# Babu Banarasi Das University, Lucknow

## School of Engineering
## (School Code: 04)
## Branch: Artificial Intelligence
## (University Branch Code: 37)
### Bachelor of Technology
### Evaluation Scheme

| Semester I | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BAS3101 | Matrices and Calculus | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAS3102 | Physics-I | 2 | 1 | 0 | 40 | 60 | 100 | 3 |
| Students need to select either GROUP 'A' or GROUP 'B' | | | | | | | | | |
| | GP3101 | General Proficiency | 0 | 0 | 0 | 100 | 0 | 100 | 1 |
| Total | | | 5 | 2 | 0 | 180 | 120 | 300 | 8 |

| GROUP 'A' | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| F | BME3101 | Engineering Mechanics | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| F | BCS3101 | Foundation of Information Technology | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| F | BEC3101 | Basic Electronics Engineering | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAS3104 | Environmental Studies | 2 | 0 | 0 | 40 | 60 | 100 | 2 |
| F | BME3151 | Engineering Mechanics Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| F | BCS3151 | Foundation of Information Technology Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| F | BME3152 | Workshop Practice | 0 | 1 | 2 | 40 | 60 | 100 | 2 |
| C | BAS3152 | Physics-I Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| Total | | | 11 | 4 | 8 | 320 | 480 | 800 | 19 |

| GROUP 'B' | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Course Category** | **Course Code** | **Code Title** | **Contact Hours** | | | **Evaluation Scheme** | | | **Credits** |
| | | | **L** | **T** | **P** | **CIA** | **ESE** | **Course Total** | |
| **F** | **BEE3101** | Basic Electrical Engineering | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **F** | **BAI3101** | Introduction to Artificial Intelligence | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **C** | **BAS3103** | Chemistry | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **C** | **BHS3101** | Technical Communication | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **F** | **BEE3151** | Basic Electrical Engineering Lab | **0** | **0** | **2** | **40** | **60** | **100** | **1** |
| **F** | **BME3153** | Engineering Graphics Lab | **0** | **1** | **2** | **40** | **60** | **100** | **2** |
| **C** | **BAS3153** | Chemistry Lab | **0** | **0** | **2** | **40** | **60** | **100** | **1** |
| **Total** | | | **12** | **5** | **6** | **280** | **420** | **700** | **20** |

| Semester II | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BAS3201 | Differential Equations and Fourier Analysis | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAS3202 | Physics-II | 2 | 1 | 0 | 40 | 60 | 100 | 3 |
| **Students need to select either GROUP 'A' or GROUP 'B'** | | | | | | | | | |
| | GP3201 | General Proficiency | 0 | 0 | 0 | 100 | 0 | 100 | 1 |
| **Total** | | | 5 | 2 | 0 | 180 | 120 | 300 | 8 |

**Note**: Students who have selected GROUP 'A' in the first semester will select GROUP 'B' in the second semester and Vice-Versa.

| GROUP 'A' | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| F | BME3201 | Engineering Mechanics | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| F | BCS3201 | Foundation of Information Technology | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| F | BEC3201 | Basic Electronics Engineering | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAS3204 | Environmental Studies | 2 | 0 | 0 | 40 | 60 | 100 | 2 |
| F | BME3251 | Engineering Mechanics Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| F | BCS3251 | Foundation of Information Technology Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| F | BME3252 | Workshop Practice | 0 | 1 | 2 | 40 | 60 | 100 | 2 |
| C | BAS3252 | Physics-I Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| **Total** | | | 11 | 4 | 8 | 320 | 480 | 800 | 19 |

| GROUP 'B' | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Course Category** | **Course Code** | **Code Title** | **Contact Hours** | | | **Evaluation Scheme** | | | **Credits** |
| | | | **L** | **T** | **P** | **CIA** | **ESE** | **Course Total** | |
| **F** | **BEE3201** | Basic Electrical Engineering | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **F** | **BAI3201** | Introduction to Artificial Intelligence | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **C** | **BAS3203** | Chemistry | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **C** | **BHS3201** | Technical Communication | **3** | **1** | **0** | **40** | **60** | **100** | **4** |
| **F** | **BEE3251** | Basic Electrical Engineering Lab | **0** | **0** | **2** | **40** | **60** | **100** | **1** |
| **F** | **BME3253** | Engineering Graphics Lab | **0** | **1** | **2** | **40** | **60** | **100** | **2** |
| **C** | **BAS3253** | Chemistry Lab | **0** | **0** | **2** | **40** | **60** | **100** | **1** |
| **Total** | | | **12** | **5** | **6** | **280** | **420** | **700** | **20** |

**Legends:**

| | |
|---|---|
| **L** | Number of Lecture Hours per week |
| **T** | Number of Tutorial Hours per week |
| **P** | Number of Practical Hours per week |
| **CIA** | Continuous Internal Assessment |
| **ESE** | End Semester Examination |

**Category of Courses:**

| | |
|---|---|
| **F** | Foundation Course |
| **C** | Core Course |
| **GE** | Generic Elective |
| **OE** | Open Elective |

**BAS 3101 Matrices and Calculus** **Credits: 4**

**Course Objective:**

The general objective of the course is to introduce

1. the concepts of matrix algebra, methods of solving system of linear equations and determine eigen values and eigen vectors of a matrix;
2. the concepts of the eigen values and eigen vectors of Hermitian, Unitary and Normal matrices differ from those of general matrices;
3. the concepts of derivatives of functions (one and several variables) and their applications;
4. the concepts of multiple integration, Beta, Gamma functions and their applications;
5. the concepts of vector calculus to expose students to mathematical applications.

**Learning Outcomes:**

Upon successful completion of the course, students will be able to

1. demonstrate ability to manipulate matrices, to find rank and to solve the system of linear equations;
2. find eigen values and eigenvectors and use them in diagonalization problems and other applications;
3. find nth derivative by using Leibnitz theorem;
4. apply partial derivatives to study extrema & expansion of functions of two variables;
5. evaluate double integrals by changing variables , changing order and triple integration to find the area and volume of given region;
6. calculate line integrals along piecewise smooth paths, interpret such quantities as work done by a force;
7. solve double and triple integrations and apply it to calculate line, surface and volume integrals;
8. apply Green's theorem to evaluate line integrals along simple closed contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and Divergence theorem to give physical interpretation of the divergence of a vector field.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Matrices** Type of Matrices, Elementary row and column transformation, Rank of matrix, Linear dependence, Consistency of linear system of equations and their solution, Characteristic equation, Caley-Hamiltion theorem, Eigen values and eigen vectors, Application of matrices to engineering problems. | 30 | 1 |
| II | **Differential Calculus** Leibnitz theorem, Partial differentiation, Euler's theorem, Expansion of function of several variables. Jacobian, Extrema of functions of several variables, Lagranges method of multipliers (Simple applications). | 30 | 1 |

| | | | |
|---|---|---|---|
| III | **Multiple Integrals**<br>Double and triple integrals, Change of order, Change of variables, Beta and Gamma functions, Applications to area and volume, Dirichlet integral and applications. | 30 | 1 |
| IV | **Vector Calculus**<br>Point function, Gradient, Divergence and Curl of a vector and their physical interpretations, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems (without proof) and applications. | 30 | 1 |

**Recommended Books:**


1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
2. Peter V. O'Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
4. R. K. Jain & S. R. K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.
5. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.

## SYLLABUS

## BAS-3102 ENGINEERING PHYSICS I

**Course Objective:**

The main objectives of the course are

1. To provide knowledge and develop an understanding of principles and processes of wave optics, optical communication and fundamentals of special theory of relativity.
2. To develop the basic skills to apply knowledge by the topics covered in the course to engineering problems.

