auxiliaries and modal auxiliaries, Common errors.

Unit 6: Effective Writing Skills [12]

Seven Cs of effective written communication, Writing emails, Essay writing, (Technical, Social, and Cultural Topics), Reports writing: Format, Structure and types, Writing memorandum, Circulars, Notices, Agenda and minutes.

Research Papers- Introduction, Structure and documentation

Business Correspondence: Letters- Layouts, Elements, Types, Job application and résumé writing.

Reference Books:

1. Sanjay Kumar, PushpLata, Communication Skills, Oxford University Press, 2016
2. Meenakshi Raman, Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2017
3. Bovee Courtland,L and Thrill, John V. Business Communication, Today McGraw Hill, New York, Taxman Publication (1989).
4. Dr.G.S. Kushwaha, English Phonetics and Pronunciation for Indian Learners, Notion Press, 2017
5. Murphy Raymond, English Grammar in Use: A Self Study Reference and Practice Book Intermediate Learners Book Cambridge, 2013

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Communication Skills Laboratory

BSHA13L/B23L	HSMC2	Communication Skills Laboratory	0-0-1	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	CA1- 15 Marks CA2- 15 Marks End Semester examination- 20 Marks

Pre-Requisites: Basic knowledge of English language with grammar.

Course Objectives:

1.	Study Received Pronunciation, stress and intonation
2.	Know the importance of oral skills
3.	Understand the importance of grammar in writing skills and use it properly
4.	Understand the importance of presentation and interview techniques.

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

CO1	Develop Received Pronunciation with stress and intonation
CO2	Take part in group discussion, elocution and debate
CO3	Utilize grammar in writing skills
CO4	Make use of presentation and interview techniques effectively

List of Practical: 2 hrs/ week

Minimum 10 practicals should be performed from the following list.

1. Ice breaking: Problems I face while communicating (LSRW) (LO3)
2. Vocabulary Building: Activities & Games (CO2)
3. Grammar activities (CO3)
4. Introduction to phonetic symbols (Consonants, Vowels & Diphthongs) (CO1)
5. Practicing correct articulation of sounds (CO1)
6. Pronunciation/transcription from the dictionary (CO1)
7. Stress and intonation (CO1)
8. Elocution & Extempore (CO2)
9. Group discussion & debate (CO2)
10. Interview techniques (CO4)
11. Effective telephonic skills (CO4)
12. Technical report writing (CO3)
13. Letter writing (CO3)
14. Case Study: preparation & presentation (CO4)
15. Presentation techniques (CO4)

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Engineering Graphics

BSHA14/B24	ESC1/5	Engineering Graphics	2-0-0	2 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	CA1-10 CA2-10 Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Geometry & Mensuration

Course Objectives:

1	To adapt basic knowledge of drawing standards, various geometrical constructions.
2	To interpret projection of points and lines with reference to principal planes.
3	To interpret projection of planes with reference to principal planes.
4	To interpret projection of solids with reference to principal planes.
5	To adapt basic knowledge of imagination and construction of sectioning effects of various kinds of solids and the true shapes of the specific sectional surfaces and also to develop lateral surfaces of the various kinds of solids.
6	To transform three dimensional isometric views into two dimensional orthographic views and vice versa.
7	Student should use the techniques, skills and modern engineering tool for engineering practices.

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

CO1	Interpret projection of points, lines and plane planes with reference to principal.
CO2	Interpret projection of solids with reference to principal
CO3	Interpret section of solids and its development of lateral surfaces
CO4	Interpret the orthographic views of an object
CO5	Interpret the isometric views of an object
CO6	List basic commands of AUTOCAD

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Course Contents:

Unit 1: Projection of points and lines and plane (1st Angle Projection only) **[6]**

Introduction to drawing instruments and their uses. Layout of drawing sheets, Lettering, Different types of lines used in drawing practice, Dimensioning system as per BIS conventions (Theoretical treatment only)

a) Orthographic projection system, First and third angle projection methods, Projection of points on regular reference planes (HRP, FRP, PRP)

b) Projection of lines –Horizontal, Frontal, Profile and oblique lines; Rotation method for determining true length and angles of a line

c) Projection of planes (regular polygons and circle) inclined to both reference planes.

Unit 2: Computer Aided Drafting **[4]**

a) Introduction to Computer Aided Drafting (CAD), Basic command to draw 2- D objects like line, point, circle, arc, ellipse, polygon, polyline, spline etc.

b) CAD Edit /Modify Commands
Erase, Trim, Extend, Scale, Break, Fillet, Chamfer, Offset, Copy, Move, Mirror, Array, Hatch etc.

c) CAD Viewing Commands
Zoom, Pan, Rotate etc., Other Commands: Line type, Text, Text style, Dimensioning, Dimension style, Leader, Layers etc.

Unit 3: Projections of Solids **[4]**

Projection of Solids such as Prisms, pyramids, cylinder and cone with their axis inclined to one the reference planes.

Unit 4: Sections of solids & Development of surfaces **[4]**

a) Sections of solids: obtaining true shape of cut sections of Prisms, Pyramids, Cylinders and Cones (Simple positions only)

b) Development of plane and curved lateral surfaces: Prisms, Pyramids, Cylinders and Cones (cutting planes specified).

Unit 5: Orthographic Projections **[5]**

Lines used, Selection of views, spacing of views, dimensioning and sections. Conversion of pictorial view into orthographic views including sectional orthographic view.

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Unit 6: Isometric projections [5]

Introduction to isometric, Isometric scale, Isometric projections and Isometric views/drawings, Circles in isometric view. Isometric views of simple solids and objects.

