### SEMESTER I

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For a given program, Total Instruction Periods per Week = 35; Total Number of Credits = 26

#Laboratory Classes on alternate weeks for Physics and Chemistry. The lab examinations will be held only in the second semester (including the first semester experiments also)

*Any one of the following courses: BFR201 – French, BGM201 – German, BJP201 – Japanese, BKR201 – Korean, BCN201 – Chinese, BTM201 – Tamil*
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For a Given Program, the Total Instruction Periods per Week = 35; Total Number of Credits = 23

*Syllabus is same as that of first semester.

# Any one of the following courses:BFR201 – French, BGM201 – German, BJP201 – Japanese, BKR201 – Korean, BCN201 – Chinese, BTM201 - Tamil
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Total No. of Contact Hours: 34
Total No. of Credits: 28

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Total No. of Contact Hours: 36
Total No. of Credits: 28
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Total No. of Contact Hours: 34  
Total No. of Credits: 26

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Total No. of Contact Hours: 34  
Total No. of Credits: 26
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**Total No. of Contact Hours:** 34  
**Total No. of Credits:** 27

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**Total No. of Contact Hours:** 30  
**Total No. of Credits:** 15

**TOTAL NO. OF CREDITS:** 199
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Aim: To make the students learn the basics of communication in order to talk fluently, confidently and vividly.

Objective: To make them master the techniques of professional communication so that they become employable after completing the course.

Course outcomes:

CO1: After the completion of the course the students can communicate without any inferior complex
CO2: They can answer the questions asked in the campus interview without any difficulty
CO3: They very well can manage the abroad job situations.
CO4: They will become effective communicators once the course is completed.
CO5: They will get a clear idea about LSRW (Listening, Speaking, Reading, Writing)

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UNIT I
Parts of speech - Active and passive voices - Subject verb agreement - Writing about School life, Hobbies, Family and friends – Word formation with prefixes and suffixes – Tenses – Concord – Summarizing – Note-making
UNIT II
Cause and effect relations – Punctuations – Differences between verbal and nonverbal communication – E-mail communication – Homophones - Etiquettes of E mail communication, Interpreting graphic representation - Flow chart and Bar chart.

UNIT III
Degrees of comparison – Positive, Comparative, Superlative - wh questions - SI units - Lab reports - Physics, chemistry, workshop and Survey report for introducing new product in the market.

UNIT IV
Writing project proposals - Presentation skills - Prefixes and suffixes - If conditions - Writing a review- Preparing minutes of the meeting, Agenda, official circulars.

UNIT V
Accident reports (due to flood and fire) - Hints development - Imperatives - Marking the stress Connectives , prepositional relatives.

TOTAL NO OF PERIODS: 60

Text Book:
1. Department of humanities and social sciences division, Anna University, oxford university press, 2013.

Reference:

BMA 101 ENGINEERING MATHEMATICS – I

Course Aim: To equip students with adequate knowledge of Mathematics to formulate problems in engineering environment and solve them analytically.

Course Objectives: At the end of this course, students shall be able to
- Apply matrix operations to solve the relevant real life problems in engineering.
Formulate a mathematical model for three dimensional objects and solve the concerning problems.

Find area and volume based on a function with one or more variables.

Course outcomes:

CO1: Apply matrix operations to solve the relevant real life problems in engineering.
CO2: Formulate a mathematical model for three dimensional objects and solve the concerning Problems.
CO3: Find area and volume based on a function with one or more variables.

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UNIT-1 Matrices 9+3

Characteristic equations- Eigen values and Eigen vectors of the real matrix- Properties- Cayley-Hamilton theorem(Excluding proof)- Orthogonal transformation of a symmetric matrix to diagonal form- Quadratic form- Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT-II Three Dimensional Analytical Geometry 9+3

UNIT-III  Differential Calculus
9+3
Curvature in Cartesian coordinates- Centre and radius of curvature- Circle of curvature- Evolutes- Envelopes- Applications of Evolutes and Envelopes.

UNIT-IV Functions of Several Variables
9+3

UNIT-V Multiple Integrals
9+3
Double integration- Cartesian and Polar coordinates- Change of order of integration- Change of variables between Cartesian and Polar coordinates- Triple integration in Cartesian coordinates- Area as double integral- Volume as triple integral.

TEXT BOOK:


REFERENCES:


PH 101 ENGINEERING PHYSICS – I
L T P C 3 0 0 3
Objectives

- To make a bridge between the physics in school and engineering courses.
- To impart a sound knowledge on the basic concepts of modern sciences like engineering applications of ultrasonics, lasers, fundamentals of crystal physics and utility of solar energy.

COURSE OUTCOMES

- **CO1** - To Know about Ultrasonic and its application in NDT.
- **CO2** - To know the principle of Laser and its application in Engineering and medicine.
- **CO3** - Acquire Knowledge on Quantum Physics.
- **CO4** – Properties of Electro Magnetic Theory.
- **CO5** – To understand the impact of Crystal Physics.

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UNIT-I Ultrasonics

System through transmission and reflection modes - A, B And C Scan Display methods - Important medical applications - Sonogram - problem.

UNIT-II LASER

UNIT-III Quantum Physics
Drawbacks with classical physics - Blackbody radiation: Max Planck theory and concept of energy quantization, deduction of Wien’s displacement law, Raleigh - Jeans law - Matter waves - de Broglie wave length - photoelectric effect - Schrödinger equation (time-independent, and time-dependent equations) - wave functions and energy spectrum - application to particle in box - problem.

UNIT – IV Electromagnetic Theory

Unit-V Crystal Physics
Lattice - Unit Cell - Bravais Lattice - Lattice Plane - Miller Indices - d-Spacing in cubic lattices - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing Factor - SC, BCC, FCC, HCP Structures - Polymorphism and Allotropy - Crystal defects - point, line and surface defects - Burger’s vector - problems.

Total: 45 Periods

Text Books


Reference Books

2. Sears.,Zemansky.,, Young.;‘College Physics; Addison Wesley Publishing Company.


BCH 101 ENGINEERING CHEMISTRY – I

Course Aim: To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

Course Objectives:

i) To make the student to be conversant with the principles, water characterization and treatment for portable and industrial purposes.

ii) To impart knowledge on the essential aspects of Principles of polymer chemistry and engineering applications of polymers

iii) To impart knowledge on the essential aspects of Principles electrochemistry, electrochemical cells, emf and applications of emf measurements

iv) To make the students understand the Principles of corrosion and corrosion control

v) To impart knowledge about the Conventional and non-conventional energy sources and energy storage devices.

Course outcomes:

CO1 – Having a knowledge of Water characterization and treatment of portable and Industrial purposes.

CO2 – Having the thinking of Principles of polymer chemistry and engineering applications of polymers.

CO3 – Having a deep knowledge about the Principles of electrochemistry

CO4 – With a true wisdom about Corrosion

CO5 - Having a sound knowledge in the Field of the Conventional and non-Conventional energy.
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UNIT I Water Technology


UNIT II Polymer

Introduction-Polymers- definition – polymerization – degree of polymerisation - types of polymerisation– Addition polymerisation and Condensation polymerization – Mechanism of Polymerisation - free radical polymerization mechanism only, Plastics: Classification – thermoplastics and thermosetting plastics – difference between thermoplastics and thermosetting plastics - preparation, properties and uses of PVC, Teflon, nylon-6,6, PET, Rubber :Types – drawbacks of natural rubber -vulcanization of rubber - properties and uses of vulcanized rubber Synthetic rubbers – butyl rubber and SBR

UNIT III Electro chemistry

UNIT IV Corrosion and Corrosion Control

UNIT V Non-Conventional Energy Sources and Storage Devices

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

BCS 101 FUNDAMENTALS OF COMPUTING AND PROGRAMMING   L T PC 3 0 0 3
Course Objectives:
1. To enable the student to learn the major components of a computer system.
2. To know the correct and efficient way of solving problem.
3. To learn to use office automation tools.
4. To learn and write program in “C”.

Course Outcome:

CO1: Student will understand the major components of computer systems.
CO2: Will know the correct and efficient way of solving problems.
CO3: Will learn the use of automation tools.
CO4: Will learn and write program in “ C”.

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UNIT I: Introduction to Computer

UNIT II: Problem Solving and Office Automation

Planning the Computer Program – Purpose – Algorithm – Flowcharts – Pseudo code

Introduction to Office Packages: MS Word, Spread Sheet, Power Point, MS Access, Outlook.

UNIT III: Introduction to C

Overview of C-Constants-Variables-Keywords-Data types-Operators and Expressions -Managing Input and Output statements-Decision making-Branching and Looping statements.

UNIT IV: Arrays and Structures

Overview of C-Constants, Variables and Data types-Operators and Expressions -Managing Input and Output operators-Decision making-Branching and Looping.

UNIT V: Introduction to C++

Overview of C++ - Applications of C++-Classes and objects-OOPS concepts -Constructor and Destructor- A simple C++ program –Friend classes and Friend Function.

Total: 45 Periods

Text books:


References:

Aim: The students should be able to act with confidence, be clear about their own personality, character and future goals.

Instructional Objectives:
- To make students understand the concept and components of personality and thereby to apply the acquired knowledge to themselves and mould their personality.
- To impart training for positive thinking, this will keep the students in a good stead to face the challenges.
- To bring out creativity and other latent talents with proper goal setting so that self-esteem gets enhanced.
- To develop an individual style and sharpen the skills in the area of leadership, decision making, time management and conflict management.
- To sharpen the employability skills of the professional undergraduate students and aid them in landing in the desired job.

Course Outcomes:
CO1: Will understand the concept of personality.
CO2: Will get positive thinking and become capable of facing challenges.
CO3: Will develop an individual style.
CO4: Employability will be sharpened

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UNIT I Introduction to Personality Development


UNIT II Attitude & Motivation

Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude - Advantages –Negative attitude - Disadvantages - Ways to develop positive attitude - Difference between personalities having positive and negative attitude. Concept of motivation - Significance - Internal and external motives - Importance of self-motivation - Factors leading to de-motivation

Unit III Self-esteem


Unit IV Other Aspects of Personality Development


Unit V Employability Quotient

Resume building- The art of participating in Group Discussion – Acing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.

Text Books:

Total: 45 Periods


Reference Books:


BBT102 BIOLOGY FOR ENGINEERS 2002

Course Aim: To provide a basic understanding of biological mechanisms and their applications from the perspective of engineers

Course Objectives:

The Students will be able to

- To understand the fundamentals of living things, their classification, cell structure and biochemical constituents
- To apply the concept of plant, animal and microbial systems and growth in real life situations
- To comprehend genetics and the immune system
- To know the cause, symptoms, diagnosis and treatment of common diseases
- To give a basic knowledge of the applications of biological systems in relevant industries

Course Outcomes:

CO1: Student will understand the fundamentals of living things and their Classification.
CO2: Able to apply biological concept in real life situation.
CO3: Will have the basic knowledge in application of biological system in relevant industries.

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UNIT-I Introduction to Life 9

Characteristics of living organisms-Basic classification-cell theory-structure of prokaryotic and eukaryotic cell-Introduction to biomolecules: definition-general classification and important functions of carbohydrates-lipids-proteins-nucleic acids vitamins and enzymes-genes and chromosome.

UNIT-II Biodiversity 9

Plant System: basic concepts of plant growth-nutrition-photosynthesis and nitrogen fixation-
Animal System: elementary study of digestive-respiratory-circulatory-excretory systems and their functions-
Microbial System: history-types of microbes-economic importance and control of microbes.

UNIT-III Genetics and Immune System 9

Evolution: theories of evolution-Mendel's cell division-mitosis and meiosis-evidence of e laws of inheritance-variation and speciation-nucleic acids as a genetic material-central
dogma immunity-antigens-antibody-immune response.

UNIT-IV Human Diseases
Definition- causes, symptoms, diagnosis, treatment and prevention of diabetes, cancer, hypertension, influenza, AIDS and Hepatitis

UNIT-V Biology and its Industrial Application

Total: 45 Periods

Text Books:

Reference Books
2. Cell Biology and Genetics (Biology: The unity and diversity of life Volume I), Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, Cengage Learning, 2008

BCE 101/BCE 201  BASIC CIVIL ENGINEERING LTPC

Course Objectives: At the end of this course, students shall be able to
To expose students with the basics of Civil Engineering
- To understand the components of a building
- To Learn Engineering aspects related to dams, water supply, and sewage disposal

Course objective:

**CO1**: Students will be exposed to basics of civil engineering.
**CO2**: Will understand the components of buildings.
**CO3**: Will learn the engineering aspects to dams, water supply and sewage disposal.

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UNIT- I  Civil Engineering Materials

Introduction – Civil Engineering – Materials – Stones – Bricks – Sand – Cement – Plain Concrete – Reinforced Cement Concrete – Steel Sections – Timber – Plywood – Paints – Varnishes (simple examples only)

UNIT- II Surveying

UNIT- III  Foundation for Building  5
Bearing Capacity of Soil – Foundation – Functions – Requirement of good foundations – 
Types of foundations – Merits & Demerits.

UNIT- IV  Superstructure  7
– White Washing (Simple examples only)

UNIT- V Miscellaneous Topics  5
Types of Bridges –Dam- purpose – selection of site - Types of Dams – Water Treatment 
& Supply sources – standards of drinking- distribution system.– Sewage Treatment 
(simple examples only)

TOTAL : 30 PERIODS

Text Books:


Reference Books:


BME 101  ENGINEERING GRAPHICS- E  2 0 3 4

Aim

To develop graphical skills in students for communication of concepts, design ideas
of engineering products and expose them to existing standards related to technical drawings.

**Objectives**
- To visualize and produce two dimensional graphic representation of three dimensional objects and buildings.
- To comprehend and visualize 3D views of objects.
- To understand and generate the different curves used in engineering applications.
- To introduce the fundamental of CAD Graphics used in design.
- To visualize interior portions of object and also to draw the surfaces necessary for producing prisms, pyramids, cone, tray, duct etc.,

**Course Outcomes:**

**CO1:** Student Ability of visualization will increase.
**CO2:** Student will understand and develop different engineering curves.
**CO3:** Student will understand the application of computer in graphics.
**CO4:** Will understand the surface necessary for producing different solids
**CO5:** Understand the importance of graphical representations of engineering components.
**CO5:** They will get a clear idea about LS RW (Listening, Speaking, Reading, Writing)

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**UNIT-I Basic Curves, Projection of points and Straight lines**  6+6
Conics—construction of ellipse, parabola and hyperbola by eccentricity method—construction of
cycloids—construction of involutes of square and circle—Drawing of tangent and normal to
the above curves—Scales—Basic drawing conventions and standards—Orthographic projection
principles—Principal planes—First angle projection—Projection of points. Projection of
straight lines (only first angle projections) inclined to both the principal planes—
Determination of true lengths and true inclinations by rotating line method and trapezoidal
method and traces.

UNIT-II Projections of Planes and solids

Projection of planes (Polygonal and circular surfaces) inclined to both the principal planes.
Projection of simple solids like prisms, pyramids, cylinder, cone, tetrahedran and truncated
solids when the axis is inclined to one of the principal planes/both principal planes by
rotating object method and auxiliary plane method.

UNIT-III Orthographic Projections, Isometric projections & Free hand sketching

Orthographic projection of Simple parts from 3D diagram—Principles of isometric projection
and isometric view—isometric scale—Isometric projections of simple solids and truncated
solids—Prisms, pyramids, cylinders, cones—combination of two solid objects in simple
vertical positions and miscellaneous problems Free hand sketching of orthographic &
Isometric projection

UNIT-IV Projection of Sectioned solids and development of surfaces

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of
the principal planes and perpendicular to the other—obtaining true shape of section. Development
of lateral surfaces of simple and sectioned solids—Prisms, pyramids cylinders and cones.
Development of lateral surfaces of solids with cut-outs and holes.

UNIT-V Perspective projection, building drawing and Computer aided drafting

Perspective projection of simple solids—Prisms, Pyramids and cylinders by visual ray
method.Introduction—components of simple residential or office building—specifications-plan and
elevation of different types of Residential buildings and office buildings.Introduction to drafting
packages and basic commands used in AUTO CAD.Demonstration of drafting packages.

Total: 60 Periods

Text Books:

1. N.D.Bhatt and V.M.Panchal, “Engineering drawing”, charotar publishing house,

References:


Special points applicable to University Examinations on Engineering Graphics

1) There will be five questions, each of either or type covering all units of the syllabus.

2) All questions will carry equal marks of 20 each making a total of 100.

BCM1L1/ BCM2L1 BASIC CIVIL & MECHANICAL ENGINEERING PRACTICES LABORATORY 0 0 2 1

Aim

To provide exposure to the students with hands on experience on various basic Civil & Mechanical Engineering practices.

Objectives

1. To provide hands on exercises in common plumbing and carpentry works associated with residential and industrial buildings.

2. To expose the students regarding pipe connection for pumps & turbines and to study the joint used in roofs, doors, windows and furnitures.