**Learning Outcome:**

At the end of the course students shall be able

1. To apply knowledge of wave optics.
2. To design and conduct experiments.
3. To identify and solve the problems in different field of engineering & technology.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Wave Optics:**<br><br>Interference: Interference of light, Biprism experiment, Displacement of fringes, Interference in thin film, Wedge shaped film, Newton's rings.<br>Diffraction: Single slit and N-slit, Diffraction grating, Grating spectra, Dispersive power of grating, Rayleigh criterion and resolving power of grating.<br>Polarisation: Double refraction, Nicolprism, Production and detection of plane, circularly and elliptically polarised light, Optical activity and Fresnel's theory of optical activity, Specific rotation and Polarimeter. | 30 | 1 |
| II | **Laser and Fibre Optics**:<br><br>Laser: Spontaneous and stimulated emission of radiation, Einstein coefficient, Population inversion & pumping, Construction and working of ruby & He-Ne Laser, Applications of Laser, Holography. Fundamental idea about optical fibre, Propagation mechanism & communication in optical fibre, Types of optical fibre, Acceptance angle and acceptance cone, Numerical aperture | 30 | 1 |

| | | | |
|---|---|---|---|
| | and V-number, Attenuation ,Signal loss in optical fibre, Dispersion in optical fibre. | | |
| III | **Special theory of Relativity:**<br><br>Inertial & non inertial frames, Concept of ether, Michelson and Morley Experiment, Einstein's basic postulate of special theory of relativity, Lorentz transformation equations, length contraction, Time dilation, Mass variation, relativistic velocity addition theorem, Mass-energy Equivalence relation. | 30 | 1 |

**References:**


1. Concepts of Modern Physics, Aurther Beiser , Mc-Graw Hill
2. Introduction of Special theory of relativity, Robert Resnick, Wiely
3. Optics, Ajay Ghatak, TataMc-Graw Hill
4. Optical fibre and Laser, Anuradha De, New Age
5. Fundamental of Physics, Resnick, Halliday & Walker, Wiely
6. Optics, Jenkin and White, Tata Mc-Graw Hill


(Dr. Karunesh Tiwari)
Convener

(Prof. Rajeev Manohar)
External Expert

(Dr. Nitin Jain)
Nominee

(Dr. Neelam Yadav)
Member

## ENGINEERING MECHANICS (BME3101/BME3201)

**Course Objective:**

1. A working knowledge of statics with emphasis on force equilibrium and free body diagrams.
2. To calculate the reactive forces and analyse the structures.
3. To know the geometric properties of the different shapes & to learn energy and momentum methods.
4. Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems, and an understanding of the mechanical behavior of materials under various load conditions.

**Learning Outcome:**

At the end of the course student should be able to:

1. Solve the engineering problems in case of equilibrium and non- equilibrium conditions & solve the problems involving dry friction.
2. Calculate the reaction forces and forces in members of statically determinate structures.
3. Determine the centroid, centre of gravity and moment of inertia of various surfaces and solids &calculate the forces acting on the rigid body, structures using varying principles.
4. To find out the stress, strain and elastic properties of different bodies.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Two-Dimensional Force Systems:** Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position, Resultant of a force system, Simple Resultant of Two dimensional concurrent Force systems and Non-concurrent Force systems, Distributed force system, free body diagrams, Equilibrium and Equations of Equilibrium, Applications of two dimensional force system. **Friction:** Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction, Equilibrium of bodies involving dry friction, Belt friction, Application of friction. | 30 | 1 |

| | | | |
|---|---|---|---|
| II | **Beam:**<br>Introduction, Shear force and Bending Moment, Differential equations for shear force & bending moment, Shear force and Bending Moment Diagrams for Statically Determinate Beams.<br>**Trusses:**<br>Introduction, Simple Truss and Solution of Simple Truss, Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members | 30 | 1 |
| III | **Centroid and Moment of Inertia:**<br>Introduction, Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area,Parallel Axes Theorem & Perpendicular axes theorem, Moment of inertia of composite bodies.<br>**Kinematics and Kinetics:**<br>Linear motion, Instantaneous center, D'Alembert principle, Rotation of rigid bodies, Impulse and momentum principle, Work and energy principle. | 30 | 1 |
| IV | **Simple Stress and Strain:**<br>Definition of stress, stress tensor, normal and shear stresses in axially loaded members, Stress-strain relationship, Stress-strain diagram for uniaxial loading of ductile and brittle materials, Hooke's law, Poisson's ratio, shear stress, shear strain, modulus of rigidity, Relationship between elastic constants. One Dimensional Loading of members of varying cross-sections, Temperature Stresses,Strain energy. | 30 | 1 |

**Reference Books:**


1. Engineering Mechanics by Irving H. Shames. Prentice-Hall.
2. Engineering Mechanics: Principles of Statics and Dynamics by R. C. Hibbler. Pearson Press.
3. Engineering Mechanics: by Shanes and Rao. Pearson Education.
4. Engineering Mechanics by S.S. Bhavikatti, K.G. Rajashekarappa, New Age Publications.
5. A textbook of Engineering Mechanics by Dr. R.K. Bansal, Laxmi Publications.
6. Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
7. Mechanics of Materials by E.P. Popov, Prentice Hall of India Private Limited.

## SYLLABUS

**BCS3101/ BCS3201 Foundation of Information Technology**

**Course Objective:**

1. Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of hardware and software, the internet, network and mobile computing.
2. Study the basic concepts and functions of hardware and software.
3. Study the basic concepts and functions of operating system.
4. Study the basic concepts and functions of computer network.
5. Study the basic concepts and functions of Information Technology.
6. Study the basic concepts of C programming language.
7. Provide foundational or "Computer literacy" curriculum that prepares students for life-long learning of computer concept and skills.

**Learning Outcome:**

At the end of the course, the student should be able to:

1. Understanding organization of computer system and networking.
2. An ability to understand the basics of computer hardware and software.
3. Awareness of basic information security issues.
4. To understand the use of Information Technology in business.
5. To analyse and understand various types of software system.
6. An ability to understand operating system and its functions.
7. Ability to apply knowledge and practice on office tools to develop I.T application.
8. To analyse various computer networks.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Hardware and Software**<br>Hardware, Software, Information technology, Types of computer: Mainframe computer, network computer, personal computer, laptop, personal digital assistant (PDA); Personal computer: Central processing unit (CPU), hard disk, common input or output devices, types of memory viz. RAM, ROM, peripheral device, computer performance.<br>**Input Devices**: Mouse, keyboard, trackball, scanner, touchpad, light pen, joystick, digital camera and microphone. **Output Devices**: Monitors, screens, printers, plotters, speakers. **Input/output Devices:** Modems, Touch Screens. **Storage Devices**: Diskette, Zip disk, data cartridges, CD-ROM, internal, external hard disk: Disk formatting<br>**Software:** Types Of Software: Operating systems software and application software, Software versions, Operating System: Functions and Types. Graphical User Interface (GUI), SDLC and its phases. | 30 Hours | 1 |

| | | | |
|---|---|---|---|
| II | **Computer Network**<br>Networks: LAN, WAN, client/server, sharing printers, applications, and files across a network. Intranet, Extranet, Internet and its uses, World Wide Web (WWW)<br>The Telephone Network In Computing: Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), Asymmetric Digital Subscriber Line (ADSL), Analog and digital modem and transfer rate. | 30 Hours | 1 |
| III | **Information Technology (IT)**<br>Applications of IT: Applications in business such as: business administration systems, airline booking systems, insurance claims processing, online banking. Uses of large-scale computer applications in government such as: public records systems (census, vehicle registration), revenue collection, electronic voting. Applications in education such as: student registration and timetabling systems, computer-based training (CBT), distance learning, homework using the Internet. Electronic World: electronic mail, E-Commerce, concept of purchasing goods and services online, payment methods, advantages and disadvantages of purchasing goods and services online<br>Health, safety and environment: Ergonomics, health issues, precautions, recycling printed outputs, recycling printer toner cartridges, using efficient monitor | 30 Hours | 1 |
| IV | **Introduction to the C Language**<br>Introduction to the C Language and its Advantages. C Program: Structure, Writing, Building an Executable Version, Debugging, and Running.<br>Data Types and Variables, Operands, Operators, and Arithmetic Expressions, Control statements, use of while, for and do while loops, nesting loops and break, continue statement. | 30 Hours | 1 |

**Text/Reference Books:**


1. D. S. Yadav, "Foundations of Information Technology", New Age International Pvt. Ltd.
2. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley Publication
3. D M Dhamdhere, "Operating Systems: A Concept based Approach", TMH
4. Yashavant P. Kanetkar, "Let us C", BPB

## BEC3101/BEC3201 BASIC ELECTRONICS ENGINEERING

**Course Objective:**

This course provides

1. Comprehensive idea about basic electronics devices like Diodes, BJT, JFET, MOSFET, Operational Amplifier.
2. Fundamental principles of Electronic instruments like CRO and digital multi-meter.
3. Fundamental principle of communication.