Text Books:

1. R. K. Dhawan, "A text book of Engineering Drawing", S. Chand and Co.

Reference Books:

1. N. D. Bhatt, "Engineering Drawing", Charotor Publication House, Bombay
2. N. D. Bhatt, "Machine Drawing", Charotor Publication House, Bombay
3. K. Venugopal, "Engineering Drawing and Graphics", New Age Publication
4. N. B. Shaha and B. C. Rana, "Engineering Drawing", Pearson Education.

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Engineering Graphics Laboratory

BSHA14L/B24L	ESC1/5	Engineering Graphics	0-0-2	1 Credits

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	CA1- 15 Marks CA2- 15 Marks End Semester examination- 20 Marks

Pre-Requisites: Geometry & Mensuration

Course Objectives:

1	To adapt basic knowledge of drawing standards, various geometrical constructions.
2	To interpret projection of points and lines with reference to principal planes.
3	To interpret projection of planes with reference to principal planes.
4	To interpret projection of solids with reference to principal planes.
5	To adapt basic knowledge of imagination and construction of sectioning effects of various kinds of solids and the true shapes of the specific sectional surfaces and also to develop lateral surfaces of the various kinds of solids.
6	To transform three dimensional isometric views into two dimensional orthographic views and vice versa.
7	Student should use the techniques, skills and modern engineering tool for engineering practices.

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

CO1	Solve projection of points, lines and plane planes with reference to principal.
CO2	Solve projection of solids with reference to principal
CO3	Adopt basic knowledge of imagination & construction of sectioning effect of various kinds of solids & to develop its lateral surfaces.
CO4	Develop orthographic views of an object
CO5	Construct isometric views of an object
CO6	Make use of different basic commands of AUTOCAD to produce drawing in CAD

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Term work:

Students are supposed to draw/construct and submit all the sheets based on syllabus contents in the semester. (Sheet size- A2)

List of Experiments/Practical's:

1. Lettering, Types of lines and Methods of dimensioning and geometrical constructions.
2. Projection of Points and lines.
3. Projection of Planes.
4. Projection of Solids.
5. Section of Solids and Development of Lateral Surfaces.
6. Orthographic Projections.
7. Isometric Projections.
8. Orthographic Projections on CAD software

Text Books:

1. R. K. Dhawan, "A text book of Engineering Drawing", S. Chand and Co.

Reference Books:

1. N. D. Bhatt, "Engineering Drawing", Charotor Publication House, Bombay
2. N. D. Bhatt, "Machine Drawing", Charotor Publication House, Bombay
3. K. Venugopal, "Engineering Drawing and Graphics", New Age Publication
4. N. B. Shaha and B. C. Rana, "Engineering Drawing", Pearson Education.

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Basic Civil Engineering

BSHA15/B25	ESC2/6	Basic Civil Engineering	1-0-0	1 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 1 hrs/week	CA1-05 Marks CA2- 05 Marks Mid Semester Exam: 15 Marks End Semester Exam: 25 Marks

Pre-Requisites: Nil

Course Objectives:

1.	To make students understand about importance and significance of various branches of civil engineering and building construction materials.
2.	To make students understand about components of building and concept of building planning
3.	To make students understand about different building services.
4.	To make the students understand about advancement in civil engineering.

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

CO1	Classify the branches of civil engineering & building construction materials.
CO2	Explain the components of building and concept of building planning.
CO3	Summarize different building services.
CO4	Describe the advance techniques in civil & modern equipments in surveying.

Course Contents:

Unit 1: Introduction to Civil Engineering [3]

Introduction to civil engineering, Branches of civil engineering, Role of Civil Engineer
Building materials –River sand or Natural sand, Bitumen, cement, structural and reinforced steel, RMC, fly ash.

Unit 2: Basic building components and building planning [4]

Types of building as per NBC, Components of a residential building, Sub structure components their functions and types, Super structure components their functions and types, Definition and concept of plan of a simple residential building, Principles of planning.

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Unit 3: Building Services [4]

Introduction to types of building services like water supply design criteria, building finishes, rain water harvesting.

Unit 4: Advancements in Civil Engineering [4]

Smart city and its features, Green building, nZEB (Nearly zero energy building). Surveying Modern equipment: Electronic distance meter, GPS, Total Station.

Text Books:

1. Sundar Narayan, "Basic Concepts of Civil Engineering", ATLANTIC Publications, 2nd edition.
2. S. K. Duggal "Building Materials", New Age International Publisher, New Delhi, 3rd edition 2009.

Reference Books:

1. S.S. Bhavikatti, "Elements of Civil Engineering", New Age International Publisher, New Delhi, 3rd edition 2009.
2. M.N. Shesha Prakash and Ganesh. B. Mogaveer, "Elements of Civil Engineering and Engineering Mechanics", PHI Learning, 3rd Revised edition (2014)
3. Rangawala SC And Dalal K B, "Engineering Materials" charotar publications
4. Dalal K R, "Essentials of Civil Engineering", Charotar publications
5. G. K. Hiraskar, "Basic Civil Engineering", Dhanpat Rai Publication.