3. To provide hands on exercise on basic welding, machining and sheet metal works.

4. To provide exposure regarding smithy, foundry operations and in latest welding operations such as TIG, MIG, CO2, spot welding etc.,

5. To expose the students regarding the construction and working of centrifugal pump, air-conditioner and lathe.
Practical

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I. CIVIL ENGINEERING PRACTICE

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

b) Study of pipe connections requirements for pumps and turbines.

c) Preparation of plumbing line sketches for water supply and sewage works.


e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Hand tools and Power tools:

a) Study of the joints in roofs, doors, windows and furniture.

b) Hands-on-exercise: Wood work, joints by sawing, planning and cutting.

c) Preparation of half joints, Mortise and Tenon joints.

II MECHANICAL ENGINEERING PRACTICE

Welding: Preparation of butt joints, lap joints and tee joints by arc welding.

Basic Machining:

a) Simple Turning and Taper turning

b) Drilling Practice
Sheet Metal Work:
   a) Forming & Bending:
   b) Model making – Trays, funnels, etc.
   c) Different type of joints.
   d) Preparation of air-conditioning ducts.

Machine assembly practice:
   a) Assembling, dismantling and Study of centrifugal pump
   b) Assembling, dismantling and Study of air conditioner
   c) Assembling, dismantling and Study of lathe.

Moulding: Moulding operations like mould preparation for gear and step cone pulley etc.,

Fitting: Fitting Exercises– Preparation of square fitting and vee– fitting models.

Demonstration:
   a) Smithy operations, upsetting, swaging, setting down and bending.  
      Example – Exercise – Production of hexagonal headed bolt.
   b) Gas welding.

REFERENCES:


BEN 201 ENGLISH II

Aim: To make the students learn the basics of communication in order to talk fluently, confidently and vividly.
Objective: To make them master the techniques of professional communication so that they become employable after completing the course

Course outcomes:

CO1: After the completion of the course the students can communicate without any inferior complex.
CO2: They can answer the questions asked in the campus interview without any difficulty.
CO3: They very well can manage the abroad job situations.
CO4: They will become effective communicators once the course is completed.
CO5: They will get a clear idea about LSRW (Listening, Speaking, Reading, Writing)

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UNIT I      Orientation 9 + 3

Numerical adjectives - Meanings in context - Same words used as different parts of speech - Paragraph writing - Non-verbal communication - Regular and Irregular verbs.

UNIT II     Oral Skill 9 + 3

Listening to audio cassettes - C.Ds, News bulletin - Special Lectures, Discourse - Note taking - Sentence patterns - SV, SVO, SVC, SVOC and SVOCA - and Giving Instructions - Reading
Comprehension answering questions. Inferring meaning.

UNIT III Thinking Skill
Self- introduction describing –Group Discussion – Debate –Role play- Telephone- Things-etiquette- Recommendation and Sequencing jumbled sentences to make a suggestions-paragraph-advertisement and notice, Designing or drafting posters, writing formal and informal invitations and replies.

UNIT IV Writing Skill
Definitions - Compound nouns - Abbreviations and acronyms - business or official letters(for making enquiries, registering complaints, asking for and giving information, placing orders and sending replies):

(b) letters to the editor(giving suggestions on an issue).

UNIT V Formal Information
Editing – Prepositions - Articles - Permission letter for undergoing practical training, Essay writing - Application for a job, letter to the principal authorities regarding admissions, other issues, requirement or suitability of course etc.

Total: 60 Periods

TEXT BOOK:


REFERENCE BOOKS:


BMA 201 - ENGINEERING MATHEMATICS – II L T P C 3 1 0 3
Course Aim: To impart adequate knowledge of Mathematics to the students so as to formulate problems in engineering environment and solve them using mathematical tools.

Course Objectives:

- At the end of this course, students shall be able to solve differential equations, simultaneous linear equations, and some special types of linear equations related to engineering.
- Deal with applications in a variety of fields namely fluid flow, heat flow, solid mechanics, electrostatics, etc.
- Find intensity of degree of relationship between two variables and also bring out regression equations.

Course outcome:

CO1: Apply matrix operations to solve the relevant real life problems in engineering.
CO2: Formulate a mathematical model for three dimensional objects and solve the concerning problems.
CO3: Find area and volume based on a function with one or more variables.

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UNIT I Ordinary Differential Equation

Higher order linear differential equations with constant coefficients - Method of variation of
parameters – Cauchy’s and Legendre’s linear equations - simultaneous first order linear equations with constant coefficients.

UNIT II Vector Calculus

Gradient, divergence and curl – Directional derivatives – Irrotational and solenoid vector fields – vector integration
– Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (without proofs) – simple applications involving cubes and rectangular parallelepipeds.

UNIT III Analytic Functions


UNIT IV Complex Integration

Complex integration – Statement and application of Cauchy’s integral theorem and Cauchy’s integral formula –

Taylor and Laurent expansions – Singular points – Residues – Residue theorem – Application of Residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding ploes on boundaries).

UNIT V Statistics


Total : 60 Periods

TEXT BOOK :


REFERENCES :


BPH 201 ENGINEERING PHYSICS – II  L T P C 3 0 0 3

Objectives

- To expose the students to multiple areas of science of engineering materials which have direct relevance to different Engineering applications
- To understand the concepts and applications of conducting, Semiconducting, magnetic & dielectric materials as well as their optical properties.

Course outcomes

CO1 - To Know about properties and advancements of conducting materials.
CO2 – To know the principle and properties semiconducting materials.
CO3 - Acquire Knowledge on magnetic and dielectric materials
CO4 – To Know about the creation of new materials with novel properties
CO5 – To understand the impact of light in technical uses

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B.Tech - Department of Mechatronics Engineering  Bharath Institute of Higher Education and Research
UNIT – I Conducting Materials


UNIT – II Semiconducting Materials

Elemental and Compound Semiconductors and Their Properties- Carrier Concentrations (Electrons and Holes) In Intrinsic Semiconductors - Carrier Concentrations in N- Type and P-Type Semiconductors – Variation of Fermi Level and Carrier Concentration With Temperature - Variation of Conductivity With Temperature – Band Gap Determination – Hall Effect – Experimental Arrangement - Application

UNIT-III Magnetic and Dielectric Materials


UNIT- IV New Engineering Material


UNIT-V Optical Materials and Optical Fibers

Principle and Propagation of Light In Optical Fibers - Numerical Aperture And Acceptance Angle- Types Optical Fibers (Material, Refractive Index, Mode based) - Double Crucible Technique of Fiber Drawing.

Text Books


Reference Books


BCH 201 Engineering Chemistry – II 3 0 0 3

Course Aim: To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

Course Objectives:

- To make the students to have a sound knowledge with industrial applications of surface chemistry
- To impart knowledge about the Industrial importance of Phase rule and alloys
- To make the students to be conversant with Analytical techniques and their
importance

- To have an idea and knowledge about the Chemistry of Fuels and
- To make them study to have a deep knowledge in Chemistry of engineering materials

Course outcomes:

- **CO1** – Having a knowledge of industrial applications of Surface Chemistry
- **CO2** – Having the thinking of industrial importance of Phase rule and alloys
- **CO3** – Having a deep knowledge with Analytical techniques and their importance.
- **CO4** – With a true wisdom about Chemistry of Engineering materials.
- **CO5** - Having a well-versed knowledge of the Chemistry of Fuels and Combustion.

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UNIT I - Surface Chemistry


UNIT II - Phase Rule and Alloys

UNIT III - Analytical Techniques

UNIT IV - Fuels

UNIT V Engineering Materials

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:


BFR 101 / 201 FRENCH

Importance of the Course:

1. Learning a language is almost akin to a journey of discovery. It not only opens up a whole new dimension but also contributes significantly to the development of an individual’s intelligence.

2. Language gives us access and insights into another culture. It is a fundamental truth that cultures define themselves through languages.

3. Since language is a symbol of culture, the curriculum for all the languages reflects this spirit.

Course Objective
The Basic Course in French is designed to:

1. Introduce the basics of the language to beginners

2. To develop their knowledge as well as their communicative skills so as to be able to respond in simple everyday contexts.

Synchronies I consists of 13 lessons with each lesson presenting a dialogue and giving the know-how, grammatical and lexical notions as well as activities required for communication. In addition, Synchronies I includes documents which initiate the learners to another world, another culture and which acclimatize them to the authentic use of the French language through the exploitation of written and iconographic documents. The Indian context has been used.

Course Objective:
CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.
CO2: Will able to read and write a foreign language.
CO3: Will get sufficient exposure for developing basic conversational skills.
CO4: Will impart knowledge on foreign lifestyle.
CO5: Will gain confidence to survive in global environment.

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UNIT – I: 9
At the airport: Savoir-faire: exchanging greetings, self introduction, introducing another, welcoming someone, identifying someone - Grammar: verbs ‘to be’, ‘to call oneself’, subject pronouns, interrogation

UNIT – II 9
At the University: Savoir-faire: enquiring after one’s welfare, taking leave, expressing appreciation -Grammar: definite & indefinite articles, gender of nouns, adjectives, present tense of regular ‘er’ verbs, ‘to have’, ‘to learn’, negation, irregular verbs

UNIT – III 9
At the café: Savoir-faire: speaking about one’s likes, giving information, expressing admiration, asking information about someone - Grammar: Interrogative adjectives, irregular verbs,
possessive and interrogative adjectives

UNIT – IV
At the beach: Savoir faire: proposing an outing, accepting/ refusing the proposal - Grammar: singular & plural, indefinite pronoun, demonstrative adjectives, negation, irregular verbs

UNIT – V
A concert: Savoir – faire: inviting, accepting, expressing one’s inability to accept an invitation

UNIT – VI
Grammar: Present tense of more irregular verbs, contracted articles, future tense, interrogative adverbs, At Nalli’s Savoir- faire: asking the price of an article, protesting against the price, Grammar: possessive adjectives, exclamative adjectives, imperative tense

Total: 45 hours

REFERENCES:
• Course Material: Synchronie I – Méthode de Français
• Madanagobalane - Samita Publications, Chennai, 2007

BGM 101/ 201 GERMAN

Course Aim: To equip students with some basic knowledge of German to get oriented to the new problems in global environment and address them.

Course Objectives: At the end of this course, students shall be able to obtain good knowledge of the language, to read, write and speak German, whereby the emphasis is laid on speech. At the end of the first course, the students are in the position to communicate in a basic manner. An example of their skills would be:

❖ Ordering food in a restaurant
❖ Expressing their likes and dislikes
❖ Going for shopping
❖ Booking a room in a hotel
❖ Or even making complaints wherever necessary.

Course Objective:
CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.
CO2: Will able to read and write a foreign language.
CO3: Will get sufficient exposure for developing basic conversational skills.
CO4: Will impart knowledge on foreign lifestyle.
CO5: Will gain confidence to survive in global environment.

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Course structure:
A. German Language (speaking, reading, writing, grammar and test)
B. Life in Germany (shopping, restaurant, doctor, government, bank, post)
C. The German Way (introduction, doing business, conversation, meetings, dining)
D. Germany (Culture, Climate)

UNIT I

Welcome: Introduction to the Language, Spelling and Pronunciation (The alphabets and numbers) Greetings, ordering, requesting, saying thank you - Grammar – the article “the”, conjugation of verbs

UNIT II

Shopping - Grammar – adjectives, endings before nouns, practice. Self introduction

UNIT III
Addresses, Occupations, Studies - Grammar - ‘to be’, the definite/indefinite articles, individual Training

UNIT IV
Leisure Time, Sports, Hobbies - Grammar – position of a verb in a main clause , oral practice

UNIT V
At a Restaurant, Food and Drink - Grammar – the personal pronoun in the Nominative and Accusative, Narrating an event

TOTAL 45 hours

Resources:

- Sprachkurs Deutsch 1 (VerlagDiesterweg), New Delhi Learning Centre

BJP 101/201 JAPANESE  3 0 0 3

Course Objective:
The student will be able
- To have a basic knowledge of Japanese language, Japanese culture and heritage
- To impart knowledge Japanese lifestyle.
- To give sufficient exposure to develop basic conversational skills.

Course Objective:

CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.
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### UNIT I

- Introduction-history and origin of Japanese language-Japan and its cultural heritage-Self introduction-counting numbers (1-100)-time-conversation with the use of audio devices, grammar- usage of particles wa, no, mo and ka

### UNIT II

- Greetings, seasons, days of the week and months of the year-numbers (up to 99,999)-grammar- usage of kore, sore, are, kono, sono, ano, koko and kochira, arimasu and imasu-i-ending and na-ending adjectives-use of audio and drills for practice

### UNIT III

- Asking the price- associated vocabulary-usage of particles ni, ga and ne- use of audio and drills for practice-Introduction to basic Kanji characters- use of audio and drills for practice

### UNIT IV

- Family relationships- colours-Kanji (numbers) and festivals of Japan-religion-Japanese art and culture-ikebana, origami-introduction to hiragana- use of audio and drills for practice

### UNIT V

- Vocabulary associated with directions-asking way-particles – e, de, mo, koko, soko, asoko, doko, nani, mae, ushiro, ue, sha- use of audio and drills for practice-introduction to katakana

**Total: 45 Periods**
Text books

Reference Books

BKR 101/201 KOREAN 3 0 0 3

Course Objective:

Learning a language is almost akin to a journey of discovery. It not only opens up a whole new dimension but also contributes significantly to the development of an individual’s intelligence. Language gives us access and insights into another culture.

It is a fundamental truth that cultures define themselves through languages. Since language is a symbol of culture, the curriculum for all the languages reflects this spirit. To give students some proficiency in the foreign languages like Korean

Course Outcome:

Upon completion of the course, students should be able to manage conversation, reading and writing on the topics related to:

• Holiday and travel
• Shopping
• Feelings, advice and introductions
• Hobbies and job requirements
• Plans and preparations
• Appointments and requests
• Ordering for food, rooms and houses

Course Objective :

CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.
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UNIT I

9

Asking/giving reasons for studying Korean, making plans for the holiday, writing letters, describing past travel experiences and future travel plans, shopping in a grocery store, shopping in electronics store, storytelling Grammar: would like to (do), want to (do), construct future tense.

UNIT II

9

Asking about feelings, asking about problems and giving advice, brief introductions - Grammar: Noun modifier, please try doing (something), irregular adjective/verb.

UNIT III

9
Asking about hobbies, asking about abilities (sports), job requirements, Ordering things for delivery, ordering a meal at a restaurant - Grammar: Sentence ending for the honorific form, please do something for me, have tried (something),

UNIT IV

Asking about evening plans, making plans with others, making preparations - Asking about rooms, describing your room to your classmates, describing your house. Grammar: to know/not know how to do something, must (do), have to (do), should,

UNIT V

Describing your plans and giving reasons, cancelling appointments. Grammar: Shall we~? / Should we~?, with, and, irregular verbs/adjective, so, because, cannot, intend to, plan to, or hope to, (more) than, the most, tag question/is n’t it? ,will (do)

Course Material:

- Korean for Non-Native Speakers(Student Book 1B) Korean Language Education Center, Sogang University.
Aim: To make the learners get acquainted with the language for professional life.

Objective: To enhance the students use this language in day today conversations with ease and confidence.

Course Objective:

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UNIT-1
History, Origins, Old and middle Chinese, Rise of northern dialects

UNIT-II
3. Nomenclature

UNIT-III
Chinese characters, Homophones, Phonology

UNIT-IV
Tones, Phonetic transcriptions, Romanization, Other phonetic transcriptions

UNIT-V
Grammar and morphology, Vocabulary, Loanwords, Modern borrowings and loanwords

Total: 45 Periods

REFERENCES:


BME 203 ENGINEERING MECHANICS L T P C 3 1 0 3

Objective:

At the end of this course the student should be able to understand

- The vectorial and scalar representation of forces and moments
- Static equilibrium of particles and rigid bodies in two dimensions
- Physical properties of surfaces and solids
- Effect of friction on equilibrium and their application
- Principle of work and energy
The laws and kinematics of motion of particles and rigid bodies

Course outcomes

CO1: Students will gain knowledge regarding the various laws and principles associated with statics and dynamics, to apply them for practical solutions.

CO2: Students will gain knowledge regarding center of gravity and momenta inertia and apply them for practical problems.

CO3: Students will gain knowledge regarding various types of forces and reactions and to draw free body diagram to quicker solutions for complicated problems.

CO4: Students will gain knowledge in work and energy

CO5: Students will gain knowledge on friction on equilibrium and its application.

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UNIT – I Basics and Statics Of Particles


UNIT – II Equilibrium of Rigid Bodies

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial
representation of moments and couples – Scalar components of a moment – **Varignon’s theorem**
- Equilibrium of Rigid bodies in two dimensions -Equilibrium of Rigid bodies in three dimensions.

**UNIT – III Properties of Surfaces and Solids**


**UNIT – IV Friction**


**UNIT – V Dynamics Of Particles**


**TEXT BOOK:**


**REFERENCES :**


UNIT – I D.C. AND A.C CIRCUITS

Ohm’s law – Kirchoff’s Laws, V – I Relationship of Resistor (R) Inductor (L) and capacitor (C).


UNIT – II ELECTRICAL MACHINES


UNIT – III BASIC MEASUREMENT SYSTEMS


UNIT IV – SEMICONDUCTOR DEVICES


UNIT V – DIGITAL ELECTRONICS


TOTAL NO. OF PERIODS: 30

TEXT BOOKS:


3. Jacob Millman and Christos C-Halkias, “Electronic Devices and Circuits”, Tata
REFERENCE BOOKS:


BCS 1L1/BCS 2L2 COMPUTER PRACTICE LABORATORY I

LIST OF EXERCISES

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A) Word Processing

Document creation, Text manipulation with Scientific Notations. Table creation, Table formatting and Conversion. Mail merge and Letter Preparation. Drawing-Flow Chart

B) Spread Sheet

Chart-Line Xy Bar and Pie – Formula-Formula Editor-Spread sheet-Inclusion of Object, Picture and Graphics Protecting the document and sheet-Sorting and Import/Export features.