**Learning Outcome:**

At the end of the course students will be able to gain knowledge about the

1. Fundamentals of electronic devices like Diodes, BJT, JFET, MOSFET, Operational Amplifier and Electronic instruments like CRO and digital multi-meter.
2. Number system, Boolean algebra, logic gates, Kaurnaugh map
3. Basics of communication systems.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **DIODES :** Energy band theory, Semiconductor material, Mass action law, PN junction: Forward and Reverse Bias characteristics, Diode as Rectifier: Half wave and Full wave Rectifiers, Breakdown Mechanism: Zener & Avalanche breakdown, Zener Diode and its application, LED, LCD, and Solar Cell. | 30 Hours | 1 |
| II | **TRANSISTORS** Construction of Bipolar Junction Transistor: PNP and NPN, Working of Transistor, BJT configurations: CE, CB and CC, Input & Output characteristics of CB & CE configuration, Biasing: Fixed bias, Emitter bias, Potential divider bias, Comparison of biasing circuits. JFET: Basic construction and characteristics, Concept of pinch off, maximum drain saturation current, Input and transfer characteristics, Biasing: Self bias and fixed bias. MOSFET- Depletion and Enhancement type MOSFET- construction, operation and characteristics. | 30 Hours | 1 |
| III | **DIGITAL ELECTRONICS AND COMMUNICATION SYSTEM** Number System, Complements, Boolean Algebra: Basic | 30 Hours | 1 |

| | | | |
|---|---|---|---|
| | Theorems and De Morgan Theorems. Standard logic gates. Universal Logic Gates, Implementation of Boolean function using Basic gates and Universal gates. Reduction of Boolean function using K-Map upto4variables.<br>Block Diagram of Communication System, Electromagnetic spectrum, Need for Modulation, Basic Definitions AM,FM,PM | | |
| **IV** | **OPERATIONAL AMPLIFIER AND APPLICATIONS:** Introduction to OP-AMP, Characteristics of ideal OP-AMP. Basics of ideal and practical OP-AMP. Configurations: Open loop and closed loop, Applications of OP-AMP, Inverting amplifier, Non-inverting amplifier, Voltage follower, summing amplifier, Difference Amplifier, Integrator and Differentiator. Principle of oscillation and Barkhausen criterion. | 30 Hours | 1 |

**Text Books:**


1. Robert L. Boylestad and Louis Nashelsky Electronic Devices and Circuit Theory, Pearson India.
2. Kennedy. Electronic Communication System. TMH
3. Kalsi H.S, Electronic Instrumentation. TMH
4. M. Morris Mano, Digital Logic and Computer Design, PHI


**Reference Books:**


1. Jacob Millman, Christos C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems (McGraw-Hill electrical and electronic engineering series).
2. William D. Cooper, Albert D.Hefrick, Modern Electronic instrumentation and measurement technique 5th edition Prentice Hall Of India, New Delhi 1997.
3. Ramakant Gaikwad .Op –Amp's & linear Integrated Circuits, 4th edition, Prentice Hall of India, New Delhi 2002.
4. Albert Paul Malvino, Donald P Leach . Digital Principle & Application 4th edition, Tata McGraw –Hill Edition . New Delhi -1991.

## BAS 3104/BAS3204: ENVIRONMENTAL STUDIES

**Course Objectives:** The main objectives of the course are:

1. To create awareness and improve knowledge about environment.
2. To conserve natural resources through sustainable use.
3. To prevent, control of pollution and protect environment.
4. To developed skill and participation in environment protection activities.

**Learning outcome:** After the completion of the course, students are expected to better understanding of:

- Environments and related issues.
- Develop skill to solve many inter related problems of socio-economic nature and ecology.
- Able to conserve natural resources and sustainable use.
- Able to protect environment.

### Course Contents:

| Modules | Course Topics | Total Hours | Credit | Lecture/ week | | |
|---|---|---|---|---|---|---|
| | | | | L | T | P |
| 1. | **Environment**<br>Environment: Definition, Principles and Scope of Environmental Studies, Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere, Ecosystems, structure and function of ecosystem, Types of ecosystem, energy flow in an ecosystem, Food chain and food web, ecological pyramids, Prey-Predator interaction, Population dynamics of Prey and Predator.<br>Material cycle: Definition and importance, Nitrogen and carbon cycle<br>Environmental Impact Assessment (EIA): Definition and Concept, Elements of EIA, Prediction of impacts and its methodology, Sustainable Development.<br>**Natural resource and its conservation**<br>Natural resources: Renewable & non-renewable natural resources, drinking water quality, water borne and water induced diseases, arsenic and fluoride problem in drinking water, deforestation, impact of overexploitation mineral resources.<br>Energy resources: Conventional and non-conventional energy sources, solar energy, hydro-power energy, Hydrogen-energy, wind energy, geothermal energy, biomass energy, nuclear energy, fossil fuels. | 30 | 1 | 2 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2. | **Environmental Pollution**<br>Environmental pollution: Definition, pollutants, sources, causes, effects and control measures of air, water, and soil pollutions. Noise: Sources of noise pollution, measurement of noise, Noise exposure levels and standards. Impact of noise on human health. Noise control and abatement measures.<br>Waste water and its treatment. Eutrophication and Biomagnifications.<br>Solid waste management: solid waste source, characterization, effects and control measures of urban and industrial waste.<br>**Current Environmental Issues**<br>Current environmental Issues: Population growth, logistic curve equation. Climate change, global warming, acid rain, ozone layer depletion, Water Crises-Conservation of water, Rain water harvesting, Biodiversity and its conservation: Natural disaster and its management. Nuclear hazards<br>Environment protection: Legal aspects of environment protection, Environment Protection Act, Air(Prevention and Control of Pollution)Act, Water(Prevention and control of Pollution)Act, Role of NGOs in environment protection.<br>Environmental Education and Awareness. | 30 | 1 | 2 | 0 | 0 |

## Text Books:

1. Environmental Biology- Agarwal, K.C.2001, Nidi Publ. Ltd. Bikaner.

2. Basics of Environment and Ecology- A. Kaushik and C.P. Kaushik, Second Edition, 2014, New Age International(p) Ltd.

## Suggested Readings:


1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,Ahmedabad-380013,India
2. Brunner R.C., Marine Pollution, Clanderson Pross Oxford (TB)
3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ, House , Mumbai,1196p.
4. De A.K., Environmental Chemistry, Wiley Eastern Ltd. Down to Earth, Centre for Science and Environment (R).

## ENGINEERING MECHANICS LAB (BME3151/BME3251)

1. To conduct the tensile test and determine the ultimate tensile strength, percentage elongation for a steel specimen.
2. To determine the compression test and determine the ultimate compressive strength for a Specimen.
3. To conduct the Impact-tests (Izod/Charpy) on Impact-testing machine to find the toughness.
4. To determine the hardness of the given specimen using Vickers/Brinell/Rockwell hardness testing machine.
5. Friction experiment(s) on inclined plane and/or on screw-jack.
6. Worm & worm-wheel experiment for load lifting.
7. Belt-Pulley experiment.
8. Bending of simply-supported and cantilever beams for theoretical & experimental deflection.
9. Torsion of rod/wire experiment.
10. Experiment on Trusses.
11. Statics experiment on equilibrium.
12. Experiment on Moment of Inertia.

**Note:**

1. At least ten experiments are to be performed in the semester.

2. At least eight experiments should be performed from the above list.

Remaining two experiments may either be performed from the above list or designed & set by the concern faculty as per the scope of the syllabus.