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Basic Mechanical Engineering

BSHA16/A26	ESC3/7	Basic Mechanical Engineering	1-0-0	1 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 1 hrs/week	CA1-05 Marks CA2- 05 Marks Mid Semester Exam: 15 Marks End Semester Exam: 25 Marks

Pre-Requisites: Engineering Mathematics, Engineering Physics, Chemistry

Course Objectives:

1	Students able to understand various thermodynamic systems and state laws of thermodynamics
2	Students able to understand different types of links, mechanisms and machines in mechanical engineering
3	Students able to understand different types of manufacturing processes and different engineering materials
4	Students able to understand metal joining processes and additive manufacturing

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

CO1	Describe various thermodynamic systems and state laws of thermodynamics
CO2	Explain different types of links, mechanisms and machines in mechanical
CO3	List different types of manufacturing processes and different engineering
CO4	Explain metal joining processes and additive manufacturing

Course Contents:

Unit 1: Introduction to thermodynamics [3]

Thermodynamic state, Process, cycle, Thermodynamic system, Heat, work, Internal energy. Zeroth Law, First Law of Thermodynamics and its application to various mechanical elements. Limitations of First Law of Thermodynamics, Statements of Second Law of Thermodynamics Thermodynamic Processes-Ideal gas equations, Isobaric, Isochoric, Isothermal, Isentropic, Adiabatic processes

Unit 2: Introduction to machine and mechanism [3]

Difference between Machine and Structure, Definition of Link, Pair, Kinematic Chain, Study of Various Mechanisms such as Steering Mechanism, Different motions involved in Mechanisms, Introduction to Machine, Study of different machines such as differential, Drilling, Lathe, Milling etc.

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Unit 3: Introduction to manufacturing processes [3]

Introduction to manufacturing processes-Casting Process, Steps involved in Sand casting processes,

Metal removing processes –Turning, Drilling, Milling, Boring, Grinding, Super finishing operations. (Applications of each metal removing process),

Materials used in engineering and their applications Metals- Ferrous and Non-Ferrous Nonmetallic materials, Material selection criteria

Unit 4: Introduction to metal joining processes and additive manufacturing [3]

Metal joining processes- Introduction to Welding, Classification of Welding Processes, Soldering Process, Brazing Process (Applications of each metal joining process), Introduction to Additive Manufacturing: Introduction to AM, AM evolution, Distinction between AM & CNC machining, Advantages of AM, Additive Manufacturing Process chain: Introduction, the eight steps in additive manufacture, variations from one AM machine to another, metal systems

Term Work:

Four assignments based on topics of syllabus of Basic Mechanical Engineering

Text Books:

1. Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi.
2. Engineering Thermodynamics by Achultan, Prentice Hall of India
3. Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot
4. Elements of Workshop Technology, Vol.I and II by Hajara Choudhari, Media Promoters
5. Theory of Machines by S.S. Ratan
6. Additive Manufacturing Technologies Rapid Prototyping to Direct Digital Manufacturing Gibson D.W. Rosen B. Stucker Springer New York Heidelberg Dordrecht, London ISBN: 9781-44191119-3 e- ISBN: 9781-44191120-9 DOI 10.1007/9781-44191120-9

Reference Books

1. Manufacturing Technology Volume I and II by P. N. Rao, Tata Mc-Graw Hill Publication.
2. Basic Mechanical Engineering by Basant Agrawal& C. M. Agrwal, Wiley India Pvt. Ltd
3. S. Hall, A. R. Holowenko, H. G .Langhlin, "Theory and Problems of Machine Design", Schaum's Outline Series, Tata McGraw Hill book Company, New York, 1982.

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Workshop Practices

BSHA17/B27	ESC4/8	Workshop Practices	0-0-4	2 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 4 hrs/week	CA1- 15 Marks CA2- 15 Marks End Semester examination- 20 Marks

Pre-Requisites: Nil

Course Objective:

1	Students able to understand different tool & equipment for work shop practice.
2	Students acquire skills for the preparation of different carpentry/sheet metal/smithy/fitting/welding/plumbing/machine shop models.
3	Students able to understand the safety precaution in the workshop
4	Student acquires skills of Application orientated tasks.

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

CO1	To make use of different tools for carpentry, fitting and plumbing operations with safety measures.
CO2	To develop skills in sheet metal, welding, smithy and machine shop operations with safety measures.

Evaluation:

The evaluation consists of continuous assessment of each job and performance of work based on Workshop Practice syllabus. The term work also based on workshop diary and attendance of student.

Instructions to the student:

Each student is required to maintain a "workshop diary" consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job.

Unit 1: Carpentry

Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tenon, Dovetail, Half Lap, etc., Methods of preparation and applications, carpentry tools like- Marking tools, cutting tools, planes, striking tools, holding tools, Carpentry operations- marking, sawing, chiseling, grooving etc. safety precautions.

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Unit 2: Fitting

Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation, safety precautions.

Unit 3: Welding

Arc welding- welding joints, edge preparation, welding tools and equipment, electrode classification and coding. Resistance welding - Spot welding, safety precautions.

Unit 4: Sheet metal work

Specifications of metal sheets, working tools, Simple development and sheet metal operations like- cutting, bending, folding, punching, revetting and joining by brazing and soldering., Sheet metal machines - Bending Machine, Guillotine shear, Sheet metal joints, safety precautions.

Unit 5: Smithy

Introduction to smithy operations like- bending, forming, upsetting, drawing. Smithy tools - hammer, hot & cold chisel flatters, tongs, anvil etc. safety precautions.

Unit 6: Plumbing

Different types of pipes, joints, taps, fixtures and accessories used in plumbing, safety precautions.

Unit 7.Machine shop:

Lathe machine, types of lathes, major parts, cutting tool, turning operations, safety precautions

List of Practical:

1. Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make different types of joint.
2. A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S. plates.
3. Exercise in Arc welding to make a joint.
4. Exercise in Resistance (Spot) welding to make a lap joint.

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5. Making a small parts using GI sheet involving development, marking, cutting, bending, brazing and soldering operations - i)Tray ii) Dust bin iii) funnel, etc. and similar articles
6. A job on smithy involving upsetting, Drawing, bending such as- Hook, peg, chisel, square headed bolt or similar articles.
7. A job on use of plumbing tools and preparation of plumbing line involving fixing of water tap and use of elbow, tee, union and coupling, etc.
8. A job on turning of a Mild Steel cylindrical job using center lathe.