C) Simple C Programming*

Data types, Expression Evaluation, Condition Statement. Arrays structures and Unions – Functions

D) Simple C++ Programming

13. Classes and Objects
14. Constructor and Destructor

*For Programming exercises Flow chart and Pseudo code are essential.

Total: 45 Periods

**BEE2L1 Basic Electrical Engineering Lab**

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### I - List of Experiments for Electrical Engineering Lab

1. Fluorescent lamp wiring
2. Stair case wiring
3. Measurement of electrical quantities-voltage current, power & power factor in RLC circuit
4. Residential house wiring using fuse, switch, indicator, lamp and energy meter
5. Measurement of energy using single phase energy meter
6. Measurement of resistance to earth of electrical equipment

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### I - List of Experiments for Electronics Engineering Lab

1. Study of electronic components and equipments.
   A. Resistor colour coding using digital multi-meter.
   B. Assembling electronic components on bread board.
3. Soldering and desoldering practice.
4. Verification of logic gates (OR, AND, OR, NOT, NAND, EX-OR).
5. Implementation of half adder circuit using logic gates.

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**BPC 2L1 PHYSICS AND CHEMISTRY LABORATORY**

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I - LIST OF EXPERIMENTS – PHYSICS
1. Determination of resistivity of high resistance alloys and temperature coefficient
2. Study of Hall effect – Hall coefficient determination
3. Determination of electrical conductivity of good conductors
4. Study of magnetic hysteresis and energy product
5. Determination of Band gap of a semiconductor
6. Determination of Dispersive power of a prism – Spectrometer

II - LIST OF EXPERIMENTS – CHEMISTRY
1. Conductometric titration (Simple acid base)
2. Conductometric titration (Mixture of weak and strong acids)
3. Conductometric titration using BaCl₂ vs Na₂SO₄
4. Potentiometric Titration (Fe²⁺ / KMnO₄ or K₂Cr₂O₇)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper Sulphate)
7. Estimation of Ferric iron by spectrophotometer.

BMA301 MATHEMATICS – III

OBJECTIVE:
❖ To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
❖ To acquaint the student with Fourier transform techniques used in wide variety of situations.
❖ To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes
❖ To develop Z transform techniques for discrete time systems.

Course Outcomes
CO01 - To learn the problem solving methods in linear differential equations
CO02 - To learn Dirichlet’s condition and operations using Fourier series
CO03 - To have a clear understanding about 2nd order equations and wave equations
CO04 – Properties of Laplace transform and problem solving using it
CO05 - Properties of Fourier transform and problem solving using it

CO/PO Mapping

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UNIT I   PARTIAL DIFFERENTIAL EQUATIONS  
Formation-solutions of standard types of first order equations-LaGrange’s equation-linear partial differential equations of second and higher order with constant coefficients.

UNIT II   FOURIER SERIES  
Dirichlet’s condition-General Fourier series-half range sine and cosine series-Parseval’s identity. Harmonic Analysis.

UNIT III   BOUNDARY VALUE PROBLEMS  
Classification of second order linear partial differential equations-Solutions of one-Dimensional wave equations, one-dimensional heat equations.

UNIT IV   LAPLACE TRANSFORMS  
Transforms of simple functions-basic operational properties-transforms of derivatives and integrals-Initial and Final value theorems-Inverse transforms-Convolution theorem. Periodic functions. Applications of Laplace Transforms for solving linear ordinary differential equations up to second order with constant coefficients and integral equations.

UNIT V   FOURIER TRANSFORMS  
Statement of Fourier integral theory-Fourier transforms pairs-Fourier Sine Cosine transforms-Properties-Transforms of simple functions-Convolution theory-Parseval’s identity.

TOTAL NO. OF PERIODS: 60

Text Books:

References:
OBJECTIVE:
1. To understand the basic components and layout of linkages in the assembly of a system / machine.
2. To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
3. To understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions.
4. To understand the basic concepts of toothed gearing and kinematics of gear trains and the effects of friction in motion transmission and in machine components.

Course Outcomes
CO01 – Upon completion of this course, the students can able to apply fundamentals of mechanism for the design of new mechanisms and analyse them for optimum design
CO02 - Will know the impact of numerical methods in engineering analysis
CO03 - Better understanding on the theoretical background of mechanisms
CO04 - Will get the confidence in using mechanisms
CO05 - Capability of solving engineering problems will increased

CO/PO Mapping

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<td>6 End Semester Examinations</td>
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UNIT I  INTRODUCTION TO MECHANISMS
Introduction-Science of mechanisms-Terms and definitions-Planar, Spherical and spatial mechanisms, Mobility-Classification of mechanisms-Indexing mechanisms, reciprocating mechanism etc. Straight line generators- kinematic inversion- Slider crank chain inversions- Four bar chain inversions- Grashof’s law.
Determinations of velocities and acceleration in mechanisms- Relative motion method (Graphical) for Mechanisms having turning, sliding and rolling pair.

UNIT II  SYNTHESIS OF MECHANISMS
Classification of kinematics- Synthesis problems- Chebyshev’s spacing, Two point synthesis- Freudenstein method- Four bar mechanism and slider crank mechanism.
Types of cams and followers- Follower motions- Uniform, parabolic, SHM, Cycloidal and polynomial- Synthesis of cam profiles for different followers. Cams with specified contours

UNIT III FRICITION 10
Friction-Types-Application-Inclined plane, Screw jack, Clutch, Brakes Bearings, Journal bearing, Flat pivot bearing, multi collar bearings Belt drives.

UNIT IV THEORY OF GEARING 12
Classification of gears, Law of gearing, nomenclature-Forms of teeth, Cycloidal teeth, Involute teeth-Length of path of contact-Length of arc of contact-Contact ratio-Interference and undercutting- Minimum number of teeth to avoid interference- Internal gears- Extended center distance system- Long and short addendum system- Gear trains-Types-Epicyclical gear trains-Automobile differential unit.

UNIT V CONTROL MECHANISMS 10
Governors- Gravity controlled governors-Spring control governors, Hartnell governor, and Hartung governor-Governor characteristics- Governor effort and power.
Gyroscopes-Gyroscopic forces and couple- Forces on bearing due to gyroscopic action-
Gyroscopic effects on the movement of aero plans and ships, stability of two wheel drive and four wheel drive, Gyroscopic effects in grinding machines.

TOTAL NO. OF PERIODS: 60

Text Books:

References:
2. V.P.Singh-Theory of Machines ,2001

BMT303 ELECTRONIC DEVICES AND ELECTRONIC CIRCUITS 3 1 0 4

OBJECTIVES:
❖ To understand the basics of electrical engineering and transformers.
❖ To understand the Constructions and working details of RC,RL and RLC circuits Q factor.
❖ To understand the semiconductor diodes and special diodes.
❖ To understand the basic concepts of Oscillators and Multi-vibrators.
❖ To understand the working principle of Rectifiers and power supplies.

COURSE OUTCOMES
After successful completion of this course, the students will be able to

CO1: Able to get the basic knowledge about the Electric and Magnetic circuits, Network Theorems.

CO2: Able to get the knowledge about the construction and working of RC, RL and RLC circuits.

CO3: Able to get the knowledge about the semiconductor diodes and special diodes.

CO4: Able to get the basic concepts of Oscillators and Multi-vibrators

CO5: To understand the working principle of Rectifiers and power supplies.

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UNIT I CIRCUIT ANALYSIS TECHNIQUES

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS

UNIT III SEMICONDUCTOR DIODES AND SPECIAL DEVICES

SPECIAL DIODES: Tunnel diodes – PIN diode, varactor diode — UJT – Diac and Triac –
Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD.

UNIT IV  OSCILLATORS AND MULTIVIBRATORS  12

Oscillators: Classification of oscillators – Barkhausen criterion operation and analysis of RC phase shift, Wien’s bridge, Hartely, colpitts oscillators.

UNIT V RECTIFIERS AND POWER SUPPLIES  12

Single –phase, half-wave and full-wave rectifiers – Bridge rectifiers – Ripple factor, rectification efficiency-Transformer Utilisation Factor and regulation – Performance characteristics of rectifiers with filters – Regulated power supply – Series and shunt type voltage regulators – Switched mode power supplies.

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

BME302 MECHANICS OF SOLIDS AND FUNDAMENTALS OF FLUIDS  3 1 0 4

OBJECTIVE:
❖ To learn fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.
❖ To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
❖ To understand the effect of torsion on shafts and springs.
❖ To analyze a complex two dimensional state of stress and plane trusses.
❖ To analyze the fluid characteristics’

Course Outcomes
CO01 - textbook and auxiliary handout reading assignments
CO02 – To understand the different types of beams and bending moment and shear force
CO03 – To learn the power transmission and strain energy and stiffness and buckling
CO04 – To learn the flow characteristic fluid continuity, Euler’s equation
CO05 - To learn the principles of dimensional analysis

S – Strong, M – Medium, W – Weak

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<td>6 End Semester Examinations</td>
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UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 12
Concept of stress-strain- Hooke’s law- Tension- Compression and shear- Stress strain diagram, poisson’s relation-Volumetric strain- Elastic constants and their relation- Stress in simple and composite bars subjected to axial loading and temperature- State of stress at a point-Principle plane- Principle stress-Normal and longitudinal stresses on a given plane-Mohr’s circle of stresses.

UNIT II TRANSVERSE LOADING ON BEAMS, SHEAR FORCE AND BENDING MOMENT 12
Types of Beams- Transverse loading on beams shear force and Bending moment in beams – Cantilever- Simply supported, overhanging beam subjected to concentrated load and UDL – Maximum bending moment and point of contra flexure-Theory of simple bending and assumption – Derivation of formulae M/I = F/Y = E/R and its applications to engineering – Leaf spring.

UNIT III TORSION, SPRINGS AND COLUMNS 12
Theory of torsion and assumption – Torsion of circular shafts- solid & hollow – strain energy in torsion- Power transmission- Strength and stiffness of shafts- Types of springs- Stiffness stresses and deflection in helical spring- Columns – Buckling and stiffness due to axial loads – Euler, Rankin and Empirical formulae for columns with different conditions.

UNIT IV FLUID FLOW CONCEPTS AND DYNAMICS OF FLUIDS 12
UNIT V DIMENSIONAL ANALYSIS AND FLOW THROUGH CIRCULAR CONDUITS

Dimension and units, Buckingham’s II theorem- Boundary layer concepts- Boundary layer thickness- Darcy-Weisbach equation- Friction factor and Moody diagram-Commercial pipes- Minor losses- Flow though pipes in series and in parallel.

TOTAL NO. OF PERIODS: 60

TEXT BOOKS

REFERENCES

BMT301 DIGITAL ELECTRONICS 3 0 0 3

OBJECTIVE:

- To introduce the Number systems and logic gates.
- To acquaint the student with various application of digital systems used in electronics engineering.
- To know the knowledge about the different circuits.
- To get the knowledge about various circuits and counters.

Course Outcomes

CO01 - To learn different types logic gates
CO02 – To understand the different types of combinational circuits
CO03 – To learn the sequential circuits and flip-flops.
CO04 – To learn the Asynchronous sequential circuits.
CO05 - To learn the Algorithmic state machines.

CO/PO Mapping

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UNIT I  NUMBER SYSTEM AND BASIC LOGIC  
Number systems-Binary, Octal, Hexadecimal, BCD, excess 3, complements conversions and arithmetic. Boolean theorems, Boolean algebra – AND, OR, NOT NAND & NOR operation, sum of product and product of sum forms. Minimization – Karnaugh’s map, tabular minimization procedures.

UNIT II  COMBINATIONAL CIRCUITS  
Problem formulation and design of combinational circuits, adder / substractor, Encoder / decoder MUX/DEMUX, comparator, code converter. Design of combinational circuits, ROM, EPROM, EEPROM, introduction to PAL and PLA and their use in design.

UNIT III  SEQUENTIAL CIRCUITS  

UNIT IV  ASYNCHRONOUS SEQUENTIAL CIRCUITS  
Stable unstable states, output specifications, cycles and races, Race free assignments, reduction of state and flor tables, hazards, pulse mode sequential circuits.

UNIT V  ALGORITHMIC STATE MACHINES  
ASM chart-timing considerations-control implementation-design with multiplexers and PLA.

TOTAL NO. OF PERIODS: 45

Text books:

References:

BMT302 ELECTRICAL MACHINES & DRIVES

OBJECTIVES:

- To understand the basics of electrical engineering and transformers.
- To understand the Constructions and working details of DC, AC motors and Special machines
- To understand the Speed control & Starting methods of DC & AC motors
- To understand the basic concepts of Drives, Electric drives, types and factors influencing the choice of electrical drives
- To understand the working principle of DC & AC motors drives and their characteristics and its braking methods

COURSE OUTCOMES

CO1: Able to get the basic knowledge about the Electric and Magnetic circuits, AC fundamentals and transformers.

CO2: Able to get the knowledge about the construction and working of DC, AC and Special machines.

CO3: Able to get the knowledge about the starting and speed control AC and DC machines.

CO4: Able to get the basic concepts of Drives, Electric drives, types and factors influencing the choice of electrical drives

CO5: To understand the working principle of DC & AC motors drives and their characteristics and its braking methods

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CO/PO Mapping
(S/M/W indicates strength of correlation)
S-Strong, M-Medium, W-Weak

COURSE ASSESSMENT METHODS

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1. Internal Tests 1. Course and Survey
2. Assignments 2. Faculty Survey
3. Seminar 3. Industry
4. Quiz 4. Alumni
5. Online test
6. End Semester Examinations

UNIT I  CIRCUITS AND TRANSFORMERS  6
D.C. Voltage, current, power-Ohms law-series, parallel circuits – Kirchoff’s laws – mesh analysis
– A.C. voltage – sinusoidal waves, phasor representation – power factor – complex power - basic
idea of transformers – simple problems.

UNIT II  ELECTRICAL MOTORS  12
Constructional details, principle of operation and performance characteristics of D.C. motors,
single phase induction motor, three phase induction motor, synchronous motors, universal motors,
stepper motors and reluctance motor.

UNIT III  SPEED CONTROL AND STARTING  9
Speed control of D.C. motors – three phase induction motors – starting methods of D.C. motor
and three phase induction motor – electrical braking – simple problems.

UNIT IV  ELECTRICAL DRIVES  9
Type of Electrical Drives – Selection & factors influencing the selection – heating and cooling
curves – loading condition and classes of duty – determination of power rating – simple problems.

UNIT V  SOLID STATE DRIVES (QUALITATIVE TREATMENT ONLY)  9
Advantages of solid state drives – D.C. motor control using rectifiers and choppers – control of
induction motor by V, V/f and slip power recovery scheme using inverters and A.C. power
regulators.

TOTAL NO. OF PERIODS: 45

Text Books:

References:
   Delhi, 1982.
OBJECTIVE:
- To study the characteristics of various electronics components
- To design basic electronics circuits like power supply, oscillator, amplifier etc
- To know the working of basic electronics circuits like power supply, oscillator, amplifier etc

Course Outcomes

CO01 - To study the characteristics of diodes like PN diode and zener diode
CO02 - To study the I/O characteristics of transistors in various configurations
CO03 – To study the various characteristics of power transistors
CO04 – To study the various characteristics of special transistors
CO05 – To design and test rectifier circuits and series voltage regulators
CO07 – To design and test amplifier, oscillator, multivibrator and clipper and clamper circuits

CO/PO Mapping
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Course Assessment Methods:
Direct | Indirect
Observation Book | Student Exit Survey
Record Book | Faculty Survey
Model exam | Industry
Viva Voce | Alumni
End semester exam

LIST OF EXPERIMENTS
1. Characteristics of PN junction and Zener diode.
2. Input and Output characteristics of CB, CE configuration.
3. Drain and Transfer characteristics of JFET.
4. Characteristics of SCR, Triac, Diac & UJT.
5. Half wave Rectifier & Full Wave rectifier.

**TOTAL NO. OF PERIODS: 60**

**LIST OF EQUIPMENTS AND COMPONENTS**

1. Variable Power Supply (0-30V) - 6
2. CRO - 4
3. Digital Multimeter - 6
4. Function Generator - 4
5. DC Ammeter - 4

**Consumables**
6. Transformers
7. Resistors ¼ Watt Assorted
8. Capacitors
9. Inductors
10. Diodes and Zener diodes
11. Bread Boards
12. ICS – 555, 741, LM 328, LM 324
13. BC107, BC147, BC 108, BC 148, BC547, BC 548, SL 100, SK100 or Equivalent transistors
14. Wires

**BMT3L2 ELECTRICAL MACHINES & DRIVES LAB 0 0 4 2**

**OBJECTIVES:**

- Information to supplement to the Electric Machines course.
- The ability to conduct testing and experimental procedures on different types of electrical machines.
- A chance to practice different types of wiring and devices connections.
- The capability to analyze the operation of electric machines under different loading conditions

**COURSE OUTCOMES**

**CO1:** Understand the concept of efficiency and the short circuit impedance of a three-phase transformer from no-load test, winding resistance, short circuit test, and load test.