**BCS3151/BCS 3251 Foundation of Information Technology Lab**

1) Run basic DOS commands.
2) Learn the use of Word Processor.
3) Learn the use of Excel.
4) Prepare presentation on any topic of your choice.
5) Write a C program to find sum of two numbers.
6) Write a C program to learn the function of FOR loop.
7) Write a C program to learn the function of WHILE/ DO WHILE loop.
8) Write a C program for pattern printing
9) Write a C program to print Fibonacci series.
10) Write a C program to find factorial and reverse of a number.



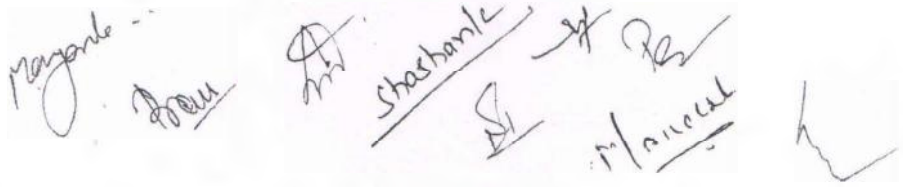
## WORKSHOP PRACTICE (BME3152/BME3252)

1. **Carpentry Shop:** Study of tools & operations and carpentry joints, Simple exercise using jack plane, to prepare half-lap corner joint, mortise & tennon joints. Simple exercise on wood working lathe.
2. **Fitting Bench Working Shop:** Study of tools & operations, Simple exercises involving fitting work, make perfect male-female joint, Use of drills/taps idea.
3. **Black Smithy Shop:** Study of tools & operations, Simple exercises base on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.
4. **Welding Shop:** Study of tools & operations of Gas welding & Arc welding, Simple butt and Lap welded joints, Oxy-acetylene flame cutting.
5. **Sheet-metal Shop:** Study of equipment & operations, Making Funnel complete with 'soldering', Fabrication of tool-box, tray, electric panel box etc.
6. **Machine Shop:** Study of machine tools and operations, Plane turning, Step turning, Taper turning, Threading, grinding of turning equipment.
7. **Foundry Shop:** Study of tools & operations, Pattern making, Mould making with the use of a core, Method of material pouring and Casting.

**Note:**

1. At least ten experiments are to be performed in the semester.
2. At least eight experiments should be performed from the above list.

Remaining two experiments may either be performed from the above list or designed & set by the concern faculty as per the scope of the syllabus



## BAS-3151*BAS-3252 PHYSICS PRACTICALS**

**Course Objective:**

The main objectives of the course are

1. To learn some basic principles of physics that help students to understand how the world around them works.
2. To realize fundamental concepts of physics and how it can be applied to other field i.e. engineering.
3. To apply scientific knowledge systematically.

**Learning Outcome:**

At the end of the end of the course students be able to

1. Tackle experimental problems in physics.
2. Use mathematics to describe the physical world.
3 Plan, execute, analyse and report experiments.
4. Compare results critically with prediction from theory.

**The student shall perform ten experiments in the laboratory by choosing at least four experiments from each group**

GROUP-A

| Practical | Topics | Total Hours | Credits |
|---|---|---|---|
| 1. | To determine the wavelength of monochromatic light by Newton's rings. | 30 | 1 |
| 2. | To determine the wavelength of monochromatic light with the help of Fresnel's biprism | | |
| 3. | To determine the focal length of two lenses by nodal slide and locate the position of cardinal points. | | |
| 4. | To determine the specific rotation of cane sugar solution using Bi-quartz polarimeter. | | |
| 5. | To determine the wavelength of various spectral lines using plane transmission grating | | |
| 6. | To study the polarization of light by simple reflection using laser. | | |
| 7. | Measurement of wavelength of a laser (He-Ne) light using single slit diffraction. | | |

*BAS3152

**PHYSICS-I LAB

As per Evaluation Scheme, SOE

**GROUP-B**

| Practical | Topics | Total Hours | Credits |
|---|---|---|---|
| 8 | To determine the specific resistance of the material of given wire using Carey Foster's bridge | 30 | 1 |
| 9 | To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil. | | |
| 10 | To verify Stefan's Law by electrical method | | |
| 11 | To calibrate the given ammeter and voltmeter | | |
| 12 | To study the Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall-effect set up. | | |
| 13 | To determine energy band gap of a given semiconductor material. | | |
| 14 | To study the characteristics of zener diode | | |
| 15 | To determine electrochemical equivalent of copper using Tangent or Helmholtz galvanometer | | |
| 16 | To draw hysteresis curve of a given sample of ferromagnetic material and from this to determine magnetic susceptibility and permeability of the given specimen. | | |
| 17 | To determine the ballistic constant of a ballistic galvanometer | | |
| 18 | To determine the value of a planck's constant by a photocell. | | |
| 19 | To determine the coefficient of viscosity of a liquid. | | |
| 20. | Measurement of fiber attenuation and aperture of fiber | | |

(Dr. Karunesh Tiwari)
Convener

(Prof. Rajeev Manohar)
External Expert

(Dr. Nitin Jain)
Nominee

(Dr. Neelam Yadav)
Member

**BABU BANARASI DAS UNIVERSITY, LUCKNOW**

**School of Engineering**

**Department of Electrical Engineering**

**Bachelor of Technology**

**SEMESTER – I / II**

## BEE3101/BEE3201 BASIC ELECTRICAL ENGINEERING

**Course Objective:**

1. This course provides comprehensive idea about circuit analysis.
2. The subject gives the knowledge about combinational circuits.
3. Subject gives the knowledge about the analysis and design of new electrical circuits.
4. Other logical working principles of machines and common Measuring instruments.

**Learning Outcome:**

At the end of the course students will be able.

1. To understand basic theorem of electrical engineering.
2. To understand basic electrical engineering.
3. To understand the basic concepts of magnetic, AC & DC circuits.
4. To explain the working principle, construction, applications of DC & AC machines & measuring instruments.
5. To gain knowledge about the fundamentals of electric components, devices.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Electric Circuit:** Introduction to linear and nonlinear circuits, circuit elements, various sources and source transformation, Star delta transformation, solution of D.C. circuits using Kirchhoff's laws- Mesh Analysis and Nodal Analysis, Signal wave forms, Passive elements specifications.<br>**Basic theorems:** Thevenin, Norton, Maximum Power, Superposition, Millman's Theorem, Tellegen's Theorem applied to DC networks. | 30 Hours | 1 |
| II | **A. C. Circuits:** A.C. voltage and currents, average and r.m.s. values, Form factor and peak factor, Phasor | 30 Hours | 1 |

| | | | |
|---|---|---|---|
| | representation of sinusoidal quantities, phasor in polar, rectangular and exponential forms.<br>Analysis of single phase series, parallel and series-parallel circuits, Active & reactive and apparent power, p.f., Volt-amperes, frequency response and Q-factor. Analysis of balanced three phase a.c. circuits, Introductory concept, voltage, current and power in three phase balanced circuits. Star-delta connections. Measurement of three phase power by Wattmeter Method. | | |
| III | **Measuring Instruments & Electromagnetic and Transformer:** Types of instruments, construction, working principles & applications, PMMC, MI, Single phase dynamometer, Ammeter, Voltmeter, Wattmeter, Induction type Energy meter, Use of shunt and multiplier.<br>Magnetic circuit concept, B-H curves characteristics of magnetic materials, Practical magnetic circuits. Magnetic circuits with D.C. and A.C. excitation, Hysteresis and eddy current losses, Magnetic force.<br>Self and mutual inductances, Faraday`s laws, Lenz`s Law, Statically and dynamically induced emfs, Energy stored in magnetic fields.<br>Principle of Transformer operation, emf equation, Equivalent circuit of transformer, Losses and efficiency, Introduction of Auto Transformer and its applications. | 30 Hours | 1 |
| IV | **Electrical Machines:** Basic concepts of rotating electric machines, DC machines (motor and generator), working principle, types, EMF and torque equations characteristics and application of DC motor. Three phase induction motors, types, principle of operation, applications.<br>Single phase induction motors, principle of operation, starting methods, applications. Synchronous machines (motor and generator), principle of operation and applications. | 30 Hours | 1 |

**Text &Reference books:**

1. 'Fundamental of Electric Circuits' by Charles K Alexander and Matthew N.O. Sadiku, Tata McGraw Hill Publication.