Reference Books:

1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, DhanapatRai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop Technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.
6. K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.

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Engineering Mathematics-II

BSH21	BSC3	Engineering Mathematics-II	3-1-0	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Tutorial: 1 hr/week	CA1- 10 Marks CA2- 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: HSC Mathematics

Course objectives:

1	To understand the concepts of basic mathematical methods for solving differential equations, the first order and first degree.
2	To understand the concepts of basic mathematical methods for solving differential equations, the first order and first degree.
3	Solve higher-order linear equations with constant coefficients.
4	To introduce the concept of Vector differentiation that finds applications in various fields like solid mechanics, fluid flow, heat problems and potential theory
5	To introduce the concept of Vector integration that finds applications in various fields like solid mechanics, fluid flow, heat problems and potential theory.
6	To identify the functions in engineering problems as analytic function and their study as a function of complex variables and to specify some difficult integration that appears in applications can be solved by complex integration.

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

1	Solve first order linear and exact differential equations and apply them to the problems related to electric circuit, mechanical system etc.
2	Solve the first order and first degree differential equations numerically.
3	Solve higher order linear differential equations with constant coefficients.
4	Apply the Vector differential operator on scalar and vector point functions.
5	Define and discuss the concept of vector Integration. & apply to solve Physics and Engineering problems.
6	Demonstrate the ability to integrate knowledge and ideas of complex differentiation and complex integration in a coherent and meaningful manner.

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Course Contents:

Unit 1: Ordinary differential equation of first order and first degree [8]
Introductory remarks - Order, degree and formation of differential equations; Linear differential equations; Reducible to Linear differential equations; Exact differential equations ;Reducible to Exact differential equations; Applications to electric circuit, orthogonal trajectories and Newton's law of cooling.

Unit 2: Numerical solution of ordinary differential equations of first order and first degree [7]
Numerical Solution by Picard's method, Taylor's series method, Euler's method, Modified Euler's method & Runge-Kutta fourth order formula.

Unit 3: Linear differential equations with constant coefficients [7]
Introductory remarks -Complementary function, particular integral; Rules for finding complementary function and Particular integral; Method of variation of parameters; Cauchy's homogeneous and Legendre's linear equations.

Unit 4: Vector differential calculus [6]
Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.

Unit 5: Vector integration [6]
Line integrals, Surface integrals and volume integrals. Theorems of Green, Gauss and Stokes (without proof).

Unit 6: Calculus of complex functions: [8]
Functions of complex variable, Analytic function, necessary and sufficient conditions for f(z) to be analytic (without proof), Cauchy-Riemann equations in Cartesian & polar coordinates; Milne-Thomson method to determine analytic function f (z); Harmonic functions. Complex integration, Cauchy's theorem and Cauchy's integral formula (without proof).

Text Books:

1. P. N. Wartikar& J. N. Wartikar: A Text Book of Applied Mathematics. (Vol I & II), Pune Vidyarthi Griha Prakashan, Pune
2. N. P. Bali: A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.
3. Peter O" Neil: A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd., Singapore

Reference Books:

1. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers.
2. Erwin Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons.
3. B. V. Ramana: Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi
4. C. R. Wylie & L. C. Barrett: advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd.

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Engineering Chemistry

BSHB12/A22	BSC2/4	Engineering Chemistry	3-0-0	3 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	CA1- 10 Marks CA2- 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: 11th and 12th Science Chemistry,
Students should have knowledge about basic chemistry related to periodic table, properties of elements, thermodynamic laws, electrochemistry, physical and chemical properties of water, etc.

Course objectives:

1.	To study water quality parameters, Water treatment methods and Green Chemistry.
2.	To develop an analytical ability of students.
3.	To understand the chemistry behind the development of engineering materials.
4.	To study the properties and characteristics of Fuel and calculate the calorific value of fuel by Bomb and Boy's Calorimeter.
5.	To learn Corrosion Mechanism and methods of Corrosion prevention.

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

CO1	Explain and determine various characteristics of water to develop water treatment methods to solve environmental problems.
CO2	Illustrate and demonstrate different rapid and reliable analytical instrumental methods for Chemical analysis.
CO3	Summarize proper advanced materials for engineering applications
CO4	Analyze the quality of fuel and select proper fuel for industrial purpose.
CO5	Outline the knowledge of corrosion for prevention of materials from corrosion
CO6	Make use of metallic materials & green chemistry approach in the industrial point of view

Course Contents:

Unit 1: Water Treatment **[8]**

Introduction, impurities in natural water, Water Characteristics –Hardness and its determination by EDTA method, Dissolve oxygen (DO) and its determination by Winkler's method, BOD, COD. ill effects of hard water in steam generation in boilers, Numerical on hardness of Water, Treatment of hard water- Hot Lime –Soda process, Zeolite process, Ion exchange process.

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Unit 2: Instrumental methods of chemical analysis [7]

Introduction, advantages and disadvantages of instrumental methods, A) pH-metry: Introduction, pH measurement using glass electrode, Applications of pH-metry, B) Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lamberts law), Single beam spectrophotometer (Principle, schematic, working and applications), C) Conductometry: Conductometric Titrations, D) Chromatography: Introduction, types, Gas-liquid chromatography (GLC), basic principle, Instrumentation and applications.

Unit 3: Advanced Materials [7]

A) Polymers: Introduction, plastics, thermo softening and thermosetting plastic, industrially important plastics like phenol formaldehyde, urea formaldehyde and epoxy resins, conducting polymers and biopolymers (Introduction, examples and applications.), B) Nanomaterials: Introduction, Synthesis –Top down and Bottom up approach, Applications of Nanomaterials, C) Composite materials: Introduction, Composition, properties and uses of fiber reinforced plastics (FRP) and glass reinforced plastic (GRP).