**CO2:** Understand the effect of unbalanced loading on a three-phase transformer with different connections, and the effects and limitations of each connection.

**CO3:** Understand the starting and connecting procedures of synchronous generators, and to obtain the ‘V’ curves of synchronous motors.
CO4: Experimentally obtain the load characteristics of various dc motors and generators

CO5: Experimentally obtain the load characteristics, starting current and starting torque of a squirrel-cage induction motor and to derive circuit parameters from no-load and blocked-rotor tests

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**LIST OF EXPERIMENTS**

1. Load test on D.C. shunt motor.
2. Speed control of D.C. shunt motor.
3. Swinburne’s test
4. Load test on three phase induction motor.
5. No load and blocked rotor tests on three-phase induction motor.
7. No load and blocked rotor tests on single phase induction motor.
8. Load test on Synchronous motors
9. Performance characteristics of Stepper motors.

**TOTAL NO. OF PERIODS: 60**

**LIST OF EQUIPMENT**

(For a batch of 30 students)

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<td>10.</td>
<td>Ammeter (0-5A), (0-10A) MC</td>
<td>Each 2</td>
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<td>11.</td>
<td>Ammeter (0-5A), (0-10A) MI</td>
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<td>12.</td>
<td>Voltmeter (0-300V) MC</td>
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<td>13.</td>
<td>Voltmeter (0-150V), (0-300V), (0-600V) MI</td>
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<td>14.</td>
<td>Wattmeter 150/300V, 5/10A UPF</td>
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<td>15.</td>
<td>Wattmeter 300/600V, 5/10A UPF</td>
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<td>Wattmeter 150/300V, 5/10A LPF</td>
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<td>17.</td>
<td>Wattmeter 300/600V, 5/10A LPF</td>
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<td>18.</td>
<td>Stepper motor 5Kg</td>
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<td>Synchronous motor 5KW</td>
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<td>Rheostat 360 ohm/1.2A</td>
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**BMT3L3 COMPUTER AIDED MACHINE DRAWING 0 0 4 2**

**UNIT I**

**UNIT II**

**UNIT III** *(Drafting work using mini drafter)*
Preparation of part and assembly drawings of Plummer block, screw jack, machine vice, lathe tailstock, tool head of the shaper, stuffing box, piston & connecting rod universal joint.

**UNIT IV**
Introduction to the use of any drafting software – creation of simple geometric bodies using primitives (line, arc, circle etc.,) and editing for the drawing, Dimensioning and text writing, concept of layer creation and setting, line types.

**UNIT V**
Preparation of 2-D drawings using CAD software for components and assemblies of Plummer block, screw jack, machine vice, lathe tailstock, tool head of the shaper. Introduction to 3-D
modeling solid and wire frame modeling.
TOTAL NO. OF PERIODS: 60

Text Books:

References:

List Of Equipment And Software Required (for a batch of 30 students)
1. Computer System 30
   VGA Color Monitor, Pentium IV Processor, 20 GB HDD, 256 MB RAM
2. Laser Printer 01
3. Plotter (A2 size) 01
4. Software: AutoCAD or Mechanical Desktop or Pro / E or CATIA or IDEAS 30 Licenses or Solidworks
5. Drawing Boards and Tables in Drawing Hall 30 Nos.

BMA402 NUMERICAL METHODS 3 1 0 4

OBJECTIVES:

This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.

OUTCOMES:-

At the end of the course, the students would
CO01- Have a fundamental knowledge of the basic solutions of equations and eigen value problems.
CO02- Have a well-founded knowledge of standard numerical differentiation and integration which can describe real life phenomena.
CO03- Acquire skills in handling situations involving first and second order differential equations
CO04- Understand boundary value problems on ordinary and partial differential equations
CO05- Be able to analyze the interpolation techniques.

CO/PO Mapping
S – Strong, M – Medium, W – Weak

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UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEM  12

UNIT II INTERPOLATION (FINITE DIFFERENCES)  12
Newton’s Divide difference formula, Lagrange’s interpolation-forward and backward difference formula-Stirling’s Bessel’s central difference formula

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION  12
Numerical differentiation with interpolation polynomials, Numerical integration by Trapezoidal Simpson’s (Both 1/3” and 3/8”) rule, Double integrals using Trapezoidal and Simpson’s rule

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  12
Single step methods, Taylor series, Euler and modified Euler, Runge kutta method of first and second order differential equations, multiple step methods, Milne and Adam’s –Bash forth predic and corrected method

UNIT V BOUNDARY VALUE PROBLEMS FOR ODE AND PDE  12
Finite difference for the second order ordinary differential equations, finite difference solutions for one dimensional heat equations (both implicit and explicit), one dimensional wave equation, Two dimensional, Laplace and Poisson equation.

TOTAL NO. OF PERIODS: 60

Textbooks:

References:
OBJECTIVE:

❖ To introduce the concept of dynamics of machines
❖ To acquaint the student with various technique involved in dynamics
❖ To introduce the various new technology in dynamics of machines

Course Outcomes

CO01 - To learn the concept about force analysis for mechanism
CO02 – To understand the various methods of balancing in different situation
CO03 – To learn the Concept about free vibration of single degree of freedom
CO04 – To learn the Concept about forced vibration of single degree of freedom
CO05 - To learn the concept about critical speed of rotating shaft

CO/PO Mapping

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S – Strong, M – Medium, W – Weak

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UNIT I  FORCE ANALYSIS OF MECHANISMS  12
Static, Inertia and combined force analysis- Graphical and analytical method- Slider crank mechanism and four bar mechanism. Turning moment diagram and flywheel-Applications in engine, Punching presses.

UNIT II  BALANCING  12
Static and dynamic balancing-Balancing of rotating masses- Balancing of several masses in different planes. Primary and secondary unbalanced forces of reciprocating parts-Balancing of in
line engines- Firing order- Balancing of ‘V’ and ‘W’ engines.

UNIT III   FREE VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS 12

Fundamentals of vibrations- Undamped free vibrations of single d.o.f systems–Derivation & solution of differential equation-Torsional Vibrations-single rotor- Equivalent stiffness of spring combinations-Bifilar, Trifilar suspensions-Compound pendulum-Types of damping-Damped free vibrations of single d.o.f-over, critical, under damped- Damping coefficient - Critical damping coefficient-Logarithmic decrement

UNIT IV   FORCED VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS 12

Forced vibrations with-Constant harmonic excitation-Rotating & Reciprocating unbalance-Excitation of the support-Energy dissipated by damping-Forced vibrations with coulomb, viscous damping-Vibration Isolation and Transmissibility- Vibration Absorbers

UNIT V   CRITICAL SPEEDS AND SHAFTS WITH ROTORS 12

Lateral vibration of beams - Whirling speed of shaft - Shafts with two & three rotors-Geared system. Dunkerly’s method for different types of beams & shaft with several loads.

TOTAL NO. OF PERIODS: 60

Text Books:

References:

BMT401 MANUFACTURING TECHNOLOGY 3 0 0 3

OBJECTIVE:
- To introduce the manufacturing technology for to production new product
- To acquaint the student with various manufacturing technology used in production engineering.
- To introduce the current trends in the production technology

Course Outcomes

CO01 - To learn different types of foundry technology
CO02 – To understand the different types of forming– processes
CO03 – To learn the material removal processes and machine (i.e. lathe)
CO04 – To learn the material removal processes and machine (i.e. milling)
CO05 - To learn the principles & applications of joining processes

CO/PO Mapping
S – Strong, M – Medium, W – Weak

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UNIT I  FOUNDRY TECHNOLOGY  
Pattern and Core making – Moulding sand – Melting furnaces Cupola and Induction furnaces – Special casting processes – Shell, Investment, Die casting – Defects in casting.

UNIT II  FORMING – PROCESSES  
Hot and Cold Working
Extrusion and Drawing: Extrusion Practice – Hot, Cold, Impact and Hydrostatic extrusion.

UNIT III  MATERIAL – REMOVAL PROCESSES  
Lathes and Lathe Operations, Drilling and Drilling Machines, Reaming and Reamers, Tapping and Taps – Tool nomenclature, cutting speed, feed, machining Time calculations.

UNIT IV  MATERIAL – REMOVAL PROCESSES  
Milling Machines and Operations, Planning and Shaping, Broaching, Gear Hobbing and Shaping.

UNIT V  PRINCIPLES & APPLICATIONS OF JOINING PROCESSES  

78
Principles and applications of Brazing and Soldering.

TOTAL NO. OF PERIODS: 45

Text Books:

References:

BEE404 POWER ELECTRONICS 3 1 0 3

OBJECTIVES:

- To get an overview of different types of power semi-conductor devices and their characteristics.
- To understand the operation, characteristics and performance parameters of controlled rectifiers.
- To study the operation, switching techniques and basic topologics of DC-DC converters.
- To learn the operation of different types of inverters like VSI, CSI, PWM Inverters, Series inverter and parallel inverter.
- To study the operation of AC voltage controller and cycloconverters.

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UNIT I  POWER SEMI CONDUCTOR DEVICES  9
Principle of operation – Characteristics of power diodes, SCR, TRIAC, GTO, Power BJT, Power MOSFET and IGBT – Thyristor protection circuits.

UNIT II.  PHASE CONTROLLED CONVERTERS  9
Single phase full converters, 3 phase half converter and 3 phase full converter – inverter operation – input power factor – effect of source inductance – Thyristor triggering circuits.

UNIT III.  DC TO DC CHOPPERS  9

UNIT IV  INVERTERS  9
Voltage source inverters – series, parallel and bridge inverters – PWM inverters – current source inverters.

UNIT V.  AC VOLTAGE CONTROLLERS AND CYCLOCONVERTERS  9
Single phase AC voltage controller – multistage sequence control – step up and step down cycloconverters – three phase to single phase and three phase cycloconverters.

TOTAL NO. OF PERIODS: 45

Text Books:

References:

BEI402       CONTROL SYSTEMS            3 1 0 4

OBJECTIVE:
    ❖ To introduce the concept of Control System for the industrial field
To acquaint the student with various technique used in control systems
To introduce the Various new technology in controlling the industrial product

Course Outcomes

CO01 - To learn the concept of System and their representation
CO02 – To understand the Concept of time response analysis
CO03 – To learn the Concept of frequency response analysis
CO04 – To learn the various methods for stability of the systems
CO05 - To learn the various types of compensation

CO/PO Mapping
S – Strong, M – Medium, W – Weak

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UNIT I SYSTEMS AND THEIR REPRESENTATION

UNIT II TIME RESPONSE

UNIT III FREQUENCY RESPONSE ANALYSIS AND DESIGN
Performance specifications – correlation to time domain specifications – Bode plots and polar plots – gain and phase margin – constant M and N circles and Nichols chart – all pass and non-minimum phase systems.

UNIT IV STABILITY OF CONTROL SYSTEMS
UNIT V  COMPENSATION DESIGN
Design concepts – realization of basis compensation – cascade compensation in time domain and frequency domain (simple MATLAB applications to analysis and compensators design problems.)

TUTORIALS
MATLAB applications: Partial Fraction expansion, Transformation of Mathematical models, Transient response analysis, Root locus, Bode diagrams, Nyquist plots with MATLAB. Simple MATLAB applications to analysis and compensator design problems.

TOTAL NO. OF PERIODS: 45

Text Books:

References:

Web Sites References:
1. www.mathworks.com
2. www.relisoft.com

BCE406  ENVIRONMENTAL STUDIES  3 0 0 3

OBJECTIVE:

❖ To introduce the multidisciplinary nature of environmental studies.
❖ To get the knowledge about ecosystems structure and function of an ecosystems .
❖ To know the knowledge about biodiversity and its conservation and environmental pollution.
❖ To get the knowledge about social issues and the public awareness.
❖ To get the knowledge about human population and the women and child welfare.

Course Outcomes
CO01 - To learn multidisciplinary nature of environmental studies.
CO02 – To understand the ecosystems structure and function of an ecosystems
CO03 – To learn biodiversity and environmental pollution
CO04 – To learn social issues and the public awareness
CO05 - To learn human population and the women and child welfare.
UNIT I  THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES
Definition, Scope and importance, Need for public awareness

NATURAL RESOURCES: RENEWABLE AND NON RENEWABLE RESOURCES:
Natural resources and associated problems.
   a) Forest resources: Use and over – exploitation, deforestation, case studies. Timber
      extraction, mining, dams and their effects on forests and tribal people.
   b) Water resources: Use and over- utilization of surface and ground water, floods, drought,
      conflicts over water, dams- benefits and problems.
   c) Mineral resources: Use and exploitation, environmental effects of extracting and using
      mineral resources, case studies.
   d) Flood resources: World food problems, changes caused by agriculture and overgrazing,
      effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case
      studies.
   e) Energy resources: Growing energy needs, renewable and nonrenewable energy sources,
      use of alternate energy sources, case studies.
   f) Land resources: Land as a resources, land degradation, man induced landsides, soil
      erosion and desertification.

   Role of an individual in conservation of natural resources, equitable use of resources for
   sustainable lifestyles.

UNIT II  ECOSYSTEMS
Concepts of an ecosystems 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, characteristics features, structure and function of the
following ecosystem: Forest ecosystem, grassland ecosystem, Desert ecosystem, Aquatic
ecosystems (ponds, streams, lakes, oceans, estuaries)
UNIT III  BIODIVERSITY AND ITS CONSERVATION

Introduction- Define, genetic, species and ecosystem diversity, biogeographically classification of India, Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega diversity nation, hot spots of biodiversity. Threats to biodiversity, habitat loss, poaching of wildlife, Conservation of biodiversity: In-situ conservation of biodiversity.

ENVIRONMENTAL POLLUTION


UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT


UNIT V  HUMAN POPULATION AND THE ENVIRONMENT


FIELD WORK

Visit to a local area to document environment assets – river forest/grassland/hill mountain, Visit to a local polluted site-rural/Industrial/Agricultural. Study of common Plants, insects, birds, Study of simple ecosystems-ponds, river, hill slopes, etc. (Field work Equal to 5 Lecture hours)

TOTAL NO. OF PERIODS: 45

BMT4L1 MANUFACTURING TECHNOLOGY LAB  0 0 4 2

OBJECTIVE:

- Study of various types of lathe operations
- To produce various shapes using machines.
- To produce the gear shape

Course Outcomes

CO01 – To practices on lathe machines and make different shapes.
CO02 – To practices on making holes using drilling machine
CO03 – To practices on surface finish using milling machine
CO04 – To practices on making key ways and dove tail machining

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CO/PO Mapping
S – Strong, M – Medium, W – Weak

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LIST OF EXPERIMENTS

UNIT I  LATHE PRACTICE
a. Plain Turning b. Taper Turning c. Thread Cutting
Estimation of machining time for the above turning processes.

UNIT II  DRILLING PRACTICE
a. Drilling b. Tapping c. Reaming

UNIT III  MILLING
a. Surface Milling b. Gear Cutting c. Contour Milling

UNIT IV  PLANNING AND SHAPING
a. Cutting Key Ways b. Dove tail machining.

TOTAL NO. OF PERIODS: 45

LIST OF EQUIPMENT (for a batch of 30 students)
1. Lathe - 15 Nos.
2. Drilling Machine - 1 Nos.

BMT4L2 MACHINE DYNAMICS LAB 0 0 4 2

OBJECTIVE:
- To learn about Governors /CAM
- To learn about Motorized Gyroscope
- To learn about Vibrating system Spring mass.

**Course Outcomes**
To Learn & Practice The Experiments Like Governors/Cam, Gyroscope, Vibrating System Mass.

**CO/PO Mapping**

S – Strong, M – Medium, W – Weak

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**LIST OF EXPERIMENTS**

1. Governors - Determination of sensitivity, effort, etc. for watt, porter, proell, Hartnell governors
2. Cam - Study of jump phenomenon and drawing profile of the cam.
3. Motorized Gyroscope - Verification of law’s - Determination of gyroscopic couple.
5. Balancing of reciprocating masses.
7. Determination of Moment of inertia by oscillation method for connecting rod and flywheel.
8. Vibrating system Spring mass - System - Determination of damping co-efficient of single degree of freedom system.
9. Determination of influence co-efficient for multi degree freedom suspension system.
11. Determination of tensional frequencies for compound pendulum and flywheel - system with lumped Moment of inertia

**TOTAL NO. OF PERIODS: 45**

**LIST OF EQUIPMENT** (for a batch of 30 students)

1. Cam analyzer. - 1 No
2. Motorised gyroscope. - 1 No.
3. Governor apparatus - watt, porter, proell and hartnell governors. - 1 No.
5. Dynamic balancing machine. - 1 No.
6. Static and dynamic balancing machine. - 1 No.
7. Vibration test facilities apparatus - 1 No.