2. 'Electrical Engineering Fundamentals' by Vincent Del Toro, PHI Publication.
3. 'Electric Technology, by H.Cotton, CBS Publishers and Distributors.
4. 'Basic Electrical Technology' by A.E.Fitzgerald, McGraw Hill Publication.
5. 'Basic Electrical Technology' by Kothari and I.J. Nagrath, Tata McGraw Hill.
6. 'Basic Electrical Technology' by S.N.Singh, PHI Publication.

## B. Tech. (AI) First Year

**Name of the subject:** Introduction to Artificial Intelligence
**Code of the subject:** BAI3101/BAI3201

**Course Objectives:**

1. Study of historical perspectives of AI and its foundations.
2. Understanding the fundamental principles of AI.
3. Study of advanced AI techniques; like soft computing and nature inspired computing.
4. Understanding different AI approaches like problem solving, inference, perception, knowledge representation and learning.
5. Investigate and understanding of applications of AI techniques in our life

**Learning Outcomes:**
Upon successful completion of this course, the student shall be able to:

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate advanced AI techniques; like soft computing and nature inspired computing
4. Demonstrate awareness and a fundamental understanding of various applications of AI techniques.
5. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

**Course Contents:**

| Module | Course Topics | Contact Hours | Credits |
|---|---|---|---|
| I | Introduction to Artificial Intelligence (AI): definition, foundation and history of AI, types of AI, intelligent agents, structure of intelligent agents, introduction to soft computing, introduction and operations on fuzzy sets, nature inspired computing and algorithms. | 30 Hours | 1 |
| II | AI terminologies & basic concepts, searching for solutions, search strategies: informed and uninformed, local and global search algorithms for optimistic | 30 Hours | 1 |

| | | | |
|---|---|---|---|
| | problems, adversarial search, searching techniques for games, Alpha – Beta pruning. | | |
| **III** | Knowledge representation and reasoning, propositional logic, theory of first order logic, inference mechanism in first order logic, forward and backward chaining, probabilistic reasoning, utility theory, Bayesian Networks. | 30 Hours | 1 |
| **IV** | Applications and future of Artificial Intelligence, ethical issues, impact of AI on public life: understanding application of AI in Healthcare, Gaming, Finance, Data Security, Social Media, Travel & Transport, Automotive Industry, Robotics, AI in Entertainment, Agriculture, E-commerce and Education. | 30 Hours | 1 |

**Text/Reference Books:**


1. Stuart Russell and Peter Norvig, Artifcial Intelligence: A Modern Approach, Pearson Education, Inc., 2010.
2. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
3. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, 2003.
4. George F. Luger, "Artificial Intelligence-Structures and Strategies For Complex Problem Solving", Pearson Education / PHI, 2002.
5. F. O. Karry, C. D. Silva, Soft Computing and Intelligent Systems Design, Pearson, 2009.

## SYLLABUS

## (BAS 3103/BAS 3203) CHEMISTRY

**Course Objective: The main objectives of course are:**

1. To provide basic building blocks of engineering chemistry.
2. To provide spatial learning style using images, pictures, colors and models.
3. To provide the basic mathematical problems of polymer chemistry.

**Learning Outcome: At the end of the course, the student will be able to:**

1. understand the role of chemistry in field of engineering.
2. understand the structure of atoms and apply the periodic laws to predict chemical and physical properties of the elements.
3. develop analytical capabilities and techniques of interpretation.
4. apply the knowledge in solving problems in their respective field of study.
5. employ critical thinking and efficient problem-solving skills in the four basic areas of chemistry (analytical, inorganic, organic, and physical).

### Course Contents:

| Module | Course contents | Total Hours | Credits |
|---|---|---|---|
| I | **Introduction to General Chemistry**<br>Atomic structure, Chemical bonding: Significance of Quantum numbers, Shapes of s, p, d, and f atomic orbitals. Rules for filling electrons in various orbitals. Electronic configuration of atoms, Molecular Orbital Theory and its Applications in Homonuclear and Heteronuclear diatomic molecules.<br>Reactions kinetics: Rate equation, Order and molecularity of reaction. Theories of reaction rates, Integrated rate equations.<br>Electrochemistry: Nernst equation and its importance.<br>Nanomaterials: Types of nanomaterial, Creation and use of Fullerenes. Carbon nanotube and its application. States of matter: Space lattice, Types of unit cell (cube), Density of unit cell, Defects in crystal.<br>Liquid crystal and its application. | 30 | 1 |

Shalini

Manisha

(Prof. V.P. Sharma)

| | | | |
|---|---|---|---|
| II | **Mechanistic Concepts of Stereochemistry**: Concept of Isomerism, Types of Isomerism.<br>Optical isomerism: Elements of symmetry, molecular chirality, optical activity, chiral and achiral molecules with two stereogenic centers. Properties of Enantiomers and Disasteromers.<br>Relative and absolute configuration: Sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism: Determination of configuration of geometric isomers, E & Z system of nomenclature.<br>Conformational isomerism: Conformational analysis of ethane and n-butane.<br>Introduction to Green Chemistry, 12 principles of Green Chemistry. | 30 | 1 |
| III | **Titrimetric Analysis:** Introduction, Standard solutions, Equivalents and Normalities and Oxidation numbers, Indicators.<br>**State of Art Analytical techniques**<br>Nuclear Magnetic Resonance: Magnetic nuclei with special reference to $^{1}H$. Chemical shift, Shielding and Deshielding.<br>Ultraviolet Spectroscopy: Types of Transition, Chromophores and Auxochromes.<br>Water treatment methods for boiler feed water by Zeolite method. Water treatment: Water Quality Monitoring and Management, Surveillance, Water effluent treatment and Relevant Standards and Regulatory Norms(IS:10500, IS 14543, IS 13428) | 30 | 1 |
| IV | **Principles of Polymer Chemistry**<br>Introduction of Polymer: Classification of Polymers, Mechanism of addition polymerization, Thermoplastic and thermosetting resins, Molecular weight of polymers.<br>Elastomers: Natural rubber, Buna-S, Buna-N, Butyl rubber.<br>Synthetic Fibers: Nylon-6, Nylon 6, 6, Kevlor, Dacron.<br>Organic conducting polymers: Polyacetylene, Polythiophene, Polypyrrole, Polyaniline. Biodegradable polymers. | 30 | 1 |

Shalini

Manisha

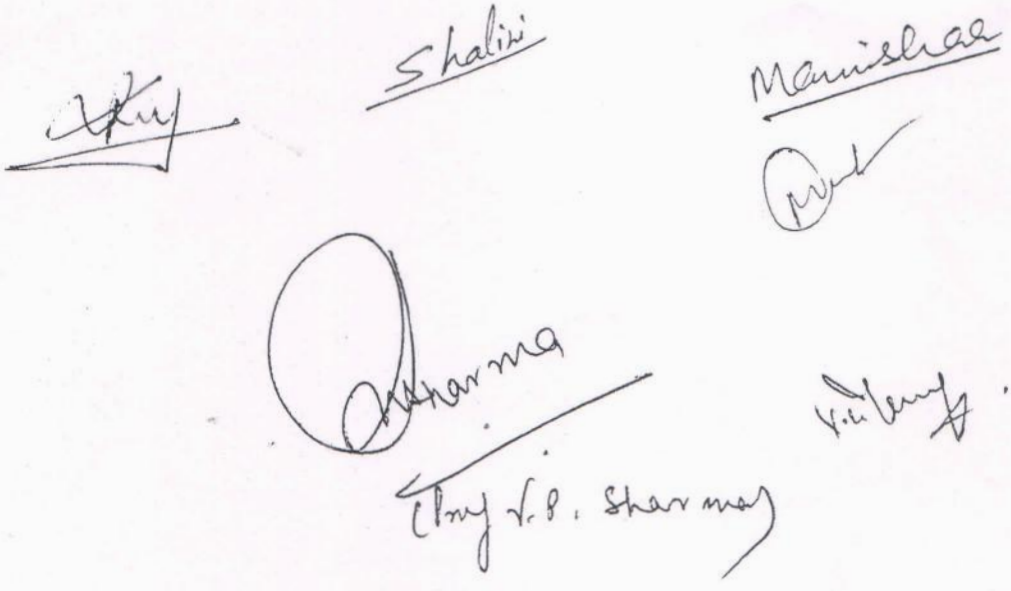
(Dr. V.K. Sharma)