Unit 4: Fuels [7]

Introduction, classification, calorific value, types of calorific value (higher and lower), characteristics of good fuels, comparison between solid, liquid and gaseous fuels, Determination of Calorific value of fuel by Bomb calorimeter, and by Boy's calorimeter, Numericals on Bomb and Boy's calorimeter, Fuel cells: Introduction, Classification, advantages, Limitations and applications.

Unit 5: Corrosion [7]

Introduction, causes, classification, atmospheric corrosion (oxidation corrosion), electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion, Prevention of corrosion by proper design and material selection, Protective coatings hot-dipping (galvanizing and tinning), Metal Spraying, cathodic protection, and electroplating.

Unit 6: Metallic materials & Green Chemistry [6]

A) Metallc materials: Introduction, alloy definition and classification, purposes of making Alloys,Ferrous alloys: Plain carbon steels (mild, medium and high), stainless steels, Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy (Duralumin and Alnico), Tin alloy (Solder metal), B) Green Chemistry: Definition, goals of green chemistry, significance, basic principle of green chemistry research, industrial applications.

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Engineering Chemistry Laboratory

BSHB12L/A22L	BSC2/4	Engineering Chemistry Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	CA1- 15 Marks CA2- 15 Marks End Semester examination- 20 Marks

Pre-Requisites: 11th and 12th Science Chemistry,
Students should have knowledge about basic chemistry related to titration, synthetic process electrochemistry, physical and chemical properties of water, etc.

Course Objectives:

	Course objective
1.	To study water quality parameters, Water treatment methods and Green Chemistry.
2.	To understand the chemistry behind the development of engineering materials
3.	To study the properties of advanced materials for engineering applications
4.	To develop an analytical ability of students.

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

CO1	Experiment with given water sample to determine different parameters such as DO, alkalinity, chloride content, hardness of water sample.
CO2	Experiment with different organic compound such as urea/phenol, formaldehyde to synthesis resins.
CO3	Experiment with different industrial compounds such coal, brass & Aluminum material for the determination its contents.
CO4	Demonstrate the different instrumental methods such as pH meter and photo-colorimeter conductivity meter, chromatography to analyze the given sample.

Term work:

The term work consists of continuous assessment and performance of laboratory work based on Engineering Chemistry syllabus.

List of Experiments:

Minimum 10 experiments should be performed from the following list out of which two experiments should be demonstrative on instrumental methods.

1. Determination of alkalinity of water.
2. Determination of chloride content of water by Mohr's method.

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3. Determination of total hardness of water by EDTA method.
4. Determination of Dissolve Oxygen of water by Winkler's method.
5. Preparation of urea-formaldehyde resin.
6. Preparation of phenol-formaldehyde resin.
7. Determination of moisture, volatile and ash content in a given coal sample by proximate analysis.
8. Determination of percentage of copper in brass.
9. Estimation of zinc in brass solution.
10. Determination of rate of corrosion of aluminium in acidic and basic medium.
11. pH metric Titration (Acid Base titration)
12. Demonstration of photo-colorimeter / spectrophotometer.
13. Conductometric Titration (Acid Base titration)
14. Demonstration of paper chromatography.
15. Demonstration of electroplating

Textbooks:

1. Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Company Ltd., New Delhi.
2. A Textbook of Engineering Chemistry by S. S. Dara and S. S. Umare, S. Chand & Company Ltd., New Delhi.
3. A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad.
4. Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.
5. A text Book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co. (Pvt.) Ltd, Delhi.
6. Engineering Chemistry by Wiley India.
7. Engineering Chemistry by RenuBapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.

Reference books:

1. D. A. Skoog, D. M. West, Fundamentals of Analytical Chemistry, Cengage Learning.
2. A. I. Vogel, Quantitative Chemical Analysis, Longmann Publication
3. Chatwal and Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House, New Delhi.
4. S. K. Kulkarni, Nanotechnology: Principals and Practices, Capital Publishing Company.
5. B. K. Sharma, Environment Chemistry, Goel Publication, Meerut.
6. K. J. Sundars, Organic Polymer Chemistry, Springer Publication.
7. B. K. Sharma, Instrumental Methods of Chemical Analysis, Goel Publication, Meerut

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Engineering Mechanics

BSHB13/A23	ESC1/5	Engineering Mechanics	3-0-0	3 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	CA1- 10 Marks CA2- 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basic concepts of physics and mathematics.

Course Objectives:

1	Study the Basic Concepts and Fundamental Law's and principles, Force, resolution-composition of forces, etc.
2	Study the concept of equilibrium, trusses and solve the problems on equilibrium of force system & truss by method of joints & method of sections for plane trusses.
3	Know the basic concepts of kinematics, kinetics and solve the problems on Kinematics & kinetics.
4	Study the concept of Impact and solve the problems related to work, power & energy of the bodies

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

CO1	Apply the knowledge of basic laws, resolution-composition of forces.
CO2	Apply concept of equilibrium for rigid bodies.
CO3	Apply the knowledge of dynamics for rigid bodies.
CO4	Solve the problems related to work, power & energy of the bodies.

Course Contents

Unit 1: Fundamentals of Statics [7]

Basic Concepts and Fundamental Law's and principles,, Force, Moment and Couple, System of Forces, Resultant, Resolution and Composition of Forces, Varignon's Theorem, Law of Moments. Basis of assumptions.

Unit 2: Equilibrium [9]

Static equilibrium, analytical and graphical conditions of equilibrium, equilibrium of coplanar concurrent forces, coplanar non concurrent forces, parallel forces, free body diagram, Lami's

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theorem, Beam, Types of beams, types of supports, types of load, beams reactions, Principle of virtual work, virtual displacements for particle and rigid bodies,

Friction: Coulomb law, friction angles, wedge friction, sliding friction and rolling resistance.

Unit 3: Analysis of Truss [5]

Types of Trusses, Assumptions, Methods of Analysis:- method of joints for plane trusses, method of sections for plane trusses

Unit 4: Kinematics [9]

Types of motions, kinematics of particles, rectilinear motion, constant and variable acceleration, motion under gravity, study of motion diagrams, angular motion, tangential and radial acceleration, kinematics of rigid bodies, concept of instantaneous center of rotation, concept of relative velocity,

Unit 5: Kinetics [6]

Introduction to Kinematics of Linear motion, Kinetics of linear motion, Newton's Laws, D'Alembert's Principle, Work- Energy Principle, Impulse Momentum Principal.

Unit 6: Work, Power, Energy [6]

Impact, Types of impact, Law of conservation of momentum, Coefficient of restitution, Numerical on direct central Impact. work done by a force, potential energy, kinetic energy of linear motion and rotation, conservation of energy, power.

Text Books

1. S. Timoshenko, D. H. Young, "Engineering Mechanics", McGraw Hill, 1995.
2. Tayal A. K., "Engineering Mechanics, Umesh Publications, 2010.
3. Bhavikatti S. S., Rajashekarappa K. G., "Engineering Mechanics", New Age international Publications,2nd Edition.
4. Beer, Johnston, "Vector Mechanics for Engineers", Vol. 1: Statics and Vol. 2: Dynamics, McGraw Hill Company Publication, 7th edition, 1995.
5. Irving H. Shames, "Engineering Mechanics - Statics and Dynamics", Pearson Educations, Fourth edition, 2003.
6. McLean, Nelson, "Engineering Mechanics", Schaum's outline series, McGraw Hill Book Company, N. Delhi, Publication.
7. Singer F. L., "Engineering Mechanics - Statics & Dynamics", Harper and Row Pub. York.
8. Khurmi R. S., "Engineering Mechanics", S. Chand Publications, N. Delhi

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Engineering Mechanics Laboratory

BSHB13L/A23L	ESC1/5	Engineering Mechanics Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	CA1- 15 Marks CA2- 15 Marks End Semester examination- 20 Marks

Pre-Requisites: Basic concepts of optics, solid state physics and modern physics.

Course Objectives:

1	Study the basic concept of equilibrium.
2	Apply graphical method to solve the problem on equilibrium
3	Study the basic concepts of coefficient of friction.
4	Acquire the basic knowledge of centroid of irregular shaped laminas.

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

CO1	Make use of concept of equilibrium.
CO2	Solve the problem on equilibrium by graphical method.
CO3	Identify coefficient of friction for various pairs of contacting surfaces.
CO4	Show centroid of irregular shaped different laminas.

Students are expected to satisfactorily complete any eight experiments listed below.

A. List of Practical's/Experiments/Assignments

1. Polygon law of coplanar forces.
2. Lamis' theorem.
3. Jib crane apparatus.
4. Centroid of irregular shaped bodies.
5. Bell crank lever.
6. Support reaction for beam.
7. To determine coefficient of friction.
8. Verification of law of Machine using Screw jack.

B. Graphics Statics (To be solved on A3 Sheets.)

9. To find resultant – 3 problems.
10. To find support reactions – 3 problems.

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Computer Programming in C

BSHB14/A24	ESC2/6	Computer Programming in C	3-0-0	3 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	CA1- 10 Marks CA2- 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites:

Course objectives:

1.	To gain knowledge of history and execution of C programming.
2.	To gain complete basic knowledge of C programming.
3.	To develop applications in C using arrays and strings.
4.	To develop application in C using functions, pointers.
5.	To develop applications using structures.
6.	To develop applications file handling and dynamic memory allocation

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

CO1	Design algorithm and flowchart by summarizing the basic terminologies used in C Programming.
CO2	Make use of different data types, operations and expressions and apply the fundamentals of C programming by choosing the loops and decision making statements to solve the problems
CO3	Apply the concept of arrays and string handling functions
CO4	Apply concepts of functions and pointers to building C application
CO5	Apply concepts of structures
CO6	Make use of file handling concepts

Course Contents:

Unit 1: Basics of C **[4]**

History and Features of C, Importance of C, About Procedural Language, Role of Compiler, Role of Interpreter, The Structure of a C Program, Writing C Programs, Algorithm, Flowchart, Building an Executable Version of a C Program, Debugging a C Program, Examining and Running a C Application program.

Unit 2: An Overview of C and Buzzwords **[6]**

Data Type, Variable, Operators, Control Statement ,Preprocessor Directives Input and Output Operators, Reading/Writing Characters ,Formatted input/output Function, The IF.....ELSE Statement, IF ELSE ladder, Nesting of IF ELSE Statements, the Switching statements, The do-while Statement, the while statement, FOR Statements.

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Unit 3: Arrays in C [6]

Array: What and Why? One Dimensions Arrays, Two Dimensions Arrays, Multi Dimensions Arrays, Reading String from Terminal, Writing String to Screen, String Handling Functions.

Unit 4: Functions in C [6]

Function Basics, Advantage of Function, Recursion, Variable Storage Classes, Variable arguments Function, Understanding Pointers, Pointer expressions, Pointer and Arrays, Pointers and Character String, Pointers to Functions, Pointers and Structures.

Unit 5: Structures in C [4]

Defining a Structure, Advantage of Structure, Size of Structure, Arrays of Structures, Structures and Functions, Defining Unions.

Unit 6: File handling in C [4]

Introduction to dynamic memory allocation- Malloc, Calloc, Realloc, Introduction to file management, Opening/Closing a file, Input/ Output operations on Files, Error handling during I/O Operations, Command Line Arguments.

Reference Books:

1. "Let us C" by Yashwant Kanetkar
2. The C Programming Language is a computer programming by Brian Kernighan and Dennis Ritchie.
3. Computing Fundamentals and C Programming | 2nd Edition, by E Balagurusamy

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Computer Programming in C Laboratory

BSHB14L/A24L	ESC2/6	Computer Programming in C	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	CA1- 15Marks CA2- 15Marks End Semester examination- 20 Marks

Objectives:

1.	Apply the basic programming concepts.
2.	Apply the knowledge of control structures.
3.	Apply the knowledge of Derived data types.
4.	Apply the knowledge of user defined functions.
5.	Apply the knowledge of file handling concepts.

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

CO1	Develop the programs on the basic programming concepts.
CO2	Understand the syntax and develop programs based on control structures.
CO3	Demonstrate the knowledge of Derived data types and develop programs.
CO4	Develop the programs on user defined functions.
CO5	Develop the basic knowledge of file handling concepts.

List of Practical: 2 hrs/ week

1. Assignment on Flowchart.
2. A simple program to display a message.
3. Basic program on operators.
4. Program using if else
4. Basic programs demonstrating different loops.
5. Programs demonstrating use of array.
6. Programs using strings handling functions.
7. Programs demonstrating use of functions.
8. Programs demonstrating use of structures.
9. Programs demonstrating use of pointers to integers, float, char, strings.
10. Programs demonstrating file handling and dynamic memory allocation.

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Basic Electrical Engineering

BSHB15/A25	ESC3/7	Basic Electrical Engineering	1-0-0	1 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 1 hrs/week	CA1- 05 Marks CA2- 05 Marks Mid Semester Exam: 15 Marks End Semester Exam: 25 Marks

Pre-Requisites: Applied Physics.

Course Objectives:

7.	To study Elementary concepts of electrical engineering.
8.	To study construction and working principle of Single Phase Transformer.
9.	To study construction and working principle of AC Motors.
10.	To study construction and working principle of DC Motors.

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

CO1	To Define Elementary concepts of electrical engineering.
CO2	To Explain construction and working principle of Single Phase Transformer.
CO3	To Explain construction and working principle of AC Motors.
CO4	To Explain construction and working principle of DC Motors.

Course Contents:

Unit 1: Elementary Electrical Concepts

Elementary electrical concepts definition of EMF, current, resistance, Work, power, energy, Ohm's law, Series parallel circuits, Kirchhoff's law-KVL, KCL, Introduction to electrical energy generation from different resources, transmission, distribution and utilization, Energy conversion.

Unit 2: Single Phase Transformer

Operating principle, construction, types of transformer, EMF equation, transformation ratio working of transformer at no load and at load, loses in transformer efficiency and regulation.

Unit 3: AC Motors

Working principle of AC motor, construction, types, circuit diagram, speed and torque equations, characteristics and applications.

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Unit 4: DC Motors

Working principle of DC motor, construction, types, circuit diagram, speed and torque equations, characteristics and applications.

Textbooks:

1. A Textbook of Electrical Technology in SI Units. Volume I: Basic Electrical Engineering by B. L. Theraja and A. K. Theraja.
2. V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-Hill Publication.
3. Vincent Del Toro, Electrical engineering Fundamentals, PHI Publication, 2nd Edition, 2011

Reference Books:

1. Basic Electrical Engineering by C L Wadhwa.
2. Basic Electrical Engineering by Mehta V K and Mehta Rohit.
3. Basic Electrical Engineering by Nagrath, I and Kothari.
4. Basic Electrical Engineering by Mittle, V and Arvind Mittle.

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Basic Electrical Engineering Laboratory

BSHB15L/A25L	BSC 3/7	Basic Electrical Engineering Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	CA1- 15Marks CA2- 15Marks End Semester examination- 20 Marks

Pre-Requisites: Applied physics.

Course Objectives:

5.	To study of different wiring components and wiring connections.
6.	To study of basic circuit theorems, different meters and instruments for measurement of electrical quantities.
7.	To learn basic methods of earthing and measurement of earth resistance and insulation resistance by using megger
8.	To Lean application of different types of lamps and different component in electrical power system.
9.	To study of different Test for performance parameters of AC machines DC machines.

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

CO1	Choose different wiring components and make use of them to prepare wiring connections.
CO2	Explain basic circuit theorems, and study different meters and instruments for measurement of electrical quantities.
CO3	Basic methods of Earthing and study how to Measure earth resistance and insulation resistance by using Megger.
CO4	Classify application of different types of lamps and list different component in electrical power system.
CO5	Test for performance parameters of AC machines DC machines.

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List of Practical: 2 hrs/ week

Minimum 8 practicals should be performed from the following list.

1. To study of electric symbols & study of wiring components.
2. To prepare wiring connection of control of two lamps from two switches & stair case wiring
3. Use of megger for insulation testing and continuity
4. To study the different types of lamps.
5. Study of electric shocks & precautions against electric shocks; Basic methods of earthing.
6. Study of single line diagram of power system
7. To Verify KCL and KVL.
8. Measurement of power in a three phase system by two wattmeter method.
9. To perform open circuit & short circuit test on a single phase transformer to calculate different losses in transformer.
10. To perform speed reversal of single phase Induction Motor
11. To perform speed control of DC shunt motor

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Basic Electronics Engineering

BSHB16/A26	ESC4/8	Basic Electronics Engineering	1-0-0	1 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 1 hr/week	CA1- 05 Marks CA2- 05 Marks Mid Semester Exam: 15 Marks End Semester Exam: 25 Marks

Pre-Requisites: Electric current and voltage-D.C and A.C., Complex impedance, Conductivity, resistivity, transformer, charging and discharging of capacitor, active and passive elements.