**BEE4L2 POWER ELECTRONICS LABORATORY**

**OBJECTIVE:**

- To practice SCR, MOSFET, UJT and TRIAC
- To practice the SCR converters

**Course Outcomes**

To learn & practice the experiments

**CO/PO Mapping**

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<th>CO</th>
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**LIST OF EXPERIMENTS**

1. Study of SCR, MOSFET & IGBT characteristics
2. UJT, R, RC firing circuits for SCR
3. Voltage & current commutated chopper
4. SCR phase control circuit
5. TRIAC phase control circuit
6. Study of half controlled & fully controller converters
7. Study of three phase AC regulator
8. Speed control of DC shunt motor using three phase fully controlled converter.
9. SCR single-phase cyclo converter
10. SCR series and parallel inverters
11. IGBT Chopper
12. IGBT based PWM inverter (single phase)

TOTAL NO. OF PERIODS: 45

LIST OF EQUIPMENT (for a batch of 30 students)

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<thead>
<tr>
<th>S.No</th>
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<td>Study of SCR, MOSFET &amp; IGBT characteristics module IJT, R, RC firing circles for SCR module</td>
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<td>Voltage &amp; current commutated chopper module</td>
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<td>Study of half controlled &amp; fully controller converters module</td>
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<td>6</td>
<td>Study of three phase AC regulator module</td>
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<td>7</td>
<td>Speed control of DC shunt motor using three phase fully controlled converter module</td>
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<td>8</td>
<td>SCR single phase cyclo converter module</td>
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<td>9</td>
<td>SCR series and parallel inverters module</td>
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<td>IGBT chopper module</td>
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<td>IGBT based PWM inverter (single phase) module</td>
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<td>Ammeter (0-5A) MC, (0-2A) MC, (0-2A) MI, (0-5V) MI</td>
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<td>Transformer 1KVA, 1:1, 230V</td>
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During the Seminar session each student is expected to prepare and present a topic on engineering/technology for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as overhead projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

TOTAL NO. OF PERIODS: 18

BMT501 THERMODYNAMICS PRINCIPLES 3 1 0 4
AND APPLICATIONS

Objectives: The purpose of this course is to introduce the undergraduate students with the basic concepts about laws of thermodynamics, air standard cycles, air compressors, vapor power and vapor compression cycles along with conduction heat transfer and convection and radiation heat transfer.

❖ To make the student acquire sound knowledge of first law and second law of thermodynamics
❖ To acquaint the students with Air compressors and air standard cycles.
❖ To make the students acquire sound knowledge of vapour power and vapor compression cycles.
❖ Studies about various modes of heat transfer and the applications of conduction and convection

Course Outcomes:

The Course outcomes of Thermodynamics and Heat transfer subjects are:

CO01 - To learn the basics about first law and second law of thermodynamics. Students will be able to understand the second law limitation of thermodynamic efficiencies and will be able to sort out realistic and unrealistic thermodynamic system claims.

CO02 - To learn air standard cycles and air compressor working principles

CO03 - Students will be able to analyze a vapor power cycle given a set of operational parameters and constraints, determine cycle efficiency, its power output, and required heat input. Students will be able to make modifications to improve the overall cycle efficiency for the steam power cycle. Students will be able to analyze and optimize a vapor refrigeration system given the requirements and constraints of a refrigeration system

CO04 – To learn the conduction heat transfer

CO05 – To learn the convection and radiation heat transfer

CO/PO Mapping

S – Strong, M – Medium, W – Weak

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<tr>
<td>Internal Tests</td>
<td>Course and Survey</td>
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89
UNIT I  FIRST LAW OF THERMODYNAMICS  12
Thermodynamics – microscopic and macroscopic point of view – systems, properties, process, path, cycle. Units – pressure, temperature – Zeroth law. First law – application to closed and open systems, internal energy, specific heat capacities CV and CP – enthalpy

UNIT II  SECOND LAW OF THERMODYNAMICS  12

UNIT III  INTERNAL COMBUSTION ENGINES  12
Classification of IC engine - IC engine components and functions. Valve timing diagram and port timing diagram - Comparison of two stroke and four stroke engines, Comparison of petrol & diesel engine, Fuel supply systems, total fuel consumption, specific fuel consumption, mechanical efficiency, BHP, IHP, FP - Ignition Systems, Lubrication system, Cooling system, MPFI, DTSI, CRDI.

UNIT IV  REFRIGERATION AND AIR-CONDITIONING  12
Principles of refrigeration, refrigerator& heat pump cycle, refrigerants, refrigerant properties, refrigerant selection, vapour compression refrigeration cycle, vapour absorption cycle, dry bulb temperature, wet bulb temperature, relative humidity, comfort air-conditioning, Psychrometric chart, humidification, de-humidification, air coolers, cooling towers.

UNIT V  HEAT TRANSFER (Qualitative Treatment Only)  12

TOTAL NO. OF PERIODS: 60

TEXT BOOK:

REFERENCES:
OBJECTIVE:
 To introduce the architecture of 8085.
 To study about interfacing of 8085.
 To study about designing of input output devices

Course Outcomes
CO01 - To learn basics about 8085 block diagram.
CO02 – To understand the different types input output devices.
CO03 – To learn the interfacing devices.
CO04 – To learn matrix keyboard& digital transmission.
CO05 - To understand the applications of 8085.

CO/PO Mapping

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S – Strong, M – Medium, W – Weak

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UNIT I   INTRODUCTION
Organization of Micro Computers – Organization of 8085: Architecture, Internal Register
Organization and Pin Configuration – Instruction Set of 8085 – addressing modes - instruction
and machine cycles with states and timing diagram. Methods of 8085 programs and 8085
assembly language.

UNIT II   INTERFACING AND I/O DEVICES
Need for Interfacing – Memory Interfacing: address space partitioning – address map – Address
decoding – Designing decoder circuit for the given address map – Bus connection and Z – line
Control – Access Time Computations.
I/O Interfacing: Data transfer schemes – programmed Synchronous and asynchronous – Interrupt
driven Transfer – Multiple devices and multiple interrupt levels – enabling disabling and masking
of interrupts.
DMA transfer: Cycle stealing – Burst mode – Multiple DMA devices – DMA transfer in 8085
system – serial data transfer.

UNIT III  INTERFACING DEVICES  9
Programmable peripheral device – programmable interval timer (8253) – Programmable
communication interface (USART) – Programmable interrupt controller – Programmable DMA
Controller (8257) – Programmable Keyboard/ display controllers.

UNIT IV  DESIGN USING PERIPHERAL DEVICES  9
Interfacing A/D and D/A converters – Matrix Keyboard design using 8255 using 8085 programs.
Designing real time clock, detecting power failure, detecting presence of objects using 8253 –
Design of Keyboard and display interfacing using 8279 – Design of digital transmission with
modems and telephone lines using 8251 A.

UNIT V  MICROPROCESSOR APPLICATIONS  8
Temperature monitoring system – Automotive applications – Closed loop process control –
Stepper motor control.

TOTAL NO. OF PERIODS: 45

Text Books:

References:
1. Microprocessor Architecture. Programming and Applications with the 8085 Ramesh
2. “Microprocessors and Interfacing, Programming and Hardware” Douglas V.Hall. Tata

BMT503     INSTRUMENTATION & CONTROL  3 0 0 3

OBJECTIVE:
❖ To introduce the various instrumentation involved in the industry
❖ To acquaint the student with various instrumentation and control used in production engineering.
❖ To introduce the current trends in the various types of instrument.

Course Outcomes
CO01 - To learn general concept of measurement
CO02 – To understand the different types of Temperature Measurements
CO03 – To learn the different types of Pressure, Flow and Level Measurements
CO04 – To learn the different types of Displacement, Force and torque Measurements
CO05 - To learn the concept of pneumatic and electronic PID controller

CO/PO Mapping
S – Strong, M – Medium, W – Weak

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UNIT 1 GENERAL CONCEPTS OF MEASUREMENT 12

UNIT II TEMPERATURE MEASUREMENT 9

UNIT III PRESSURE, FLOW AND LEVEL MEASUREMENTS 9

Level Measurement: Float Level, surge type, Differential Pressure Type, Electrical Type-Resistance and Capacitance.

UNIT IV DISPLACEMENT, FORCE, TORQUE & VIBRATION MEASUREMENT 9

UNIT V PNEUMATIC AND ELECTRONIC PID CONTROLLERS 6
Pneumatic and Electronic PID Controllers – Automatic Speed Control of Drives- Pneumatic Two Step Controller – Machine Tool Control.

TOTAL NO. OF PERIODS: 45

Text Books:

References:

BMT502 CNC TECHNOLOGY 3 0 0 3

OBJECTIVE:
❖ To introduce the CNC technology for to production of products.
❖ To learn the student with various CNC technology used in production engineering.
❖ To introduce the industrial current trends in the production technology

Course Outcomes

CO01 - To introduce the fundamentals of CNC Technology.
CO02 – To understand the constructional features and retrofitting of CNC machines.
CO03 – To learn the types of controls system, various feedback devices and tooling
CO04 – To practice writing programs using G codes and M Codes
CO05 - To learn the economics and maintenance of CNC installation

CO/PO Mapping
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</table>
UNIT I  FUNDAMENTALS OF CNC MACHINES  9

UNIT II  CONSTRUCTIONAL FEATURES OF CNC MACHINES AND RETROFITTING  10

UNIT III  CONTROL SYSTEMS, FEED BACK DEVICES AND TOOLING  10

UNIT IV  CNC PART PROGRAMMING  9

UNIT V.  ECONOMICS AND MAINTENANCE  7
Factors influencing selection of CNC Machines – Cost of operation of CNC Machines – Practical aspects of introducing CNC machines in industries – Maintenance features of CNC Machines – Preventive Maintenance, Other maintenance requirements.

TOTAL NO. OF PERIODS: 45

Text Books :

References :
OBJECTIVE:
- To introduce concept of metrology and measurement
- To explain the various measurement systems
- To introduce the different types metrological equipments
- To introduce the using of metrological equipments

Course Outcomes
CO01 – To explain the concept of metrology and measurement and various terms used in the metrology.
CO02 – To understand the vernier caliper, micrometer and gauge block
CO03 – To explain the measurement by comparison
CO04 – To explain the optical metrology
CO05 - To explain the surface measurement

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UNIT I

UNIT II
Measurement with scales and scaled Instruments – steel rule – role of error – calipers – types and applications.
Vernier Instruments – Vernier Caliper, Depth gauge, Height gauge – height master – Three

UNIT III 9

UNIT IV 9
Optical Flats and Optical alignment – light waves as standards – measurement with optical flats, applications of optical flat measurement – principles of optical metrology – Alignment Telescope – Straightness measurement – Optical squares and squareness measurement – Sight level – Plumbness, optical polygons – Angles, Jig Transit – Planes, Theodolite Angles and planes. Reference planes-Flatness, Perpendicularity and modern reference planes. Angle measurement-Basic geometry function, sign bars and plates and mechanical angle measurements.

UNIT V 9

TOTAL NO. OF PERIODS: 45

Text Books:

References:

BEC5L2 MICROPROCESSOR LAB 0 0 4 2

OBJECTIVE:

❖ To learn about basic programming using 8085.
❖ To learn about ascending/descending order.
❖ To study about interfacing devices.

Course Outcomes

To understand 8085 basics and practice various programs in the laboratory.

CO/PO Mapping
S – Strong, M – Medium, W – Weak

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LIST OF EXPERIMENTS

I. PROGRAMMING 30

1. Addition of two 8-bit numbers, sum of 8-bits and 16 bits.
2. Decimal addition of two 8-bit numbers Sum: 16 bits.
3. 8-bit subtraction.
4. 8-bit decimal subtraction.
5. Additional of two 16-bit numbers, Sum: 16 bits or more.
7. To arrange a series of numbers in Ascending order
8. To arrange a series of numbers in Descending order
9. 8-bit Multiplication.
10. 8-bit Division.
11. Decimal to hexadecimal conversion and hexadecimal number to decimal number conversion.

II. INTERFACING 30

1. Analog to digital conversion
2. Digital to analog conversion
4. Temperature controller

TOTAL NO. OF PERIODS: 60

LIST OF EQUIPMENT

(for a batch of 30 students)

<table>
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<td>1</td>
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<td>DAC interface card</td>
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<tr>
<td>4</td>
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BMT5L1 INSTRUMENTATION & CONTROL LAB 0 0 4 2

OBJECTIVE:

❖ To introduce the concept of various instrument involved in industry.
❖ To acquaint the student with various practical concepts in instrumentation and control.
❖ To introduce the various advanced technology in controlling technique.

Course Outcomes
CO01 - To learn the practical experiments about pressure measurement and control
CO02 – To understand the practical experiments about force and torque measurement
CO03 – To learn the practical experiments about temperature measurement and control
CO04 – To learn the practical experiments about speed measurement and control
CO05 - To learn the practical experiments about application of data acquisition system for industrial purposes.

CO/PO Mapping

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LIST OF EXPERIMENTS

1. PRESSURE MEASUREMENT AND CONTROL
Pressure measuring devices – Pressure and vacuum gauge calibration.

2. TEMPERATURE MEASUREMENT AND CONTROL
Temperature measuring devices like platinum resistance thermometer, thermocouple, radiation pyrometer, etc.

3. SPEED MEASUREMENT AND CONTROL
Studying the devices and characters and measuring the speed using tachometer,
4. FORCE MEASUREMENT
   Force measuring devices, load cells and proving rings.
5. TORQUE MEASUREMENT
   Torque measurement – using torque measuring devices.
6. POWER MEASUREMENT
   Power measurement using prony brake.
7. STRAIN MEASUREMENT
   Study and use of strain – strain gauge indicator.
8. DISPLACEMENT MEASUREMENT
   LVDT-Displacement and velocity measurement using encoders.
9. SOUND MEASUREMENT
   Measurement of sound level using sound level meters.
10. Study on the application of data acquisition system for industrial purposes.

TOTAL NO. OF PERIODS: 45

BMT5L2                  CNC LAB                  0 0 4 2

OBJECTIVE:

- Study of CNC machines
- To teach part programming in the CNC machines
- To produce various shapes CNC machine.
- To produce the different shapes

Course Outcomes

- CO01 – To practices the Manual part programming
- CO02 – To practices on programming and simulation of machining
- CO03 – To practices on Linear and Circular interpolation
- CO04 – To practices on Pocket milling, slotting, peck drilling and other fixed canned cycles

CO/PO Mapping

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LIST OF EXPERIMENTS

1. Manual part programming using G and M codes for Turning, step turning, Taper turning, thread cutting and radius turning on cylindrical components.
2. Programming and Simulation of machining using the following features.
   (i) Linear and Circular interpolation
   (ii) Pocket milling, slotting, peck drilling and other fixed canned cycles.
3. Given a component drawing to write the manual part programming and execute on CNC Lathe and Milling Machine.

LIST OF EQUIPMENT (for a batch of 30 students)

1. CNC Lathe with Fanuc controller - 1 No.
2. CNC Milling Machine with Fanuc controller - 1 No.
3. Master CAM software - 10 Licenses

BMT5S1  TECHNICAL SEMINAR – II  0 0 3 1

During the Seminar session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

TOTAL NO. OF PERIODS: 30

BMT601  SENSORS & SIGNAL PROCESSING  3 0 0 3

101
OBJECTIVE:

- To introduce the various Sensors involved in the industry
- To introduce sensors input and output signals processing
- To introduce the current trends in the various types of sensors and its processing

Course Outcomes

CO01 - To learn general concept of sensors and its type
CO02 – To understand the different types of Electrical sensors
CO03 – To learn the different types of smart sensors
CO04 – To learn the various types of signal conditioning
CO05 - To understand the concept of data Acquisition

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<td>End Semester Examinations</td>
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UNIT I  INTRODUCTION AND MECHANICAL SENSORS 10
Sensors and transducers - Classification of sensors- Static and Dynamic characteristics of sensors
Temperature: Filled thermometer – Bimetallic thermometer – monometers.
Elastic transducers– bourdon gauge – bellows – diaphragm.
Vacuum: McLeod gauge, thermal conductivity gauge –Ionization gauge
Flow measurement: orifice, venture, nozzle, pilot tube, turbine flow meter, hot wire anemometer.

UNIT II  ELECTRICAL SENSORS 9

UNIT III  SMART SENSORS 9
Radiation Sensors - Smart Sensors - Film sensor, MEMS & Nano Sensors – applications - Automobile, Aerospace, Home appliances, Manufacturing, Medical diagnostics, Environmental monitoring.

UNIT IV SIGNAL CONDITIONING 9

UNIT V DATA ACQUISITION 8

TOTAL NO. OF PERIODS: 45

Text Books:

References:

BMT602 APPLIED HYDRAULICS AND PNEUMATICS 3 0 0 3

OBJECTIVE:

- To introduce the fluid power system and its fundamentals
- To learn the student for various hydraulic and pneumatic components
- To design the various circuits using hydraulic, pneumatic and electro hydraulic components

Course Outcomes

CO01 - To introduce fundamentals of fluid power systems
CO02 - To learn various types and function of hydraulic components.
CO03 – To design hydraulic circuits for simple practical applications
CO04 – To learn various types and function of pneumatic components
CO05 - To design pneumatic circuits for simple practical applications

CO/PO Mapping

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103
UNIT I FLUID POWER SYSTEMS AND FUNDAMENTALS 9

UNIT II HYDRAULIC SYSTEM AND COMPONENTS 9

UNIT III DESIGN OF HYDRAULIC CIRCUITS 9
Accumulators and Intensifiers: Types of accumulators – Accumulators circuits, sizing of accumulators, intensifier – Applications of Intensifier – Intensifier circuit.