**Text Book:**


1. Shashi Chawla, A Text book of Engineering Chemistry,8th edition Dhanpatrai & Co(p) ltd,2013.
2. R.K. Agarawal: Engineering chemistry, 15th edition,Krishna publication media (P) Ltd.2014
3. I.L.Finar,Organic Chemistry,6th edition ,Pearson,2011
4. Clark, J. H. "Green chemistry: Challenges and opportunities". *Green Chemistry*.1999


## Suggested Readings:


1. Arun Bahl and B.S. Bahl , Advanced organic chemistry,S.Chand,2010
2. R.T. Morrison, R.N. Boyd, S.K. Bhatacharjee, Organic Chemistry, 7thEdn, Pearson, 2011.
3. Charles P Poole, Frank J Owens, Introduction to Nanotechnology,John Wiley Sons,2007
4. Atkins P and de Paula J. Physical Chemistry (8th ed., W.H. Freeman 2006)

## SYLLABUS

**Course Title: Technical Communication** **Course Code: BHS3101/3201**

**Course Objectives:**

- To make the students aware of the fundamentals of communication and its types and various levels;
- To train them techniques and methods of vocabulary building and paragraphs writing and make communication effective and impressive;
- To groom them expert in oral as well as written communication with the knowledge of various forms and formats;
- To make them understand the role of Nonverbal (Kinesics) in Communication
- To enhance their capacity for comprehension, creative and critical thinking;

**Learning Outcome:** The successful completion of the course students will be able to:

- Understand the meaning of communication and its various applications;
- Form and apply suitable vocabulary, phrases and sentences in communicating variety of situations;
- Able to use variety of forms/formats and techniques required in different levels of communication;
- Maintain congruity between verbal and nonverbal communication;
- Able to comprehend and clarify the intricacies of art of communication.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Fundamentals of Communication:**<br>Communication: Definition, Nature, Origin, Scope, Features and Process of communication;<br>Types of Communication: Verbal and Non-Verbal, Formal and Informal, Oral & Written Communication and technical and general Communication;<br>Levels of Communication: Extra-personal, Intra-personal, Interpersonal, organisational, Grapevine, Group and Mass Communication; Language as a Tool of Communication;<br>The Flow of Communication: Vertical (Upward and Downward), Lateral or Horizontal;<br>Technical Communication: Definition, Distinction between Technical & General Communication, Importance of Technical Communication for Technocrats & Professionals;<br>Barriers to Communication: definition; types: Physical, Semantic, Psychological barriers or Extra-personal, Intra-personal, Interpersonal, and Organizational barriers, How to Overcome these Barriers; | 30 | 1 |
| II | **Creativities in Communication**<br>**Word Formation:** Affixation, Compounding, Blending, | 30 | 1 |

10/6/19 10/6/19

| | | | |
|---|---|---|---|
| | Conversion. Enriching **Vocabulary:** Synonyms, Antonyms, Homophones. Homonyms, One word Substitution, Foreign Words & Phrases;<br>**Forms of Writing and Techniques:** Note taking, Reviewing. Interpreting, Paraphrasing and Précis Writing, Pre-Requisites of Good Sentences;<br>Essentials of Good Sentences, Common Errors to be avoided<br>**Requisites of Good Paragraph Writing:** Unity, Coherence, Clarity. Proper Length, Emphasis, Logical Sequencing, Development of Paragraphs;<br>**Methods of Writing:** Inductive, Deductive, Chronological, Spatial. Comparison & Contrast, Question to Answer, Interruptive. Illustrative; | | |
| **III** | **Business Communication**<br>Principles. 7 C's of technical Communication; Formats of Business Letters; **Types of Letter:** Sales & Credit Letters, Inquiry. Quotation & Reply Letters, Letters for Placing & Fulfilling Orders, Complaint, Claim & Adjustment Letters;<br>**Job Letters:** Cover letters, Resume<br>**Reports:** Definition, Significance, Features & Purpose,<br>**Types:** Formal . Informal, Periodic, Informational, Analytical;<br>**Formats & Structures of Reports:** Letter Format, Memo Format. Printed Format, Manuscript Format; Writing of a Report Structure of Manuscript Format;<br>**Proposals:** Definition, Significance, Features & Purpose;<br>Types & Structures: Solicited & Unsolicited, Business, Research. Technical; Structure of Technical Proposals. | 30 | 1 |
| **IV** | **Presentation Strategies:** Purpose, Scope, Understanding Audience & Locale. Organizing contents, Audio-Visual Aids;<br>**Modes of Presentation:** Manuscript, Impromptu, Memorization. Extempore;<br>**Non-Verbal Dimensions of Communication:**<br>**Kinesics:** Gesture. Posture, Facial Expression, Eye Contact;<br>Paralinguistics. Proxemics, Haptics, Chronemics, Oculecsis.<br>Group Discussion.Telephone Etiquettes,Dining Etiquettes, Interviews.Ice-Breaking. | 30 | 1 |

**Text books:**

Minakshi Raman et al. Technical Communication, New Delhi: Oxford University Press, 2014.

Singh. R.P. Functional Skills in Language & Literature, New Delhi: Rupa, 2007.

**Reference Books:**

Sharma, Sangeeta et al. Communication Skills for Engineers and Scientists, New Delhi: PHI, New Delhi. 2009.

Shukla, Aditya. Professional Communication, Pune: Technical Publications, 2013.

10/6/19

10/6/19

## BEE3151/BEE3251 BASIC ELECTRICAL ENGINEERING LAB

**(Any 10 experiments)**

1. Verification of KCL & KVL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Superposition theorem.
5. Measurement of active and reactive power in 1-phase and Power Factor Improvement.
6. Measurement of active power in 3 -phase circuit using TWO wattmeter methods.
7. Study of transformer through assembling and polarity check.
8. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
9. Study of dc shunt motor speed control using (1) Armature control (2) Field Control.
10. Determination of efficiency of DC shunts motor by load test.
11. Study of Electrical Equipment used in daily life.
12. Study of DC Machine.
13. Full wave rectifier circuit using diodes.
14. Transistor input-output characteristics.

## ENGINEERING GRAPHICS LAB (BME3153/BME3253)

1. **Scales:** Representative factor, plain scales, diagonal scales, scales of chords.
2. **Projection:** Types of projection, orthographic projection, first and third angle projection.
3. **Projection of points:** The principle of orthographic projections of a point on HP and VP, Conventional representation, Projection of a point in all the quadrants.
4. **Projection of Lines**: Line inclined to one plane, inclined with both the plane, True Length and True Inclination, Traces of straight lines.
5. **Projection of planes and solids:** Projection of Planes like circle and polygons in different positions; Projection of polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions.
6. **Section of Solids:** Section of right solids by normal and inclined planes; Intersection of cylinders.
7. **Isometric Projections:** Isometric scale, Isometric axes, Isometric Projection from orthographic drawing.
8. **Perspective Projection:** Nomenclature of Perspective Projection, Method of drawing perspective views, Visual Ray Method, using Top and Front, Top and Side views.
9. **Computer Aided Drafting (CAD)-I:** Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders.
10. **Computer Aided Drafting (CAD)-II:** Transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD.

**Note:**

1. At least ten experiments are to be performed in the semester.

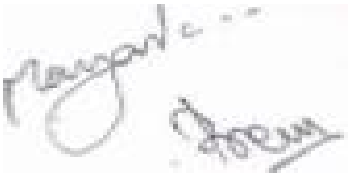
2. At least eight experiments should be performed from the above list.