Course Objectives:

1	To understand the function of different types of electronics instruments and diode applications.
2	To understand the different types of transistor configuration, regions and application of BJT
3	To study the application of operational amplifier.
4	Understand Boolean algebra and principles of various Electronic appliances.

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

CO1	To demonstrate the function of Electronics instruments and diode applications
CO2	To illustrate different parameters of transistor
CO3	To compare applications of op amp
CO4	To Classify logic Gates and Boolean algebra laws; various Electronic appliances

Course Contents:

Unit 1: Basics of Electronics and Diode applications **[04]**

Evolution of electronics, Introduction of active and passive components-symbol and units, Types and color coding, Semiconductor Theory, Diode-construction and working, VI Characteristics of diode, Types of Diodes: Zener diode- reverse bias characteristics, Diode applications: half wave and full wave rectifiers (centre tapped and bridge) circuits and operation.

Unit 2: Bipolar junction transistor (BJT) **[04]**

Transistor construction and working principle, configurations: CE, CB, CC, junction biasing condition for active, saturation and cut-off modes, DC analysis for transistor circuits, biasing circuits - fixed bias; voltage divider bias; collector to base bias BJT as an amplifier and as a switch.

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Unit 3: Introduction to Operational Amplifiers **[04]**

OPAMP– definition, block diagram, operation, characteristics, applications, μA 741 pin diagram. Definitions of virtual ground, CMRR and slew rate. OPAMP applications– inverting, integrator, differentiator, summer, voltage follower, and comparator Filters- definition, Working- low pass, high pass passive and active filters

Unit 4: Digital Electronics **[04]**

Basic logic gates, Universal logic gates, Boolean algebra, Introduction to number system, Half Adder, Full Adder, Multiplexer, Demultiplexer, Flip-Flop, Microwave oven, solar panel. Telephone, Radio, Television, Radar, Satellite communication: Block diagram and Operation.

Text Books:

1. D. Chattopadhyay, P. C. Rakshit, Electronics Fundamentals and Applications, New Age International
2. Millman & Halkias, Integrated Electronics, Tata McGraw Hill.
3. Boylestead and Nashelsky, Electronic Devices and Circuits Theory, 9/e, PHI, 2006.
4. Digital Circuits, Anandkumar

Reference Books:

1. Sedra& Smith, Microelectronics Engineering.
2. John D. Ryder, Electronic Fundamentals and Applications, PHI
3. J.B.Gupta, Basic Electronics, S.K. Kataria.
4. Malvino: Electronic Principle.
5. Schilling & Belove: Electronics Circuits
6. Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Learning Pvt. Ltd., Fourth Edition.

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Basic Electronics Engineering Laboratory

BSHB16L/A26L	ESC4/8	Basic Electronics Engineering Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	CA1- 15 Marks CA2- 15 Marks End Semester examination- 20 Marks

Pre-Requisites: Basic concepts of semiconductor theory.

Course Objectives:

1	To understand the function of different types of Electronics instruments and Diode applications.
2	To understand the different types of transistor configuration, regions and application of BJT.
3	To study the application of op amp.
4	Understand Boolean algebra and principles of various Electronic appliances.

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

CO1	To demonstrate the function of Electronics instruments and diode applications.
CO2	To illustrate different parameters of transistor.
CO3	To compare applications of op amp.
CO4	To Classify logic Gates and Boolean algebra laws; various Electronic appliances.

List of Practical: 2 hrs/ week

Minimum 8 practicals should be performed from the following list.

1. Identification of Circuit Components, Breadboard and its connections
2. Study of CRO and measurement of voltage amplitude and frequency
3. To study the VI characteristics of P-N junction diode
4. To study the VI characteristics of Zener diode
5. To study Half wave Rectifier with and without filter
6. To study Full wave Rectifier with and without filter
7. To perform single stage amplifier using transistor
8. To study the Inverting and Non-inverting Amplifier
9. To study the digital logic Gates
10. To perform De-Morgan's theorem

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Mini Project

BSHMP	PRJ01	Mini Project-I	0-0-2	Audit

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	CA1- 25 Marks CA2- 25Marks

Pre-Requisites: Basic fundamental knowledge of various engineering streams.

Course Objectives:

1. To create awareness among the students to express technical ideas, strategies and methodologies.
2. To enable students to work as a responsible member and possibly a leader of a team.
3. To improve the team building, communication and management skills of the students through Project.

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

CO1	Identify the problems related to engineering.
CO2	Associate the problem with real life situation.
CO3	Develop leadership and team building skill.
CO4	Employ managerial skills while working in team.

Course Content:

First year engineering students can choose their area of interest among the latest technologies and use their hands-on skills to develop mini projects. The mini-project should be undertaken preferably by a group of 4-5 students who will jointly work and implement the mini-project. The group will select a project with the approval of the project guide. Mini project topics and the work for these groups in the batch will be guided by a teacher for the batch, preferably on one of the topics from energy engineering, mechanical engineering, Civil Engineering, Computer Engineering., Electrical Engineering., Electronics and Telecommunication Engineering., etc. The teacher will periodically assess the performance of students in the mini project. Project group will submit hardcopy project report along with project demonstration at the term end.

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Credit distribution

Course Category	HSMC	BSC	ESC	PCC	PEC	OEC	PROJ	MC
Credits	4	8	9	--	--	--	--	--
Cumulative Sum	4	16	19	--	--	--	--	--

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