UNIT IV PNEUMATIC SYSTEMS & COMPONENTS 9
Pneumatic Components: Properties of air – Compressors – Filter, Regulator, and Lubricator Unit – Air control valves, Quick exhaust valves, pneumatic actuators.
Fluid Power Circuit Design, Speed control circuits, synchronizing circuit, Pneumo hydraulic circuit, Sequential circuit design for simple applications using cascade method.

UNIT V DESIGN OF PNEUMATIC CIRCUITS 9
Servo systems – Hydro Mechanical servo systems, Electro hydraulic servo systems and proportional valves.
Fluidics – Introduction to fluidic devices, simple circuits, Introduction to Electro Hydraulic
Pneumatic logic circuits, ladder diagrams, PLC applications in fluid power control. Fluid power circuits; failure and trouble shooting.

TOTAL NO. OF PERIODS:45

Text Books :

References :

BEC611 MICROCONTROLLER AND PLC 3 1 0 4

OBJECTIVE:

- To introduce the Architecture of 8051 and addressing modes.
- To get the knowledge about 8051 micro controller design and testing design.
- To know the knowledge about micro controller applications.
- To get the knowledge about programmable logic controllers and instruction set of PLC.
- To learn the knowledge about the applications of the PLC.

Course Outcomes

CO01 - To learn the Architecture of 8051 microcontroller.
CO02 – To understand the 8051 micro controller design and testing design.
CO03 – To learn the 8051 micro controller applications.
CO04 – To learn the programmable logic controllers
CO05 - To learn the applications of the PLC.

CO/PO Mapping

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</table>
UNIT I  INTRODUCTION TO MICROCONTROLLER  

UNIT II  8051 MICROCONTROLLER DESIGN  

UNIT III  INTERFACING AND APPLICATIONS  
Stepper motor control-Keyboard interfacing-Alpha-Numeric display interfacing Devices –Analog to digital converter interfacing-Digital to analog converter interfacing- Interfacing of Electronic weighing bridge.

UNIT IV  INTRODUCTION TO PLC  
Programmable Logic Controllers: Introduction – Parts of PLC – Principles of operation – PLC sizes – PLC hardware components — PLC programming Simple instructions – Connecting PLC to computer interlocks and alarms -Latching relays PLC ladder diagram, Converting simple relay ladder diagram in to PLC relay ladder diagram.

UNIT V  APPLICATIONS OF PLC  
Timer instructions ON DELAY, OFF DELAY and RETENTIVE Timers, UP COUNTER, DOWN COUNTER and UP DOWN COUNTERS, control instructions – Data manipulating instructions, match instructions; Applications of PLC –case study of Tank level control system - Automatic lubrication of supplier Conveyor belt - Automatic control of warehouse door.

TOTAL NO. OF PERIODS: 60

Text Books:

References:
2. Embedded Controller Handbook, Intel Corporation, USA.

BMT603  DESIGN OF MECHATRONICS SYSTEMS  3 0 0 3

OBJECTIVE:
- To introduce the various Mechatronics system and its design
- To acquaint the student with various design approach in Mechatronics system design.
- To introduce the current trends in the Mechatronics system design
Course Outcomes

**CO01** - To learn various types of Design processes  
**CO02** – To understand the concept of Real time interfacing  
**CO03** – To learn the various case studies on Data Acquisition and control  
**CO04** – To learn the various case studies on Mechatronics Products  
**CO05** - To learn the concept of advance application in Mechatronics

CO/PO Mapping

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UNIT I INTRODUCTION


UNIT II REAL TIME INTERFACING


UNIT III CASE STUDIES ON DATA ACQUISITION AND CONTROL

Case studies on Data Acquisition and control: Introduction – pH control system – De-Icing Temperature Control system – Skip control of a CD Player – Auto focus Camera, exposure control.

UNIT IV CASE STUDIES ON DESIGN OF MECHATRONIC PRODUCTS 9
Introduction–Fuzzy based Washing machine – Autofocus Camera, exposure control– Motion control using D.C.Motor & Solenoids – Engine management systems. – Controlling temperature of a hot/cold reservoir using PID- Control of pick and place robot – Part identification and tracking using RFID – Online surface measurement using image processing

UNIT V ADVANCED APPLICATIONS IN MECHATRONICS DESIGN 8
Introduction–Sensors for condition Monitoring – Mechatronic Control in Automated Manufacturing – Artificial intelligence in Mechatronics – Fuzzy Logic Applications in Mechatronics – Microsensors in Mechatronics

TOTAL NO. OF PERIODS: 45

Text Book :

References :

BME605 COMPUTER INTEGRATED MANUFACTURING 3 0 0 3

OBJECTIVE:

- To introduce the CAD and CAM
- To explain the computer integrated manufacturing
- To explain the various component design using computer
- To explain the various production management system

Course Outcomes

CO01 – To introduce the CAD and its element
CO02 – To explain the elements of cad systems and design using computers
CO03 – To explain the various component design using computer
CO04 – To explain the computer aided manufacturing
CO05 - To explain the computer integrated manufacturing

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UNIT I INTRODUCTION TO CAD AND ITS ELEMENTS 9

UNIT II ELEMENTS OF CAD SYSTEMS AND DESIGN USING COMPUTERS 9
Elements of CAD Systems, Introduction to Graphic Hardware, Software, Details of 2D Software Packages-Layering, Drawing Primitives, Display Techniques, Editing, utilities, Scaling, Dimensioning, 3D Visualization, Geometric Modeling-Wireframe and Solid models.

UNIT III DESIGN USING COMPUTERS 9

UNIT IV COMPUTER AIDED MANUFACTURING 9

UNIT V COMPUTER INTEGRATED MANUFACTURING 9
Programming Interrupt, Real Time Clock Input.

TOTAL NO. OF PERIODS: 45

Text Book:

References:

BMT6L1 SENSORS AND SIGNAL PROCESSING LAB 0 0 4 2

OBJECTIVE:
- To introduce the concept of signal processing and various types of sensor
- To acquaint the student with various practical concepts in sensors and signal processing
- To introduce the various advanced technology in smart sensor

Course Outcomes

- **CO01** - To learn the concept wave shaping circuit and A/D converter
- **CO02** – To understand the practical experiments about speed sensor and proximity sensor
- **CO03** – To learn the practical experiments about V/F and F/V converter
- **CO04** – To learn the practical experiments about temperature sensors
- **CO05** - To learn the practical experiments about displacement sensors

CO/PO Mapping

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LIST OF EXPERIMENTS

1. Wave Shaping circuit
2. Analog to Digital Converters
3. Digital Comparator
4. Speed measurement using Inductive pickup / Proximity sensor
5. Voltage to frequency converter
6. Frequency to Voltage Converter
7. Measurement of temperature using thermocouple, thermistor and RTD
8. Measurement of displacement using LVDT & Capacitive transducer
9. Position and velocity measurement using encoders
10. Position measurement using linear scales
11. Absolute encoders

TOTAL NO. OF PERIODS: 45

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

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<th>S.No</th>
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<td>2</td>
<td>Function Generator</td>
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<td>3</td>
<td>Regulated power supply</td>
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<td>Displacement Measurement Trainer using LVDT</td>
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<td>Capacitive pickup trainer module (dielectric)</td>
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<td>Position and Velocity measurement using encoder kit</td>
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<td>7</td>
<td>Position measurement using linear scales kit</td>
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<td>8</td>
<td>Speed Measurement uses inductive pickup /Proximity sensor kit</td>
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<td>Speed measurement and closed loop control of DC Motor using photo electric pickup kit</td>
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<td>PC based data acquisition unit (optional)</td>
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BEC6L6 MICROCONTROLLER & PLC LAB 0 0 4 2

OBJECTIVE:

- To introduce the Architecture of 8051.
- To get the knowledge about 8051 micro controller Programming Exercises.
- To know the knowledge about stepper motor and DC motor interfaces.
- To get the knowledge about programmable logic controllers and interrupt structure of 8051.
- To learn the knowledge about the Sequential operation pneumatic cylinders.

Course Outcomes
CO01 - To learn the Architecture of 8051 microcontroller.
CO02 – To understand the 8051 micro controller Programming Exercises.
CO03 – To learn the 8051 micro controller applications.
CO04 – To learn the Architecture of the programmable logic controllers.
CO05 - To learn the Sequential operation pneumatic cylinders.

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LIST OF EXPERIMENTS

1. Study of Microcontroller Kits.
2. 8051 / 8031 Programming Exercises.
5. Study of interrupt structure of 8051.
6. Interfacing high power devices to microcomputer port lines, LED relays and LCD displays.
7. Linear actuation of hydraulic cylinder with counter and speed control.
8. Hydraulic rotation with timer and speed control.
9. Sequential operation of pneumatic cylinders.
10. Traffic light controller.
11. Speed control of DC motor using PLC.
12. Testing of Relays using PLC.

TOTAL NO. OF PERIODS: 45
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

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<td>4</td>
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<td>5</td>
<td>8051 MicroController Kit</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>stepper Motor</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>stepper motor interfacing board</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>PLC trainer kit and related software</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Hydraulic cylinder</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Pneumatic cylinder</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>LED/LCD interface units</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>SCR/Triac/Power MOSFET interface unit</td>
<td>1</td>
</tr>
</tbody>
</table>

BMT6L2       HYDRAULICS & PNEUMATICS LAB       0 0 4 2

OBJECTIVE:
- 1. To introduce design and testing hydraulic and pneumatic circuits
- 2. To learn the various control valves like flow, pressure, direction
- 3. To practice the simulation using given software

COURSE OUTCOMES

- CO01 - To design and test the hydraulic circuits using various valves
- CO02 - To design and test the pneumatics circuits using various valves
- CO03 – To model and analysis of fluid power system using MATLAB/LABVIEW
- CO04 – To simulate basic electric, hydraulic and pneumatic circuits

CO/PO Mapping

<table>
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<tr>
<th>COs</th>
<th>Programme Outcomes (POs)</th>
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<tbody>
<tr>
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<td>CO1</td>
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<td>CO2</td>
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<td>CO3</td>
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<tr>
<td>CO4</td>
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Course Assessment Methods:

<table>
<thead>
<tr>
<th>Direct</th>
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<tbody>
<tr>
<td>Observation Book</td>
<td>Student Exit Survey</td>
</tr>
<tr>
<td>Record Book</td>
<td>Faculty Survey</td>
</tr>
<tr>
<td>Model exam</td>
<td>Industry</td>
</tr>
</tbody>
</table>
LIST OF EXPERIMENTS

1. **Design and testing of hydraulic circuits such as**
   i) Pressure control
   ii) Flow control
   iii) Direction control
   iv) Design of circuit with programmed logic sequence, using an optional PLC in hydraulic Electro hydraulic Trainer.

2. **Design and testing of pneumatic circuits such as**
   i) Pressure control
   ii) Flow control
   iii) Direction control
   iv) Circuits with logic controls
   v) Circuits with timers
   vi) Circuits with multiple cylinder sequences in Pneumatic Electro pneumatic Trainer.

3. Modeling and analysis of basic electrical, hydraulic, and pneumatic systems using MATLAB/LABVIEW software.

4. Simulation of basic hydraulic, pneumatic and electrical circuits using Automation studio software.

**TOTAL NO. OF PERIODS: 45**

LIST OF EQUIPMENT (for a Batch of 30 students)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Equipments</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Hydraulic Equipments</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Pressure relief valve</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Pressure reducing valves</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Flow control valves</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Pressure switch</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Limit switches</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Linear actuator</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Rotary actuator</td>
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</tr>
<tr>
<td>8</td>
<td>Double solenoid actuated DCV</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Single solenoid actuated DCV</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Hydraulic power pack with 2 pumps &amp; 2 pressure relief valve</td>
<td>1</td>
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<td>11</td>
<td>PLC</td>
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</table>

**Pneumatics Equipment**

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<tr>
<th>S.No</th>
<th>Equipments</th>
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<tbody>
<tr>
<td>1</td>
<td>Pneumatic trainer kit with FRL Unit, Single acting cylinder, push buttons</td>
<td>1</td>
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<tr>
<td>2</td>
<td>Pneumatic trainer kit with FRL unit, Double acting cylinder, manually actuated DCV</td>
<td>1</td>
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<tr>
<td>3</td>
<td>Pneumatic training kit with FRL unit, Double acting cylinder, pilot actuated DCV</td>
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<tr>
<td>4</td>
<td>Pneumatic trainer kit with FRL unit, Double acting</td>
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TOTAL NO. OF PERIODS: 45
During the Seminar session each student is expected to prepare and present a topic on engineering/technology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also. Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

TOTAL NO. OF PERIODS: 15

OBJECTIVE:

- To introduce the concept of Simulation and Modeling
- To acquaint the student with various technique used in simulation of Mechatronics system
- To introduce the current trends in Simulation and Modeling

Course Outcomes

CO01 - To learn the concept of system and simulation
CO02 – To understand the various methods of generating and testing of random number
CO03 – To learn the various methods of random Variate generation
CO04 – To learn the concept about analysis of simulation data
CO05 - To learn the various software for simulation and modeling

CO/PO Mapping

S – Strong, M – Medium, W – Weak

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Course Assessment Methods:

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115
UNIT I
System and System Environment: Component of a System – Continuous and discrete systems – Types of model; Steps in Simulation study; Simulation of an event occurrence using random number table – Single server queue – two server queue – inventory system.

UNIT II

UNIT III
Random – Variate Generation: Inverse transform technique for Exponential, Uniform, triangular, weibull, empirical, uniform and discrete distribution, Acceptance rejection method for Poisson and gamma distribution; Direct Transformation for normal distribution.

UNIT IV
Analysis of simulated Data – Data collection, identifying the distribution, Parameter estimation, goodness of fit tests, verification and validation of simulation models.

UNIT V
Comparison and selection of GPSS, SIMSCRIPT, SLAM; Arena simulation languages: Development of simulation models using Arena simulation package for queuing system, Production system, inventory system, maintenance system.

TOTAL NO .OF PERIODS: 45

Text Book:

References:

Web References :
1. www.arenasimulation.com
2. www.gpss.co.uk
3. www.caciasl.com
4. Other useful sites can be found in the text book recommended for this course.
OBJECTIVE:

- To introduce the automation and robotics
- To explain the different types of robots and its components
- To introduce the machine vision
- To explain the various image processing technique

Course Outcomes

CO01 – To introduce the automation, robotics and its components  
CO02 – To explain the inverse kinematics and reverse kinematics  
CO03 – To explain the various end effectors and sensors used in robot  
CO04 – To explain the machine vision technique  
CO05 - To explain the image processing technique and application of MV

CO/PO Mapping

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S – Strong, M – Medium, W – Weak

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UNIT I


**Drives and control systems:** Hydraulic systems, power supply – servo valve – sump – hydraulic motor – DC servo motors – stepper motors – operation.

**Mechanical Components of Robots:** Power transmission systems: Gear transmission. Belt drives, cables, Roller Chains, Link – Road Systems, Rotary to linear motion conversion, Rack and pinion drives, ball bearing screws, speed reducers, Harmonic drives.

UNIT II

Kinematics of Robot: Introduction, Matrix Representation, Homogeneous transformation, forward and inverse Kinematics, Inverse Kinematics Programming, Degeneracy, dexterity, velocity and
static forces, velocity transformation force control systems, Basics of Trajectory planning.

UNIT III

UNIT IV

UNIT V

TOTAL NO .OF PERIODS: 45

Text Book:

References:

BAM705 AUTOMOTIVE ELECTRONICS 3 0 0 3

OBJECTIVE:
- To introduce the automotive electronics for various features.
- To learn the student with various sensors, actuators, and engine control.
- To introduce chassis and safety systems.

Course Outcomes

CO01 – To introduce the automotive electronics with Euro rules and charging system
CO02 – To study about the engine basics, ignition and injection systems.
CO03 – To know the characteristics of various sensors and actuators.
CO04 – To understand the concept of engine management system and CAN standard.
CO05 - To learn the safety system in automotive electronics.
CO/PO Mapping

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<td>Quiz</td>
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<td>Online test</td>
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</table>

UNIT I   INTRODUCTION

UNIT II  BASICS OF ENGINES

UNIT III  SENSOR AND ACTUATORS

UNIT IV  ENGINE CONTROL SYSTEMS

UNIT V  CHASSIS AND SAFETY SYSTEMS
Text Book:

References:

BMA701 OPERATIONS RESEARCH FOR ENGINEERS 3 1 0 4

Course Objectives

- To impart knowledge about various tools in Operations Research to apply and solve real life problems in Engineering.

Course Outcomes:

- CO1: Formulate a raw problem into LPP or TP or AP and solve them by using relevant method
- CO2: Solve network problems by applying PERT or CPM concept.
- CO3: Find optimum stock level in an inventory system with many products.
- CO4: Solve queuing problems with single and multiple channels.
- CO5: Make decisions for replacement of equipments under stochastic situations.