Remaining two experiments may either be performed from the above list or designed & set by the concern faculty as per the scope of the syllabus

**Reference Books:**

1. Computer Aided Engineering Drawing by S.Trymbaka Murthy, I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.

2. Engineering Graphics by K.R.Gopalakrishna, 32nd edition, 2005, Subash Publishers Bangalore.



## BAS 3153/BAS3253 CHEMISTRY LAB

**Course Objective:** The main objectives of course are:

1. To Purify and identify organic compounds.
2. To calculate reaction yield for relevant lab experiments.

. **Learning objective:** Upon successful completion of this course, students will be able to:

1. identify the difference between scholarly/peer-reviewed research and practical information related to agriculture as well as information that is authoritative, unbiased, and timely.
2. apply the principles of teaching and learning in relation to practical chemistry laboratories and associated chemistry concepts.

**Course Contents:**

| Module | List of Experiments | Total hours | Credit |
|---|---|---|---|
| 1. | Determination of constituents and amount of alkalinity of supplied water sample. | | |
| 2. | Determination of total hardness of water by complexometric titration method. | | |
| 3. | Determination of chloride content in a given sample of bleaching powder | | |
| 4. | Determination of chloride content in supplied water sample using mohes method. | 60 | 2 |
| 5. | Determination of iron content in the given water sample by using external indicator | | |
| 6. | Determination of pH of a solution using a pH meter and titration of such a solution phmetrically. | | |

## Suggested Readings:


1. Textbook of practical chemistry, A.I. Vogel, Prentice Hall, 5th edition.
2. Vogels quantitative chemical analysis, A.I. Vogel, Prentice hall, 6th edition.
3. Practical organic chemistry, F.G. Mann & B.C. Saunders, orient longman,1960.


Shalini Sharma (Prof V.P. Sharma)

Manisha

**BAS 3201 Differential Equations and Fourier Analysis** **Credits: 4**

**Course Objective:**

The general objective of the course is to introduce

1. the formulation and solution of ordinary differential equations;
2. the concepts of series solution of differential equation and solution of Bessel's. Legendre's equations and their properties;
3. the concept of Fourier series expansion of functions and harmonic analysis;
4. the formulation and solution of partial differential equations arising in a number of practical problems;
5. the applications of partial differential equation in wave equations, heat flow and line transmission.

**Learning Outcomes:**

Upon successful completion of the course, students will be able to

1. identify an ordinary differential equation and its order and degree;
2. compute the general solution of 2nd order ordinary differential equations and apply them to solve the L-C-R circuits;
3. determine the general solution of higher order linear equations with constant coefficients;
4. determine whether a system of functions is linearly independent using the Wronksian;
5. use the method of reduction of order and undetermined coefficients to find a second linearly independent solution of a second order linear homogeneous equation when one solution is given;
6. use the method of variation of parameters to find particular solutions of second order, linear homogeneous equations;
7. use power series and Frobenius series method to solve differential equations;
8. expand periodic functions into Fourier series the knowledge of which is useful in signal processing;
9. determine the Fourier sine and cosine series for functions defined on an interval;
10. use the method of separation of variables to reduce some partial differential equations to ordinary differential equations;
11. solve quasilinear first-order partial differential equations using the method of characteristics and first integrals;
12. solve second-order hyperbolic partial differential equations by the travelling wave approach (D'Alembert's method of solution);
13. provide an application oriented computation for solving wave equation, heat equation and steady state two dimensional heat flow.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Differential Equations**<br>Linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solution of second order differential | 30 | 1 |

| | | | |
|---|---|---|---|
| | equation by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation). | | |
| II | **Series Solution and Special Functions**<br>Series solution of ordinary differential equations of $2^{nd}$ order with variable coefficients (Frobenius Method), Bessel and Legendre equations and their series solutions, Properties of Bessel functions and Legendre polynomials. | 30 | 1 |
| III | **Fourier series**<br>Periodic functions, Trigonometric series, Fourier series of period $2\pi$, Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series. Harmonic Analysis. | 30 | 1 |
| IV | **Partial Differential Equations and its applications**<br>Homogeneous Linear partial differential with constant coefficients, Non- Homogeneous Linear partial differential equation with constant coefficients. Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions, Laplace equation in two-dimensions, Heat conduction equations up to two-dimensions, Equations of transmission lines. | 30 | 1 |

**Recommended Books:**


1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
2. Peter V. O'Neil, Engineering Mathematics-II, Thomson (Cengage) Learning, 2007.
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
4. R. K. Jain & S. R. K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.
5. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
6. C. Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd. 2003
7. G. F. Simmons, Differential Equations, Tata McGraw-Hill Publishing Company Ltd. 1981.
8. C. Prasad, Advanced Mathematic for Engineers, Prasad Mudranalaya, 1996.
9. A. C. srivastava and P. K. Srivastava, Engineering Mathematics, Vol. II, PHI Learning Pvt. Ltd., New Delhi, 2011.

## SYLLABUS

## BAS-3202 ENGINEERING PHYSICS II

**Course Objective:**

The main objectives of the course are

1. To provide knowledge and to develop an understanding of Modern Physics.
2. To develop a scientific attitude at micro and nano scales of materials.

**Learning Outcome:**

At the end of the course students shall be able

1. To apply knowledge in developing advanced materials and devices.
2. To apply fundamental laws of electricity and magnetism in engineering.
3. To identify and solve applied physics problems.

**Course Contents:**

| Module | Course Topics | Total Hours | Credits |
|---|---|---|---|
| I | **Fundamental of quantum Mechanics:**<br><br>Wave particle duality, de-Broglie matter wave, Davission Germer experiment, Phase velocity and group velocity, Uncertainty principle and its applications, Wave function and its significance, Expectationvalue, Schrödinger wave equation and its significance, Particle in one dimensional box, Linear harmonic oscillator. | 30 | 1 |
| II | **Crystal Structure, X ray Diffraction & Electromagnetism:**<br><br>Space lattice, basis, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices, Crystal-System Structure, Packing factor (cubic, body and face), Crystal structure of NaCl and diamond, Lattice planes and Miller Indices, Reciprocal Lattice, Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer.<br>Displacement current, Equation of continuity, Maxwell's equations (Integral and Differential forms), Poynting theorem and poynting vectors, EM-wave equation and its propagation characteristics in free space, non-conducting and in conducting media, Skin depth. | 30 | 1 |

| | | | |
|---|---|---|---|
| III | **Superconductivity and Nanotechnology:**<br><br>Superconductors: Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type I and Type II superconductors, BCS theory (Qualitative), High temperature superconductors and applications of super-conductors.<br>Nano-Materials: Basic principle of nanoscience and technology, Structure; properties and uses of fullerene and carbon nanotubes, Synthesis of nanomaterials-chemical vapour deposition technique, pulse laser deposition technique, characterization techniques (XRD, SEM,AFM),. Applications of nanotechnology. | 30 | 1 |

**References:**


1. Concept of modern physics, Auther Bieser, Tata Mc-Graw Hill
2. Solid state Physics, S.O. Pillai, New Age International
3. Solid State Physics, CharleKittal Seventh Ed. Wiley Eastren
4. Nanotechnolgy, Reached Booker& Earl Boisen, Welly PL
5. Introduction to Electrodynamics, David J. Griffith, PHI


(Dr. Karunesh Tiwari)
Convener

(Prof. Rajeev Manohar)
External Expert

(Dr. Nitin Jain)
Nominee

(Dr. Neelam Yadav)
Member

# Babu Banarasi Das University, Lucknow
## School of Engineering
## Bachelor of Technology (Artificial Intelligence)
## Branch Code: 37

| Credit Summary Chart | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Category | Semester | | | | | | | | Total Credits | %age |
| | I | II | III | IV | V | VI | VII | VIII | | |
| F | 16/11 | 11/16 | 0 | 0 | 0 | 0 | 0 | 0 | 27/27 | 12.80 |
| C | 10/16 | 16/10 | 25 | 25 | 25 | 21 | 13 | 13 | 148/148 | 70.14 |
| GE | 0 | 0 | 0 | 0 | 0 | 4 | 8 | 8 | 20 | 9.48 |
| OE | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 8 | 3.79 |
| GP | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | 3.79 |
| Total | 27/28 | 28/27 | 26 | 26 | 26 | 26 | 26 | 26 | 211 | 100 |

| Discipline wise Credit Summary Chart | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Category | Semester | | | | | | | | Total Credits | %age |
| | I | II | III | IV | V | VI | VII | VIII | | |
| Basic Sciences | 10/12 | 12/10 | 4 | 3 | | | | | 22 | 10.43 |
| Humanities and Socials Sciences | 0/4 | 4/0 | 2 | 2 | 3 | 3 | | | 21 | 9.95 |
| Engg. Sciences | 16/11 | 11/16 | | | | | | | 27 | 12.79 |
| Professional Subject Core | | | 19 | 20 | 22 | 17 | 10 | 5 | 93 | 44.07 |
| Professional Subject -General Elective | | | | | | 4 | 8 | 8 | 20 | 9.48 |
| Professional Subject -Open Elective | | | | | | | 4 | 4 | 8 | 3.80 |
| GP + Project Work, Seminar and / or Internship in Industry or elsewhere. | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 9 | 20 | 9.48 |
| Total | 27/28 | 28/27 | 26 | 26 | 26 | 26 | 26 | 26 | 211 | 100 |

## SEMESTER III

| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BHS3301/ BHS3302 | Industrial Psychology / Industrial Sociology | 2 | 0 | 0 | 40 | 60 | 100 | 2 |
| C | BAS3301 | Complex Analysis and Integral Transforms | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3301 | Database Management Systems | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3302 | Artificial Intelligence in Mechanical Engineering Systems | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BCS3301 | Discrete Mathematics | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BCS3303 | Digital Logic Design | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3351 | Database Management System Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3352 | Artificial Intelligence in Mechanical Engineering Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BCS3353 | Digital Logic Design Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| | GP3301 | General Proficiency | - | - | - | 100 | - | 100 | 1 |
| Total | | | 17 | 5 | 6 | 460 | 540 | 1000 | 26 |

## SEMESTER IV

| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BHS3402/ BHS3401 | Industrial Sociology /Industrial Psychology | 2 | 0 | 0 | 40 | 60 | 100 | 2 |
| C | BAS3401 | Statistical and Numerical Techniques | 2 | 1 | 0 | 40 | 60 | 100 | 3 |
| C | BAI3401 | Concepts of Machine Learning with Python | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3402 | Data Structure Using 'C' | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BCS3402 | Operating Systems | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BIT3404 | Computer Organization & Architecture | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3451 | Machine Learning Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BCS3452 | Operating System Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3452 | Data Structure Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BIT3454 | Numerical Techniques Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| | GP3401 | General Proficiency | - | - | - | 100 | - | 100 | 1 |
| Total | | | 16 | 5 | 8 | 500 | 600 | 1100 | 26 |

| SEMESTER V | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BHS3501 | Engineering & Managerial Economics | 3 | 0 | 0 | 40 | 60 | 100 | 3 |
| C | BAI3501 | Optimization Techniques | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3502 | Concepts of Data Science with Python | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3503 | Artificial Neural Network | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BCS3503 | Computer Networks | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BCS3504 | Automata Theory and Formal Languages | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3552 | Data Science with Python Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BCS3553 | Computer Networks Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3553 | Artificial Neural Network Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| | GP3501 | General Proficiency | - | - | - | 100 | - | 100 | 1 |
| Total | | | 17 | 5 | 6 | 460 | 540 | 1000 | 26 |

| SEMESTER VI | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BHS3601 | Industrial Management | 3 | 0 | 0 | 40 | 60 | 100 | 3 |
| C | BAI3601 | Evolutionary Algorithms | 3 | 0 | 0 | 40 | 60 | 100 | 3 |
| C | BAI3602 | Design & Analysis of Algorithms | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3603 | Robotics and Intelligent Systems | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BCS3604 | Compiler Design | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| GE | | Generic Elective I | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3651 | Evolutionary Algorithms Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3652 | Algorithms Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3653 | Seminar | 0 | 0 | 2 | 100 | 0 | 100 | 1 |
| | GP3601 | General Proficiency | - | - | - | 100 | - | 100 | 1 |
| Total | | | 18 | 4 | 6 | 520 | 480 | 1000 | 26 |

Note: The students need to undergo a 4 to 6 weeks of industrial training that will be evaluated in the VII Semester.

| SEMESTER VII | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BAI3701 | Natural Language Processing | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| C | BAI3702 | Fuzzy Logic | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| GE | | Generic Elective II | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| GE | | Generic Elective III | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| OE | | Open Elective I* | - | - | - | 40 | 60 | 100 | 4 |
| C | BAI3751 | Natural Language Processing Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3752 | Fuzzy Logic Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3758 | Industrial Training Evaluation | 0 | 0 | 2 | 100 | - | 100 | 1 |
| C | BAI3759 | Project I[#] | 0 | 0 | 4 | 100 | - | 100 | 2 |
| | GP3701 | General Proficiency | - | - | - | 100 | - | 100 | 1 |
| Total | | | 12 | 4 | 10 | 580 | 420 | 1000 | 26 |

*Students will opt any one of the open elective from the list of open electives provided by the university.

[#]Students need to submit an abstract for the project, select a guide and will complete the literature review related to the project.

| SEMESTER VIII | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Category | Course Code | Code Title | Contact Hours | | | Evaluation Scheme | | | Credits |
| | | | L | T | P | CIA | ESE | Course Total | |
| C | BAI3801 | Concepts of Deep Learning | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| GE | | Generic Elective IV | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| GE | | Generic Elective V | 3 | 1 | 0 | 40 | 60 | 100 | 4 |
| OE | | Open Elective II** | - | - | - | 40 | 60 | 100 | 4 |
| C | BAI3851 | Deep Learning Lab | 0 | 0 | 2 | 40 | 60 | 100 | 1 |
| C | BAI3859 | Project II[##] | 0 | 0 | 16 | 160 | 240 | 400 | 8 |
| | GP3801 | General Proficiency | - | - | - | 100 | - | 100 | 1 |
| Total | | | 9 | 3 | 18 | 460 | 540 | 1000 | 26 |

**The opted subject should be different from the one selected in VII Semester.

[##]This is in continuation with the project work started in Semester VII. In this semester the students will formulate the methodology do experimentation and show the results. Finally all project work will be presented in a report i.e. Project Report.

Legends:

L Number of Lecture Hours per week
T Number of Tutorial Hours per week
P Number of Practical Hours per week
CIA Continuous Internal Assessment
ESE End Semester Examination

Category of Courses:

F Foundation Course
C Core Course
GE Generic Elective
OE Open Elective

## List of Open Electives
## Offered by B. Tech (Artificial Intelligence) course

| S.N. | Course Code | Open Elective |
|---|---|---|
| 1 | OE33701 | Principles of Industry 4.0 |
| 2 | OE33702 | Nature Inspired Algorithms |

## List of Generic Electives

| Course Code | Generic Elective I |
|---|---|
| GE33711 | Cyber Law and Security |
| GE33712 | Introduction to Unmanned Aerial Vehicles |
| GE33713 | Computer Vision |
| GE33714 | Recommender Systems |

| Course Code | Generic Elective II |
|---|---|
| GE33721 | Block Chain Technology |
| GE33722 | System Modeling & Simulation |
| GE33723 | Embedded System Design |
| GE33724 | Sentiment Analysis |

| Course Code | Generic Elective III |
|---|---|
| GE33731 | Evolutionary Multi-objective Optimization |
| GE33732 | Bioinformatics |
| GE33733 | Internet of Things |
| GE33734 | Cloud Computing |

| Course Code | Generic Elective IV |
|---|---|
| GE33741 | Data Mining and Ware Housing |
| GE33742 | Introduction to Drones |
| GE33743 | Computer Forensics |
| GE33744 | Augmented & Virtual Reality |

| Course Code | Generic Elective V |
|---|---|
| GE33751 | Wireless Sensor Networks |
| GE33752 | Distributed Systems |
| GE33753 | Gaming in Artificial Intelligence |
| GE33754 | Pattern Recognition |