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<tr>
<th>COs</th>
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<td>CO3</td>
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<td>CO4</td>
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</tr>
<tr>
<td>CO5</td>
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</table>

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak
Course Assessment methods:

<table>
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</tr>
<tr>
<td>6 End Semester Examinations</td>
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</tbody>
</table>

UNIT – I LINEAR PROGRAMMING 12

UNIT – II RESOURCE SCHEDULING AND NETWORKS 12

UNIT – III INVENTORY AND REPLACEMENT MODELS 12
Inventory models- Types of Inventory and variables in the Inventory problem – deterministic models- Replacement models – Replacement of items that deteriorate with time – equipment that fails completely and their analysis – factors for evaluation of proposals of capital expenditures and comparison and alternatives – present value average investment – rate of return pay off period – individual and group replacement policy.

UNIT – IV QUEUEING MODELS 12

UNIT – V DECISION MODELS 12
Game theory –Saddle point-Maximin-Minimax principle-Two person zero sum games(mixed Strategies)-Graphical method for 2×n or m×2 games-Dominance Property-Oddment method.

Total No. of Periods : 60

TEXT BOOKS:

References:
LIST OF EXPERIMENTS

1. Solid modeling using Ideas / Pro Engineering / CATIA software of gives components / products such as (at least 3 components)
2. Analysis of engineering problems using FEA package (at least 3 problems)
3. Exercise in surface machining – Multi Axis Machining and software Development for manufacturing. (at least 3 jobs)
4. Computer assisted part programming using Master Computer Software for various internal and external curved surface machining.

TOTAL NO. OF PERIODS: 60

LIST OF EQUIPMENT (for a batch of 30 students)
1. Any CAD software – 10 licenses
2. Any FEA software – 5 licenses
3. Any CAM software – 10 licenses

OBJECTIVE:

- To study of different types of robots based on configuration and application
- To practice on verification of transformation
- To practice on accuracy, repeatability and resolution.
- To practice robotics programming exercise

Course Outcomes

CO01 – To practices different types of robots based on configuration and application
CO02 – To study of different type of links and joints used in robots
CO03 – Verification of transformation (Position and orientation) with respect to gripper and world coordinate system
CO04 – To practices on programming exercises

CO/PO Mapping

<table>
<thead>
<tr>
<th>COs</th>
<th>CO1</th>
<th>CO2</th>
<th>CO3</th>
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S – Strong, M – Medium, W – Weak

Course Assessment Methods:

<table>
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</table>
LIST OF EXPERIMENTS

1. Study of different types of robots based on configuration and application.
2. Study of different type of links and joints used in robots.
3. Study of components of robots with drive system and end effectors.
4. Determination of maximum and minimum position of links.
5. Verification of transformation (Position and orientation) with respect to gripper and world coordinate system.
7. Robot programming exercises
   (Point-to-point and continuous path programming)

TOTAL NO .OF PERIODS: 45

LIST OF EQUIPMENT (for a batch of 30 students)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Equipment/components</th>
<th>No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Any one type of robot configuration with at least five degree</td>
<td>1 set</td>
</tr>
<tr>
<td></td>
<td>of freedom.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Robot programming software inclusive of computer system.</td>
<td>10 licenses</td>
</tr>
<tr>
<td>3</td>
<td>Models of different types of end effectors drive systems Links</td>
<td>5 each</td>
</tr>
<tr>
<td></td>
<td>and Joints.</td>
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<tr>
<td>4</td>
<td>Models of different configuration robots</td>
<td>5 each</td>
</tr>
</tbody>
</table>

BMT7P1 MECHATRONICS SYSTEM DESIGN & FABRICATION PROJECT  0 0 4 2
(Mini-project)

The objective of this project is to provide opportunity for the students to implement their skills acquired in the previous semesters to practical problems.

The students in convenient groups of not more than 4 members have to take one small item for design and fabrication. Every project work shall have a guide who is the member of the faculty of the institution.

The item chosen may be control elements (like control applications) automotive appliances, agricultural implements, simple electronic applications, hydraulic/pneumatic devices etc.
The students are required to design and fabricate the chosen item in the college and demonstrate its working apart from submitting the project report. The report should contain assembly drawing, parts drawings, process charts related to fabrication.

**List of example Mechatronics systems are given below:**

1. Cantilever beam force measurement system.
2. Controlling temperature of a hot/cold reservoir.
3. Pick and place robot.
5. Car engine management system.
7. Solenoid force displacement calibration system.

**TOTAL NO .OF PERIODS: 90**

**BMT7L4**

**COMPREHENSION**

0 0 3 1

In comprehension, the knowledge acquired by the students in the earlier semesters, is tested. The student is prepared to face competitive examinations. There will be tests involving objective type and short answer type questions.

**TOTAL NO .OF PERIODS: 45**

**BMT7V1**

Inplant Training (End of 6th –Sem 15 days) 0 0 0 1

**BMT8P1**

**PROJECT WORK** 0 0 18 6

The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by guide and also to present in periodical seminars on the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines. The continuous assessment shall be
made as prescribed in the regulations.

TOTAL NO. OF PERIODS: 263

ELECTIVES

BMT002 INTEGRATED CIRCUITS  3 0 0 3

OBJECTIVE:

- To introduce the concept of Integrated Circuits
- To acquaint the student with various concepts used in integrated circuits
- To introduce the various new technology in Integrated Circuits

Course Outcomes

CO01 - To learn the characteristics of op-amp & its fundamentals
CO02 – To understand the various application of op-amp
CO03 – To learn the various types of digital to analog and analog to digital converters
CO04 – To learn the concept of Special IC’s and Voltage regulator.
CO05 - To learn the concept of phase logged loop and function generator

CO/PO Mapping

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</table>

UNIT I CHARACTERISTICS OF OPAMP & ITS FUNDAMENTALS 9
Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and current:
voltage series feedback and shunt feedback amplifiers, differential amplifier; frequency response of OP-AMP; Basic applications of opamp - summer, differentiator and integrator, V/I & I/V converter.

UNIT II APPLICATIONS OF OPAMP
Sign Changer, Scale Changer, Phase Shift Circuits, Logarithmic amplifier, Precision rectifier, Instrumentation amplifier, Comparators, multivibrators, Schmitt trigger, waveform generators, clippers, clampsers, peak detector, S/H circuit, First and Second order active filters, Low-pass, high-pass and band-pass Butterworth filters

UNIT III ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

UNIT IV SPECIAL ICs & VOLTAGE REGULATORS
555 Timer circuit - Functional block, characteristics & applications; 566-voltage controlled oscillator circuit, OP-Amp Voltage regulator-Series, Shunt and switching regulator.

UNIT V ANALOG MULTIPLIER AND PLL
Analog Multiplier using Emitter Coupled Transistor Pair – Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

TOTAL NO. OF PERIODS: 45

TEXT BOOKS

REFERENCES

BCS001 C and Object Oriented Programming 3 0 0 3

OBJECTIVE:
To introduce the concept of various programming language
To acquaint the student with various concepts used in C and object oriented programming
To introduce the various new technology in programming software

Course Outcomes

CO01 - To learn the concept about C programming language
CO02 – To understand the concept about array and structures in C
CO03 – To learn the concept about object oriented programming
CO04 – To learn the concept about encapsulation
CO05 - To learn the concept about polymorphism

CO/PO Mapping

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UNIT I INTRODUCTION TO C
Overview of C – Constants – Variables – Keywords - Data types - Operators and Expressions - Managing Input and Output statements-Decision making-Branching and Looping statements.

UNIT II ARRAYS AND STRUCTURES
Arrays - Handling of Character Strings - Pointers – Structures-Union -Functions – Recursion-Call by value and Call by reference.

UNIT III FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING

UNIT IV IMPLEMENTING ADTS AND ENCAPSULATION
Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and
Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics.

UNIT V POLYMORPHISM

TOTAL NO. OF PERIODS: 45

Text books:

References:

BEC001 NEURAL NETWORKS AND FUZZY LOGIC SYSTEMS 3 0 0 3

OBJECTIVE:

- To introduce the neural network.
- To study about associative memories.
- To study about fuzzy logic system.

Course Outcomes

CO01 - To learn basics of neural networks.
CO02 – To learn about feed forward neural network.
CO03 – To learn about associative memories
CO04 – To learn about classical and fuzzy sets.
CO05 - To learn about application of neural networks and fuzzy logic.

CO/PO Mapping

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UNIT I INTRODUCTION TO NEURAL NETWORKS

UNIT II FEED FORWARD NEURAL NETWORKS:

UNIT III ASSOCIATIVE MEMORIES

UNIT IV CLASSICAL & FUZZY SETS
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzy Logic System Components. Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT V APPLICATIONS

TOTAL NO. OF PERIODS: 45

Text Book:
BMT001 EMBEDDED SYSTEM AND DESIGN 3 0 0 3

OBJECTIVE:

- To study embedded hardware
- To study about embedded microcomputer systems
- To study about the real time operating system

Course Outcomes

CO01 - To learn review of embedded hardware
CO02 – To learn about microchip pic micro controller
CO03 – To learn embedded microcomputer systems
CO04 – To learn about software development
CO05 - To understand the real time operating systems

CO/PO Mapping

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UNIT I REVIEW OF EMBEDDED HARDWARE 9
UNIT II MICROCHIP PIC MICRO CONTROLLER


UNIT III EMBEDDED MICROCOMPUTER SYSTEMS


UNIT IV SOFTWARE DEVELOPMENT


UNIT V REAL TIME OPERATING SYSTEMS

Task and Task States, Tasks and Data, Semaphores and Shared Data Operating System services – Message Queues – Timer function – Events – Memory Management, Interrupt Routines in an RTOS environment, Basic design using RTOS.

TOTAL NO .OF PERIODS: 45

Text Books :

References :

BET801 MEDICAL MECHATRONICS 3 0 0 3

OBJECTIVE:
 To study about transducers.
 To study about medical support devices.
 To study about diagnostic instruments.

Course Outcomes

CO01 - To learn basics about electrodes.
CO02 – To learn about transducers in medical mechatronics.
CO03 – To learn about amplifiers & recorders.
CO04 – To learn about medical support devices.
CO05 - To understand the biomedical diagnostic instrument.

CO/PO Mapping

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UNIT 1  INTRODUCTION          9
Cell structure – electrode – electrolyte interface, electrode potential, resting and action potential –
electrodes for their measurement, ECG, EEG, EMG – machine description – methods of
measurement – three equipment failures and trouble shooting.

UNIT II  TRANSDUCERS FOR BIO-MEDICAL INSTRUMENTATION  9
Basic transducer principles Types – source of bioelectric potentials – resistive, inductive,
capacitive, fiber-optic, photoelectric and chemical transducers – their description and feature
applicable for biomedical instrumentation – Bio & Nano sensors & application

UNIT III  SIGNAL CONDITIONING, RECORDING AND DISPLAY  9
Input isolation, DC amplifier, power amplifier, and differential amplifier – feedback, op-Amp-
electrometer amplifier, carrier Amplifier – instrument power supply. Oscillagographic –
galvanometric - X-Y, magnetic recorder, storage oscilloscopes – electron microscope – PMMC
writing systems – Telemetry principles – Bio telemetry.

UNIV IV BIO-MEDICAL DIAGNOSTIC INSTRUMENTATION


TOTAL NO .OF PERIODS: 45

Text Books :

References :

BMT005 MEMS AND NANOTECHNOLOGY 3 0 0 3

OBJECTIVE:
- To introduce the MEMS and nano technology for micro fabrication.
- To learn manufacturing concepts of micro sensors and actuators
- To introduce the nano level manufacturing

Course Outcomes

CO01 - To introduce various micro sensors and emergence of micro machines.
CO02 – To study about various materials for micro and nano fabrication
CO03 – To know various micro fabrication methods.
CO04 – To understand the concept of nano scale and technology
CO05 - To learn nano scale manufacturing

CO/PO Mapping

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UNIT I

Introduction: Historical background development of microelectronics, evolution of micro sensors, MEMS, emergence of micro machines.

Micro sensors: Introduction, thermal sensors, mechanical sensors, flow sensors and Introduction to SAW DEVICES

UNIT II

MEMS materials and processing: Overview, metals, semiconductors, ceramic, polymeric and composite materials.


UNIT III

Micro System Fabrication Processes: Photolithography, Chemical Vapor Deposition, Etching, Bulk and Surface Micro Manufacturing.

NANO-TECHNOLOGY

UNIT IV


UNIT V

Nanoscale Manufacturing: Nanomanipulation, Nanolithography - An introduction to tribology and its industrial applications - Nanoscale Materials and Structure, Nanocomposites, Safety issues with nanoscale powders - Applications, Applications in energy, informatics, medicine, etc.

TOTAL NO OF PERIODS: 45

Text Books:

References:

BMT003 ARTIFICIAL INTELLIGENCE 3 0 0 3

OBJECTIVE:
- To introduce the artificial intelligence
- To study of knowledge representation
- To study about the structural representation

Course Outcomes
- CO01 - To learn pattern recognition
- CO02 – To learn about game playing
- CO03 – To learn knowledge representation
- CO04 – To learn about knowledge representation using other logic
- CO05 - To learn structural representation of knowledge

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UNIT I  INTRODUCTION  

UNIT II  GAME PLAYING  

UNIT III  KNOWLEDGE REPRESENTATION  
Use of Predicate logic – Introduction to representation – representing simple facts in logic augmenting the representation – resolution – Conversion to clause from – The basis of resolution Unification of algorithm – Question answering – Natural Deduction.

UNIT IV  KNOWLEDGE REPRESENTATION USING OTHER LOGICS  

UNIT V  STRUCTURAL REPRESENTATIONS OF KNOWLEDGE  

TOTAL NO .OF PERIODS: 45

Text Books :

References :

BMT004 VIRTUAL INSTRUMENTATION  3 0 0 3

OBJECTIVE:
To introduce the Virtual Instrument
To study of LabVIEW
To study about image processing

Course Outcomes

CO01 - To introduce the virtual instrumentation
CO02 – To learn about LabVIEW
CO03 – To learn array operation
CO04 – To learn basic DAQ hardware and software
CO05 - To learn image acquisition

CO/PO Mapping

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UNIT I
Historical perspective and traditional bench-top instruments - General functional description of a digital instrument- Block diagram of a Virtual Instrument – Physical quantities and analog interfaces- Hardware and Software – User Interfaces –Advantages of Virtual Instruments over conventional instruments – Architecture of a Virtual Instruments and its relation to the operating system.

UNIT II
UNIT III
FOR Loops, WHILE loops, Shift Registers, CASE structure, formula nodes-Sequence structures-Arrays and Clusters- Array operations – Bundle, Unbundle – Bundle/Unbundle by name, graphs and charts – string and file I/O – High level and Low level file I/Os – attribute nodes local and global variables.

UNIT IV
Basics of DAQ Hardware and Software – Concepts of Data Acquisition and terminology – Installing Hardware, Installing drivers -Configuring the Hardware – addressing the hardware in LabVIEW- Digital and Analog I/O function – Buffered I/O – Real time Data Acquisition.

UNIT V
Simple programs in VI- Advanced concepts in LabVIEW- TCP/IP VI’s, Synchronization – other elements of Virtual Instrumentation – Bus extensions – PXI - Computer based instruments - Image acquisition –Motion Control.

TOTAL NO. OF PERIODS: 45

Text Books :

References :

BMT006 CONSUMER ELECTRONICS 3 0 0 3

OBJECTIVE:
❖ To understand the operation of audio, video systems.
❖ To learn the operation of various memory devices.
❖ To understand the performance of various switching systems.
❖ Able to conduct experiments on electrical machines and analyze the experimental data

Course Outcomes

CO01 - To learn various sound systems like stereophonic, Quadraphonic, recording
CO02 - To learn various video systems like cameras, VCR, VCP, TV etc
CO03 – To study various memory devices like CD, HDD etc
CO04 – To learn switching system in telephone exchange
CO05 - To study the home appliances like oven, Refrigerators, washing machines

CO/PO Mapping

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UNIT I AUDIO SYSTEM 10
Hi-Fi systems, stereophonic sound system, public address systems, Acoustics, Quadraphonic sound systems, Graphics Equalizer, Electronic tuning, Digital sound recording on tape and disc..

UNIT II VIDEO SYSTEMS 4
B & W TV, colour TV and HD TV systems, Electric cameras, VCR, VCP, Block diagram and principles of working of cable TV and DTH, cable TV using internet.

UNIT III MEMORY DEVICES 12
CD systems, Memory diskettes, Discs and drums vide monitoring audio, video recording media & Systems.

UNIT IV SWITCHING SYSTEMS 10
Dolby noise reduction digital and analog recording. Switching Systems: Switching systems for telephone exchange, PAB EPRABX, modular telephones, Telephone message recording concepts, remix controlled systems.

UNIT V HOME APPLIANCES 9
Electronic toys, microwave oven, Refrigerators, washing machines, calculator, data organizers.

TOTAL NO. OF PERIODS: 45

TEXT BOOKS
2. Encyclopedia of video & TV / Focal press

REFERENCES
OBJECTIVE:

- To introduce the concept of Digital Image Processing
- To acquaint the student with various techniques used in Digital Image Processing.
- To introduce the current trends in Digital images and its Processing

Course Outcomes

CO01 - To learn Fundamentals of Digital Images
CO02 – To understand the concept of image enhancement in special domain
CO03 – To learn the concept of image enhancement in frequency domain
CO04 – To learn the various methods of image compression
CO05 - To learn the various methods of image segmentation

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UNIT I  FUNDAMENTALS 8
What is Digital image processing, Examples (Briefly), Components of Image Processing System, Light and electromagnetic spectrum, Image Sensing and Acquisition, Simple Image Formation Model, Image Sampling and Quantization:- Representing Digital Images, Spatial and Grey level Resolution, Basic Relationship Between Pixels.

UNIT II  IMAGE ENHANCEMENT IN SPATIAL DOMAIN 9
Background, some Basic Grey Level Transformation:- Image Negatives, Log negatives,

UNIT III  IMAGE ENHANCEMENT IN FREQUENCY DOMAIN  9
Two dimensional DFT and its Inverse, Filtering the frequency domain, Basics of filtering in frequency domain, smoothing and sharpening filters.

UNIT IV  IMAGE COMPRESSION  9
Fundamentals, Coding Redundancy, Interpixel Redundancy Psycho-Visual Redundancy, Image Compression Models, Error Free Compression, Variable – Length Coding, Huffman Coding, Arithmetic Coding, Run-length coding, Lossy Compression, Transform coding, JPEG.

UNIT V  IMAGE SEGMENTATION  10
Detection of Discontinuous, Edge linking and Boundary Detection:- Local Processing, Thresholding:- Basic Global Thresholding, Region Based Segmentation:- Region Growing, Region Splitting and Merging, Use of Motion In Segmentation.

TOTAL NO .OF PERIODS: 45

Text Books:

References:

BMT008  MICROELECTRONICS AND NANOELECTRONICS  3 0 0 3

OBJECTIVE:

- To introduce the micro electronics and explain the quantum mechanics
- To explain the various different types of component with micro structure
- To introduce the nano electronics
- To explain the molecular electronics

Course Outcomes

CO01 – To introduce the semiconductor physics and quantum electronics
CO02 – To explain the different types of junctions
CO03 – To explain the MOS structure
CO04 – To introduce and explain the nano electronics and its structure
CO05 - To explain the molecular electronics

CO/PO Mapping

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UNIT-I
Introduction to semiconductor physics: Review of quantum mechanics, electrons in periodic lattices, E-k diagrams, Quasi-particles in semiconductors, electrons, holes and phonons. Boltzmann transport equation and solution in the presence of low electric and magnetic fields - mobility and diffusivity; carrier statistics; continuity equation, poisson's equation and their solution; high field effects: velocity saturation, hot carriers, avalanche breakdown, punch through and kirk effects.

UNIT-II
Semiconductor junctions: Schottky, homo- and hetero-junction band diagrams and I-V characteristics, small signal switching models; two terminal and surface states devices based on semiconductor junctions. Bipolar transistor working, its charge control, and gummel poon model, structure of graded base, graded emitter transistor, hetro junction transistor.

UNIT-III
MOS structures: Semiconductor surfaces; the ideal and non ideal MOS capacitor band diagrams and CVs; Effects of oxide charges, defects and interface states; characterization of MOS capacitors: HF and LF CVs, avalanche injection; high field effects and breakdown. Long & short channel effects.

NANOELECTRONICS
UNIT-IV
Shrink-down approaches: Introduction, CMOS scaling, the nanoscale MOSFET, finfets, vertical. MOSFETs, limits to scaling, system integration limits (interconnect issues etc.), resonant tunneling transistors, single electron transistors, new storage, optoelectronic, and spintronics devices.

UNIT-V
Atoms-up approaches: Molecular electronics involving single molecules as electronic devices, transport in molecular structures, molecular systems as alternatives to conventional electronics, molecular interconnects; Carbon nanotube electronics, bandstructure & transport, devices, mems applications.

TOTAL NO. OF PERIODS: 45

TEXT BOOK
REFERENCE BOOKS

BBA051 MARKETING MANAGEMENT 3 0 0 3

OBJECTIVE:

- 1. To learn about consumer marketing.
- 2. To study about demographic factors.
- 3. To study about retailing process.

Course Outcomes

CO01 - To learn marketing concepts between industry and consumer.
CO02 – To learn about demographic factors.
CO03 – To study about pricing methods.
CO04 – To learn about portfolio analysis.
CO05 – To study about advertising and sales methods.

CO/PO Mapping

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UNIT I  INTRODUCTION  9
Definition- Marketing Process- Dynamics- Needs- Wants and demands-Marketing Concepts-
Environment- Mix- Types- Philosophies- Selling Vs Marketing- Organizational- Industrial Vs

UNIT II  BUYING BEHAVIOUR & MARKET SEGMENTATION  9
Cultural- Demographic Factors- Motives- Types- Buying Decisions- Segmentation factors-
Demographic- Psychographic & Geographic Segmentation- Process- Patterns.

UNIT III  PRODUCT PRICING AND MARKETING RESEARCH  9
Objectives- Pricing- Decisions & Pricing Methods- Pricing Management- Introduction- Uses-
Process of Marketing Research.

UNIT IV  MARKETING PLANNING AND STRATEGY FORMULATION  9
Components of marketing plan- Strategy formulation and marketing process- Implementation-
Portfolio analysis- BCG- GEC grids.

UNIT- V  ADVERTISING, SALES PROMOTION AND DISTRIBUTION  9
Characteristics- Impact- Goals- Types- Sales promotion- Point of Purchase- Unique selling
proposition- Characteristics- Whole selling- Retailing- Channel Design- Logistics- Modern trends
in retailing.

TOTAL NO. OF PERIODS: 45

Text Books:
1. Ramasamy and Nama kumari, “Marketing Environment: Planning, implementation and
   control the Indian context”, 2002

References:
1. Philip Kotler, Marketing Management, Analysis, Planning, Implementation and
   control, 1998.
1. Khanna O.P. – Industrial Engineering and Management, Khanna Publishers, New Delhi,
   2000.
   1995

BBA052  PROFESSIONAL ETHICS  3 0 0 3

OBJECTIVE:

- To study about engineering ethics.
- To study ethics codes.
- To study about risk benefit analysis.

Course Outcomes
CO01 - To learn about ethical theories.
CO02 – To learn about codes of ethics.
CO03 – To study about assessment of safety and risk.
CO04 – To learn about responsibility and rights.
CO05 – To study about environmental ethics.

CO/PO Mapping

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UNIT I ENGINEERING ETHICS

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering As Experimentation – Engineers as Responsible Experimenters – Codes of Ethics – The Challenger, Case Study.

UNIT III ENGINEER’S RESPONSIBILITIES FOR SAFETY

UNIT IV ENGINEERS'S RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES
Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development
– Engineers As Managers – Consulting Engineers – Engineers As Expert Eye Witnesses And
Advisors – Moral Leadership

TOTAL NO. OF PERIODS: 45

Text books:
1. Mike W Martin and Roland Schinzinger, Ethics In Engineering, Tata Mcgraw Hill,
2. R S Nagaarazan, Textbook On Professional Ethics And Human Values, New Age
   International Publishers, 2006

References:
1. Laura Schlesinger, How Could You Do That? The Abdication Of Character, Couage, And
3. Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 2004

BBA054 INDIAN CONSTITUTION AND SOCIETY 3 0 0 3

OBJECTIVE:

❖ To introduce the Indian history and Indian constitution
❖ To study about prime minister, cabinet and parliament and supreme court
❖ To study about Indian Federal System and society

Course Outcomes

CO01 - To learn about Constituent Assembly of India
CO02 – To learn about Structures of the Union Government and Functions
CO03 – To study about State Government
CO04 – To learn about Indian Federal System.
CO05 – To study about Society

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Course Assessment Methods:
UNIT I

UNIT II
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III

UNIT IV
Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V
Society : Nature, Meaning and definition; Indian Social Structure; Castle, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL NO. OF PERIODS: 45

Text Books:

Reference:
4. Yogendra Singh, “(1997) Social Stratification and Charge in India “, Manohar, New Delhi
OBJECTIVE:

know about engineering economics and cost analysis.

Course Outcomes

CO01- To learn about introduction to economics.
CO02- To learn about value engineering.
CO03- To learn about cash flow.
CO04- To learn about economics of sampling and Replacement and Maintenance analysis.
CO05- To learn about depreciation and Evaluation of public alternatives.

CO/PO Mapping

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UNIT I   INTRODUCTION TO ECONOMICS


UNIT II   VALUE ENGINEERING

Make or buy decision, Value engineering – Function, aims, Value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.
UNIT III CASH FLOW 9
Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method, Examples in all the methods.

UNIT IV REPLACEMENT AND MAINTENANCE ANALYSIS 9
Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT V DEPRECIATION 9

TOTAL NO. OF PERIODS: 45

Text Books :

References :

BBA056 PRODUCT DESIGN AND COSTING 3 0 0 3

OBJECTIVE:
To know about Product Design and Costing and Development

Course Outcomes

CO01- To learn about Criteria for product design and Product analysis.
CO02- To learn about economics of design.
CO03- To learn about product modeling and Types of product models.
CO04- To learn about product and Outline Process charts.
CO05- To learn about Fundamentals of FEM and and process design.

CO/PO Mapping

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UNIT I  PRODUCT DESIGN AND DEVELOPMENT  8

UNIT II  ECONOMICS OF DESIGN  9
Breaks even point - Selection of optimal materials and processes – Material layout planning – Value analysis – Re-engineering and its impact on product development.

UNIT III  PRODUCT MODELING  9

UNIT IV  PRODUCT COSTING  10
Bill of materials – Outline Process charts – Concepts of operational standard time - Work measurement by analytical estimation and synthesis of time – Budgets times – Labor cost and material cost at every stage of manufacture – W.I.P. costing

UNIT V  RECENT ADVANCES AND CONCEPTS IN PRODUCT DESIGN  9
Fundamentals of FEM and its significance to product design – Product life cycle management – Intelligent information system – Concept of Knowledge based product and process design.

TOTAL NO. OF PERIODS: 45

Text Books:

References:

1. HARRY NYSTROM, “Creativity and Innovation”, John Wiley & Sons, 1979
3. DONALD E. CARTER, “Concurrent Engineering”, Addison Wesley, 1992

BBA057  STATISTICAL QUALITY CONTROL  3 0 0 3

OBJECTIVE:

To equip students with adequate knowledge of Mathematics to formulate problems in Engineering, and solve them analytically.

Outcomes:

CO01-To learn about Probability concepts and Quality costs.
CO02-To learn about control charts for variables.
CO03- To learn about control charts for attributes.
CO04- To learn about Economics of sampling and Problem Solving using it.
CO05- To learn about Pareto Analysis and quality improvement.

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UNIT I  INTRODUCTION  7

Probability concepts, Review of distribution: Normal, Poison’s, and Binomial, Problems,
Measuring of quality and control, Value and quality, Quality costs, Quality assurance.

UNIT II CONTROL CHARTS FOR VARIABLES 10
Chance and assignable causes of quality variation, Control charts for variables, X-bar, R, and σ-charts, Warning and modified control limits, Process capability study, Ranges, Moving Averages, and Six σ-limits, multivariate charts.

UNIT III CONTROL CHARTS FOR ATTRIBUTES 8
Limitation of variable chart, p-chart, problems with variable sample size, np-chart, c-chart, u-chart, and ku-chart, Demerits per unit control chart.

UNIT IV ACCEPTANCE SAMPLING 10
Economics of sampling, Lot formation, OC-Curve-Producer’s and Consumer’s risk, Single and double sampling plans, AOQ, AOQL, ATI, ASN, Sequential sampling plan, MIL – STD – 1050 tables, MIL – STD – 414 tables, IS 2500 Standard.

UNIT V QUALITY IMPROVEMENT 10
Zero defects program, Quality circle, Fishbone diagram, scatter diagram, Pareto Analysis, Deming cycle, Introduction to Reliability function, System reliability of series, parallel, and combined configurations, Reliability improvement techniques.

TOTAL NO. OF PERIODS: 45

Text Books:

References:

BBA058 ENTREPRENEURSHIP DEVELOPMENT 3 0 0 3

OBJECTIVE:

- To learn about types of entrepreneurship.
- To study about major motivation methods.
- To study about government policies for small scale industries.

Course Outcomes
CO01 - To learn difference between entrepreneur and interpreneur.
CO02 – To learn about entrepreneurship development programs.
CO03 – To study about economic feasibility methods.
CO04 – To learn about taxation.
CO05 – To study about corrective measures methods.

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UNIT I ENTREPRENEURSHIP 8
Entrepreneur - Types of Entrepreneurs - Difference Between Entrepreneur and Interpreneur - Role of Entrepreneurship in Economic Growth- Women and Rural Entrepreneurship - Factors Affecting Entrepreneurial Growth.

UNIT II MOTIVATION 8

UNIT III BUSINESS 9

UNIT IV FINANCING AND ACCOUNTING 10
UNIT V    SUPPORT TO ENTREPRENEURS  

Text Books:

References:

BBA059     PROFESSIONAL ETHICS AND HUMAN VALUES     3 0 0 3

OBJECTIVE:

- To learn about moral of professional ethics.
- To study case studies of ethics.
- To study about employee rights.

Course Outcomes

CO01 - To learn senses of ethics.
CO02 – To learn about codes of ethics.
CO03 – To study about assessment of safety and risk.
CO04 – To learn about intellectual property rights.
CO05 – To study about moral leadership.

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UNIT I  ENGINEERING ETHICS 9
Moral Dilemmas – Moral Autonomy – Kohlberg’s And Gilligan’s Theory – Consensus And
Controversy – Models Of Professional Roles – Theories About Right Action –Self Interest –
Customs And Religion – Use Of Ethical Theories.

UNIT II  ENGINEERING AS SOCIAL EXPERIMENTATION 9
Engineering As Experimentation – Engineers as Responsible Experimenters – Codes of Ethics -
The Challenger, Case Study.

UNIT III  ENGINEER’S RESPONSIBILITIES FOR SAFETY 9
Safety And Risk – Assessment Of Safety And Risk – Risk Benefit Analysis And Reducing Risk –
The Three Mile Island , And Cher Nobyl Case Studies.

UNIT IV  ENGINEER’S RESPONSIBILITIES AND RIGHTS 9
Collegiality And Loyalty – Respect For Authority – Collective Bargaining – Confidentiality –

UNIT V  GLOBAL ISSUES 9
Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development
–Engineers As Managers – Consulting Engineers – Engineers As Expert Eye Witnesses And
Advisors – Moral Leadership

TOTAL NO. OF PERIODS: 45

Text books:
1. Mike W Martin and Roland Schinzinger, Ethics In Engineering, Tata Mcgraw Hill, Newyork
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2. R S Nagaarazan, Textbook On Professional Ethics And Human Values, New Age International
   Publishers, 2006
3. Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 2004

References:
1. Laura Schlesinger, How Could You Do That? The Abdication Of Character, Couage, And

BBA060  PRINCIPLES OF MANAGEMENT AND
ORGANIZATIONAL BEHAVIOUR 3 0 0 3

OBJECTIVE:
To learn about moral of professional ethics.
- To study case studies of ethics.
- To study about employee rights.

**Course Outcomes**

**CO01** - To learn senses of Management
**CO02** – To learn about codes of Management.
**CO03** – To study about assessment of safety and risk.
**CO04** – To learn about intellectual property rights.
**CO05** – To study about Organizational Behavior

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**UNIT I**


**UNIT II**

UNIT III
Organizing – Theory & Approach – Organization Structure – Authority & Responsibility –
Delegation – Centralization & Decentralization – Line & Staff Relationship – Staffing –
Fundamentals – System approach – Manpower Planning – Recruitment & Selection – Training
and development – Performance appraisal – Direction – Fundamentals Motivation – Theories of
Motivation-Maslow’s Hersberg’s MaClelland’s theory X,Y & Z leadership – Theories and Styles

UNIT IV
Organizational Behaviour – Definition – Organization – Managerial Role and Functions –
Organizational Approaches, Individual behaviour – Causes – Environmental effect – Behaviour
and performance, perception – Organizational implications, Personality – Contributing factors –
Dimension, Motivation – Need Theories – Process Theories – Job satisfaction, Learning and
Behaviour – Learning Curves, Work Design and Approaches.

UNIT V
Group Behaviour – Groups – Contributing factors –Group Norms, types – Causes – Intergroup
relations – Conflict and Resolution – Change Process –Resistance to change.

TOTAL NO. OF PERIODS: 45

Text books:

References:
2. Ties AF, Stoner and R. Edward Freeman, “Management” Prentice Hall of India

BMT061 TOTAL QUALITY MANAGEMENT
AND RELIABILITY ENGINEERING 3 0 0 3

OBJECTIVE:
❖ To introduce the concept of quality management and reliability for the industrial field
❖ To acquaint the student with various technique used in quality management
❖ To introduce the various new trends in quality management

Course Outcomes

CO01 - To learn the concept of quality planning
CO02 – To understand the various techniques for total quality management
CO03 – To learn the various system components of TQM
CO04 – To learn the concept of reliability in TQM
CO05 - To learn the various technique for time maintainability
CO/PO Mapping

S – Strong, M – Medium, W – Weak

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<tr>
<th>COs</th>
<th>Programme Outcomes (POs)</th>
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<td>PO1</td>
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Course Assessment Methods:

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UNIT I  BASIC CONCEPTS ON QUALITY PLANNING

UNIT II  TQM TECHNIQUES

UNIT III  HUMAN DIMENSION & SYSTEM COMPONENT OF TQM

UNIT RELIABILITY

UNIT V  MAINTAINABILITY
Text Books:

Reference Books: