

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE101

Subject : Chemistry

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVES :

The objective of this foundational course is to develop general familiarity and understanding with the following areas in chemistry: inorganic, organic, physical chemistry, electrochemistry, photochemistry and Thermochemistry. The course also intended to make students work effectively and safely in the laboratory working environment. Last portion of curriculum addresses critical thinking and numerically analyzing the chemical problems.

### Course content:

**Unit-I : Molecular Structure & Bonding:** VSEPR Model, Valance-Bond Theory, Molecular Orbital Theory, Molecular Orbital of Polyatomic Molecules.

**Electrochemistry:** Arrhenius theory of electrolytic dissociation, Transport Number, Kohlrausch's Law, Solubility Product, Redox Reaction, Electrochemical & Concentration Cells.

**Unit-II : Chemical & Phase Equilibria:** Phase Diagram for single component system (Water), Phase diagram for Binary Eutectic System (Copper-Silver), Corrosion of metals in acids, Corrosion by Oxygen, Corrosion by Metal Contact.

**Reaction Dynamics:** Order, Molecularity, Rate Law, Methods of detPermining order of reaction (1<sup>st</sup> & 2<sup>nd</sup> Order).

**Unit-III : Polymers & Polymerization:** Monomers, Polymers, their classification, thermoplastics & thermosetting with examples, Bio-Polymerization, Bio-Degradable Polymerization, Preparation, Properties & Technical

Applications of PVC, PVA, Teflon, Nylon6, & Nylon6:6, Polyester, Phenol-Formaldehyde, Urea-Formaldehyde, Natural & Synthetic Rubber, Vulcanization of Rubber.

**Unit-IV : Photochemistry:** Photo-excitation of organic molecules, Jablonski Diagram, Laws of Photochemistry and quantum yield, some examples of photochemical reactions, chemistry of vision and other applications of photochemistry.

**Unit-V : Thermochemistry:** Fundamental concept of first law, work, heat, energy and enthalpies, relation between  $C_V$  &  $C_p$ . Second Law: Entropy, Free Energy, (The Helmholtz and Gibbs) and chemical potential.

Numerical problems based on water analysis and water softening process. Determination of hardness by complexometry, Alkalinity and its determination and their relevant numerical problems, testing of lubricating oils, viscosity and viscosity index, flash & fire point, cloud & pour point, Aniline Point, Carbon Residue, Steam-emulsion number, Neutralization number, Saponification number.

**Laboratory :** Experiments as suggested by the course coordinator.

**Course outcomes :** Student after successful completion of course must possess skills to think critically and analyze chemical

problems. They must also feel confident to work in teams as well as independently. Students are also expected to learn solving chemistry problems with an engineering purview. Laboratory work is intended for students to learn conducting experiments, and analyze experimental data.

**Evaluation :** Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

**References :**

*Lee, J. D, Author, Concise Inorganic Chemistry, Oxford University Press*

*Alberty, R. A., Physical Chemistry, John Wiley and Sons*

*N. Krishnamurthy, P. Vallinayagam, Engineering Chemistry, PHI Learning Pvt. Ltd.*

*Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology, Tata McGraw Hill.*



# UIT-RGPV (Autonomous) Bhopal

Subject code-BE102

Subject : Mathematics- I

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVES :

The objective of this foundational course is to review mathematical concept already learnt in higher secondary classes. This course will also introduce fundamentals of mathematical functions, derivatives and aspects of calculus to students.

## Course Contents

**UNIT I : Recapitulation of Mathematics-** Basics of Differentiation, Rolle's and Lagranges Theorem, Tangents and Normals, Indefinite Integral (Substitution, Integration using Trigonometric Identity & Integration by Parts & Definite Integral).

**UNIT II : Ordinary Derivatives & Applications -** Expansion of functions by Maclaurin's & Taylor's Theorem (One Variable), Maxima and Minima of functions of two variables, Curvature (Radius, Center & Circle of Curvature for Cartesian Coordinates), Curve Tracing.

**UNIT III : Partial Derivatives & Applications-** Definition, Euler's Theorem for Homogeneous Functions, Differentiation of Implicit Functions, Total Differential Coefficient, Transformations of Independent Variables, Jacobians, Approximation of Errors.

**UNIT IV : Integral Calculus -** Definite Integrals as a Limit of Sum, Application in Summation of series, Beta and Gamma functions (Definitions, Relation between Beta and Gamma functions, Duplication formula, Applications of Beta & Gamma Functions).

**UNIT V : Applications of Integral Calculus-** Multiple Integral (Double & Triple Integrals), Change of Variables, Change the Order of Integration, Applications of Multiple Integral in Area, Volume, Surfaces & Volume of Solid of Revolution about X-Axis & Y-Axis.

**Course outcomes-** The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concepts of mathematical functions, partial derivatives as well as fundamentals and applications of integral calculus.

**Evaluation-** Evaluation will be continuous an integral part of the class as well through external assessment.

## Reference Books:

- 1) Michael Greenberg, *Advanced Engineering Mathematics, Second Edition, Pearson Education, 2002 (Indian Edition).*
- 2) B.V. Rammana, *Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007.*
- 3) Potter, Goldberg & Edward, *Advanced Engineering Mathematics, Oxford University Press.*
- 4) S. S. Shastry, *Engineering Mathematics, PHI Learning*
- 5) C.B. Gupta, *Engineering Mathematics I & II, McGraw Hill India, 2015*
- 6) Alan Jeffrey, *Mathematics for Engineers and Scientist, CRC Press, 2013.*
- 7) Dean G. Duffy, *Advanced Engineering Mathematics with MATLAB, CRC Press, 2013.*
- 8) E. Kreyszig, *Advanced Engineering Mathematics, John Wiley & Sons Inc.*
- 9) Gorakh Prasad, *Differential Calculus, Pothishala Publication*
- 10) Gorakh Prasad, *Integral Calculus, Pothishala Publication*
- 11) N P Bali, *Higher Engineering Mathematics, Laxmi Publications*
- 12) Dwivedi, *Engineering Mathematics, PHI Learning*
- 13) B.S Grewal *Higher Engineering Mathematics, Khanna Publications*

# UIT-RGPV (Autonomous) Bhopal

**Subject code-BE103**

**Subject : English**

**Semester : I/II**

**For credits & marks refer your scheme**

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## **COURSE OBJECTIVES :**

**Grammar** - Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations.

**Vocabulary Development** - Using Dictionary and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargons.

**Developing Reading Skills** - Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies and Benefits of effective reading, note-making, note-taking, Reading and comprehension of technical material and SQ3R reading technique

**Developing Writing Skills** - Planning, Drafting & Editing, Writing with style, right-words selection, writing effective sentences, developing logical paragraphs, art of condensation, précis, essay, technical definition and technical description

**Business Correspondence** - Business Letters, Parts & Layouts of Business Letters, Writing Resume/ Application Calling/ Sending Quotations/ Orders/ Complaints and E-mails.

## **Course objective:**

The objective of this foundational course is to develop the second language learners' ability to use the four fundamental language skills - listening, speaking, writing and reading. The objective of this laboratory is to practice English phonetics through audio & visual aids and computer software. It intends to enable student to speak English correctly with confidence.

## **Language Laboratory:**

1. Basic Grammar & Vocabulary Practice (Synonyms, Antonyms, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, Proverbs, Common Errors. Phonetic Symbols, Pronunciations)
2. Listening Skills - Including Listening Comprehension
3. Extempore and JAM (Just a Minute Session)
4. Role Play - I  
Role play - II
5. Body Language  
Debate
6. Oral Presentation - Preparation & Delivery using Audio - Visual Aids with stress on body language and voice modulations. (Topics to be selected by the Instructor)

**Course outcomes :** Student after successful completion of course must possess sound language skills. They must also feel confident in communicating their ideas and feelings. After laboratory exercises, students must possess sound language skills. They must also feel confident in communicating their ideas to others.

**Evaluation :** Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

### Reference Books

1. *Practical English Usage*, Michael Swan , Oxford.
2. *A Practical English Grammar* , A.J. Thompson and A.V. Martinet , Oxford.
3. *Essential English Grammar* , Raymond Murphy , Cambridge.
4. *Technical Communication* ,Dr. M. Hemamalini.
5. *Current English Grammar and Usage*, S.M. Gupta , PHI.
6. *Technical English* , M .Sambaiah , Wiley.
7. *English for Effective Communication* , Sanjay Kumar and Pushp Lata, Oxford.
8. *English Grammar and Composition*, Wren and Martin , S. Chand.
9. *Communication Skills for Engineers* , K.R. Lakshminarayan and T. Murugavel, - Scitech.



# UIT-RGPV (Autonomous) Bhopal

Subject code-BE104

Subject : Fundamentals of Electrical Engineering

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVES :

This subject has been introduced for the undergraduate students to understand and develop the concepts of basic electrical engineering for all the undergraduate students of different branches of engineering.

**Course content: D.C. Circuits:** Units and dimensions, Ohm's Law, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and their application for analysis of series and parallel resistive circuits excited by independent voltage sources, Power & Energy in such circuits. Mesh & nodal analysis, Star Delta circuits.

**1- phase AC Circuits:** Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity, Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series & parallel circuit

**3-phase AC Circuits:** Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections. Power in balanced & unbalanced three-phase system and their measurements

**Magnetic Circuits:** Basic definitions, magnetization characteristics of Ferro magnetic materials, self inductance and mutual inductance, energy in linear magnetic systems, coils connected in series, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F.

single phase transformer- general construction, working principle, e.m.f. equation, open circuit and short circuit test

**Electrical Machines:** D.C. Motor & D.C. Generator, Three phase Induction motor and Synchronous Machines, their general construction, working principle, emf equation and applications. Types of losses occurring in electrical machines.

**Course outcomes :** The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Electrical Engineering subjects. The topics covered under this subject will help to enhance the basic understanding of Electrical machines and power systems.

**Evaluation :** Evaluation will be continuous and integral part of the class followed by final examination.

## References

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

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE105

Subject : Engineering Graphics

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVES :

1. To familiarize with the construction of geometrical figures
2. To familiarize with the projection of 1D, 2D and 3D elements
3. To familiarize with the sectioning of solids and development of surfaces
4. To familiarize with the Preparation and interpretation of building drawing

**Introduction To Engineering Drawing:** Scales, types Engineering curves: conical Curves by different methods. Construction of Roulettes-cycloid, Epicycloids, hypocycloids, Trochoids, Special Conditions,

**Projections of Points and Planes:** Various types of projection Systems, Projection of Points in different quadrants, Projection of parallel Line, Perpendicular line and oblique Line, line placed in two quadmnts, line contained by Profile Plane, Traces of lines methods of determining T.L. and T.I. of oblique line rotating line method Trapezoidal method, Real world problems.

**Projections of Planes:** Projection of Perpendicular and oblique plane. Traces of plane.

**Projection of Solids:** Classification of Solids, Position of Solids with respect to R.P. Projection of Platonic solids, Polyhedrons solids of revolution, projection of solids on Auxiliary plane, Projection of Combination of Solids Section of Solids: Classification of section planes. B.I.S. representation. Section of right solids by normal and inclined planes. Section of platonic solids, True and apparent shape of section Problems on anti section.

**Development of Surfaces:** Principle of development of surfaces, methods of development parallel line and radial line methods for right solids, solids with cutouts. Intersection of cylinders. Isometric Projections Principle of isometric projection, isomeric scale, isometric axes, isometric views. Methods of drawing so metric projections. Combinations of Solids, isometric Projection from orthographic drawing Conversion of someone Views to Orthographic Views.

**Introduction to computer-aided drafting (CAD):** Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems; Basic drawing commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror. Display Commands: Zoom, Pan, Redraw, and Regenerate; Simple dimensioning and text, Simple exercises.

**Solid modelling:** Basics of 2-D solid modelling

**Laboratory :** Drawing for topics covered in the theory as suggested by the course coordinator.

**Evaluation :** Evaluation will be continuous an integral part of the class as well through external assessment.

## References

*Bhatt and V.M.Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.*  
*James leach, AutoCAD 2015 Instructor, SDC Publications*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE106

Subject : Manufacturing Practices

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVES :

1. To familiarize with the basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy
2. To familiarize with the production of simple models in the above trades.

**Fitting:** Tools & Equipments – Practice in filing. Making Vee Joints, Square, Dovetail joints and Key making - plumbing.

*Suggested Mini project – Assembly of simple I.C. engines*

**Carpentry:** Tools and Equipments- Planning practice. Making Half Lap, Dovetail, Mortise & Tenon joints.

*Suggested Mini project - model of a single door window frame.*

**Sheet Metal:** Tools and equipments– practice. Making rectangular tray, hopper, scoop, etc.

*Suggested Mini project - Fabrication of a small cabinet, dust bin, etc.*

Tools and equipments - Arc welding of butt joint, Lap joint, Tee fillet. Demonstration of gas welding, TIG & MIG welding.

**Smithy:** Tools and Equipments – Making simple parts like hexagonal headed bolt, chisel.

**Foundry:** Tools and Equipments, Mould making, conducting casting operation of a job

1. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
2. An ability to design and conduct experiments
3. An ability to design a system, component, or process to meet desired needs .ethical, health and safety, manufacturability, and sustainability
4. An ability to use the techniques, skills, and modern engineering tools necessary for Engineering practices

Evaluation will be continuous an integral part of the class as well through external assessment.

## References

*S K Hazara Choudhary, Gopal.T.V, Kumar.T, and Murali.G, “A first course on workshop practice – Theory, Practice and Work Book”, Suma Publications, Chennai, 2005.*

*Kannaiah.P and Narayanan.K.C, “Manual on Workshop Practice”, Scitech Publications Venkatachalapathy.V.S, “First year Engineering Workshop Practice”, Ramalinga Publications*



# UIT-RGPV (Autonomous) Bhopal

Subject code-BE107

Subject : Communication

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE:

The objective of this course is to help students to acquire reading and writing skills in a self-learning mode. To develop in them an interest to read and appreciate literary books. The self-learning module is designed to improve the academic language skills. Through writing a book review he/she will learn how to organize his/her arguments and to use language effectively.

## Course content:

### Exercises to be performed by students:

Reading text selection from the list given below:

1. My experiments with truth by M.K Gandhi.
2. Wings of fire by A.P.J Abdul Kalam.
3. The theory of everything by Stephen Hawking.
4. A Passage to India by E.M. Forster.
5. The Argumentative Indian by Amartya Sen.
6. Malgudi Days by R.K. Narayan.
7. The old man and the sea by Ernest Hemingway.
8. Last Mughal by William Dalrymple.
9. Life of Pi by Vann Martel.
10. The Alchemist by Paulo Coelho.
11. Haroun and the sea of stories by Salman Rushdie
12. I am ok you are ok by Thomas Harris.
13. The Eighth Habit by Stephen Covey.
14. Tough Time Never Last But Tough People Do by Dr. Robert Schuller.
15. The Road Less Travelled by M. Scott Peck.
16. ..or any other book/ text of your own choice.

**Course outcomes :** Student after successful completion of course must possess sound comprehension skills. They must also feel confident in writing reviews and comments on the text material.

**Evaluation :** Evaluation will be continuous as an integral part of the class. Assessment will be based on assignments, presentations, and viva of each candidate.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE108

Subject : Introduction to Mechanical Engineering

Semester : I/II

For credits & marks refer your scheme

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## **COURSE OBJECTIVE:**

This course introduces students to mechanical engineering and its sub-domains. Students are expected to learn about scope, current and future trends, jobs, innovations & research opportunities in the field of mechanical engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

**Course content:** What is Engineering, Who are Mechanical Engineers, Overview of Mechanical Engineering, its domains, scope and its utility in different areas; Specializations available with in mechanical Engineering (thermal, production and design) and job opportunities in mechanical Engineering.

Basic definitions of terms related to Thermodynamics, First and Second law of Thermodynamics, Properties of Steam, Introduction to Boilers, Terminology of IC Engines, Two and Four Stroke Petrol and Diesel Cycle.

Introduction to mechanical properties, basic manufacturing processes, pattern, type and its use in metal casting, Introduction of welding, brazing and soldering processes

Case study on any topic from Manufacturing Engineering Magazine Published by Society of Manufacturing Engineers (USA), Machinist Magazine, Technorama published by Institution of Engineers (India) and Manufacturing Today and any other magazine related to mechanical engineering.

Overview of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Society of Automotive Engineers, American Society of Mechanical Engineers (ASME); Indian Society of Mechanical Engineers (ISME) etc ; Emerging areas and new technologies in the field of mechanical engineering (3D Printing)

**Course outcomes :** After successful completion of course, Students are expected to possess basic understanding and knowledge about the scope, current and future trends in mechanical engineering. The versatility of the mechanical engineering branch and career-opportunities in this field will enable the students to explore the new avenues in their future endeavours.

**Evaluation :** Evaluation will be continuous an integral part of the class only through internal assessment

## **References :**

*Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning. Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE109

Subject : Introduction to Electrical Engineering

Semester :

For credits & marks refer your scheme

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## **COURSE OBJECTIVE:**

This subject has been introduced for the undergraduate students of B.E. Electrical Engineering as an introductory minor course giving a broad spectrum of the prevalent technologies, carrier opportunities and prospects in the area of academics, industries and research and development in leading organizations.

**Course content:** An overview of Electrical Engineering, Generation, Transmission and Distribution, Distributed generation, National Power Grids, Smart Grid

Various electrical equipments viz Transformer, Induction motor, synchronous machine, Circuit Breakers etc, Relays, substation components, Product specification, application

Leading manufacturers of Electrical equipments and components, Electrical Engineering research organization, PSUs and utilities

General Introduction to Power Electronics, Power System, Electrical Machines, Control System, Automation

Role of Electrical Engineer in Industry, R&D, Electrical Utilities, Placement scenario, future trends

**Course outcomes:** The final outcome of the subject will result into an enhancement in understanding vast spectrum of opportunities and applications of electrical engineering for an incumbent undergraduate student. Latest trends and technologies in the area of renewable energy, smart grid and industrial control will be the key outcome of this subject.

**Evaluation:** Evaluation will be continuous an integral part of the class only through internal assessment

## **References:**

1. D.P. Kothari & I.J. Nagrath, *Basic Electrical Engineering*, Tata McGraw Hill, latest edition.
2. M.S. Sukhija, T. K. Nagsarkar, *Basic Electrical and electronics engineering*, Oxford University press, 2012

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE110

Subject : Introduction to Electronics Engineering

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE:

1. To understand the construction, identification, characteristics, specifications, merits, limitations and applications of electronic components and materials
2. To understand communication, audio and video communication, and microwave communication
3. To fill the gap between learning and application
4. To explore varied career options

## Course content:

**Introduction:** What is electronics, An introduction to Electronic devices & circuits, Analog and digital electronics, Analog communication, Digital communication, Microwave engineering, Micro processor & controllers, Antenna, Signals & systems.

**Scope and applications:** Wireless communication, Satellite Communication, Internet Telephony, Nanotechnology, Teleconferencing, Embedded System, Wireless Sensor Networks, Optical Computing, Electrocardiograph, Display Technology, Advanced Optical Networks, Brain Computer Interfaces, Thin Film Technology, Global positioning system, Fiber Optics, Micro electro mechanical systems, Robotics, Radar, Speaker Recognition, Microwave Communication, Earthquake Monitoring, Remote Sensing, Direct to Home TV systems, Wireless Communication (mobile phones, geographical navigation, satellite communication, Wi-Fi etc.)

**Some of the govt. Sector / private sector electronics labs/division/companies:** CSIR LABS, CSIO, DRDO, BSNL, BEL, BHEL, C-DAC, DOORDARSHAN, ISRO, TBRL, IIT'S, Environment Monitoring Divisions PANASONIC, SAMSUNG, SONY, PHILIPS, TOSHIBA, SANSUI, VIDEOCON, ONIDA, HAIER, LG ELECTRONICS, PIONEER, LLYOD HITACHI, APPLE, WIPRO, ELICO, HP

**Telecom companies:** Top companies of VLSI, Fabrication units in India and abroad

**Career options:** Telecommunication, Software Development, Consumer Electronics, Semiconductor, Embedded Systems etc.

Product Based Company – Building their own product and selling it in market,

Service Based Company – Building product, application or part of them, for other companies and their clients

Telecom equipment R&D, EDA Company

Electronic Exchanges, Department of Telecommunications, BSNL, Railways, Electricity Board, Medical equipments manufacturing

**Course outcomes :** To prepare the students according to the requirements of industry for highly skilled engineers and contribute to the next generation technology by their innovation.

**Evaluation :** Evaluation will be continuous an integral part of the class.

## References :

*Study material provided by the instructor*

# UIT-RGPV (Autonomous) Bhopal

**Subject code-BE111**

**Subject : Introduction to Automobile Engineering**

**Semester : I/II**

**For credits & marks refer your scheme**

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## **COURSE OBJECTIVES :**

This course introduces students to Automobile Engineering and its sub-domains. Students are expected to learn about scope, current and future trends, jobs, innovations & research opportunities in the field of Automobile Engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

**Course content:** What is Engineering, Who are Automobile Engineers , Overview of Automobile & Mechanical Engineering, its domains, scope and its utility in different areas; Specializations available with in Automobile Engineering and job opportunities in Automobile Engineering. Basic definitions of terms related to Thermodynamics, First and Second law of Thermodynamics, Properties of Steam, Introduction to Boilers, Terminology of IC Engines, Two and Four Stroke Petrol and Diesel Cycle. Introduction to mechanical properties, basic manufacturing processes, pattern, type and its use in metal casting, Introduction of welding, brazing and soldering processes Case study on any topic from Manufacturing Engineering. Magazine Published by society of Automotive Engineering , Society of Manufacturing Engineers (USA), Machinist Magazine, Technorama published by Institution of Engineers (India) and Manufacturing Today and any other magazine related to mechanical engineering. Overview of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Society of Automotive Engineers (SAE), United States Council for Automotive Research, American Society of Mechanical Engineers (ASME) etc; Emerging areas and new technologies in the field of Automobile Engineering like alternate automotive fuels, hybrid vehicles etc.

**Course outcomes :** After successful completion of course, Students are expected to possess basic understanding and knowledge about the scope, current and future trends in mechanical engineering. The versatility of the mechanical engineering branch and career-opportunities in this field will enable the students to explore the new avenues in their future endeavours.

**Evaluation :** Evaluation will be continuous an integral part of the class only through internal assessment

## **References :**

*Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning. Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE112

Subject : Engineering Mechanics & Civil Engineering

Semester : I/II

For credits & marks refer your scheme

## COURSE OBJECTIVES :

This course introduces students to civil engineering and its sub-domains. Students are expected to learn about scope, current and future trends in infrastructure industry, jobs, innovations & research opportunities in the field of civil engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

## Course content :

**Unit-I : Engineering Materials** - Stones, Bricks, Cement, Lime, Timber, Mortar and Concrete- types, basic properties, tests & uses.

**Unit-II : Building construction**- Sub and super structure of a building, Types of Foundations, Types of Brick and Stone masonry, Planning & Orientation of building, Plastering and Pointing, Concept of Green Building.

**Unit-III : Surveying & Positioning**- Introduction to Surveying- Classification, Fundamental Principles, & Instrument Used, Linear measurement by Chain survey, Angular measurement by Compass survey, Measurement of elevation by levelling, Introduction to Remote Sensing & its applications.

## Engineering Mechanics

**Unit-IV : Forces, Centroid & Moment of Inertia**- Composition and resolution of forces, Concurrent, non-concurrent and parallel forces in a plane, Free body diagrams, Moment of a force and Varignon's theorem, Conditions of equilibrium, Polygon of forces, Couple, Moment of a couple, Equivalent couple, Addition of couples, Location of Centroid and Moment of Inertia of plane areas, Perpendicular Axis and Parallel Axis theorems,

**Unit-V : Shear Force and Bending Moment**: Shear Force and Bending Moment Diagram for Cantilever and Simply supported beam with concentrated load, distributed load and couple. Point of Inflexion/ Contra-flexure, Relationship between bending moment and shear for pure bending.

## References:

1. Palanichamy, *Basic Civil Engineering*, TMH
2. S. Ramamrutam & R. Narayanan: *Basic Civil Engineering*, Dhanpat Rai Pub, New Delhi.
3. Duggal: *Surveying*, Tata McGraw Hill New Delhi.
4. S. C. Rangwala: *Building Construction*, Charotar Publications House, Anand.
5. Sushil Kumar: *Building Construction*.
6. Shesha Prakash & Mogaveer: *Elements of Civil Engineering and Engineering Mechanics*, PHI Learning Pvt. Ltd New Delhi
7. Dr. K.L. Kumar *Engineering Mechanics*, Tata McGraw Hills New Delhi.
8. Timoshenko: *Engineering Mechanics*. Tata McGraw Hills New Delhi.
9. R S Khurmi : *Engineering Mechanics*.
10. Duggal : *Building Materials*, New Age International Publishers.

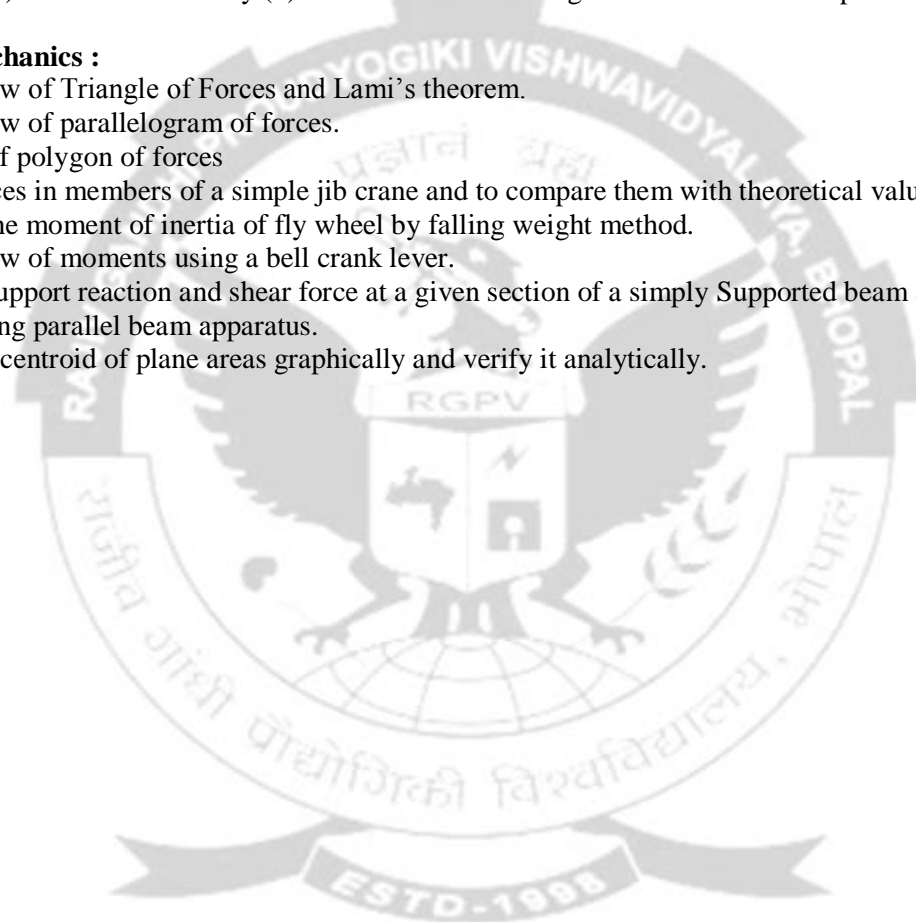
**List of experiments:** Students are expected to perform minimum ten experiments from the list suggested below by preferably selecting experiments from each unit of syllabus.

**Basic civil engineering :**

1. To perform Chain survey of a given area for locating existing ground features.
2. To perform Traverse surveying with prismatic compass, check for local attraction and determine corrected Bearings.
3. To perform Levelling exercise by Height of instrument method and Rise & Fall method.
4. To study the use of Theodolite for determining horizontal and vertical angles
5. To determine the Compressive strength of Bricks.
6. To determine the Compressive strength of Concrete.
7. To determine (a) Normal consistency (b) Initial and Final Setting time of a cement sample.

**Engineering Mechanics :**

1. To verify the law of Triangle of Forces and Lami's theorem.
2. To verify the law of parallelogram of forces.
3. To verify law of polygon of forces
4. To find the forces in members of a simple jib crane and to compare them with theoretical values
5. To determine the moment of inertia of fly wheel by falling weight method.
6. To verify the law of moments using a bell crank lever.
7. To determine support reaction and shear force at a given section of a simply Supported beam and verify analytically using parallel beam apparatus.
8. To find out the centroid of plane areas graphically and verify it analytically.



# UIT-RGPV (Autonomous) Bhopal

**Subject code-BE113**

**Subject : Introduction to Computer Science & Engineering**

**Semester : I/II**

**For credits & marks refer your scheme**

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## **COURSE OBJECTIVES :**

To Introduce:

- Course Structure & Scope of the branch
- The basic concepts in Computer Science & Engineering
- The different styles of programming
- Types & important features of programming languages

## **COURSE CONTENT:**

CBCS Guidance/ Counselling / Advices, Complete course structure/scheme, Continuous Evaluation System. Relevance & Importance of each subject, Specialization Flow Diagram, Pre-requisite Flow Diagram, Scope of the Branch and Future Avenues.

Review of Computer Engineering Fundamentals: Definition, Evolution, Classification, Number System, Organization i.e. CPU, register, Bus Architecture, Instruction Set, Memory & Storage Systems, I/O Devices & Application Software

Computer Science & Engineering Application in: Data Processing, Information Systems, Communication, Interworking, World Wide Web, e-Business, Bio-Informatics, Health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc, Defence.

Introduction to flowchart, Algorithm, Categories of Programming Languages, Program Design, What are data structures, Introduction to Programming, Security Threats: Viruses, Worms, Malware, Trojans, Spyware, and anti-spyware software, firewall, internet fraud.

Overview and idea about good computer magazines, Major Computer Science & Engineering Journals, Case Studies/ Success Stories of Computer Engineers, Professional Societies and associations, Computing Ethics & Good Practices.

## **Course outcomes :**

After successful completion of course, students will be able to:

- Know course structure & scope of the branch
- Know the basic concepts in Computer Science & Engineering
- Compare different styles of programming languages
- Will start writing algorithm for problems

**Evaluation :** Evaluation will be continuous an integral part of the class only through internal assessment

## **Text/ References:**

*Subhasis Banerjee, S. Arun Kumar, D. Dubhashi, Introduction to Computer Science, Peter Norton, Computing Fundamentals, McGraw Hill India*

*Peter Norton, Introduction to Computers, TMH*

*Silakari & Rajesh K Shukla, Basic Computer Engineering, Wiley India*

*Kenneth Hoganson, Concepts in Computing , Jones & Bartlett*

*RJ Dromey, How to solve it by computer, Prentice Hall India Series, 2007*



# UIT-RGPV (Autonomous) Bhopal

Subject code-BE115

Subject : Introductions to Civil Engineering

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

This course introduces students to civil engineering and its sub-domains. Students are expected to learn about scope, current and future trends in infrastructure industry, jobs, innovations & research opportunities in the field of civil engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

## Course content :

**Unit- I :** Overview of Civil Engineering, types of Infrastructures, Effect of infrastructure facilities on economy and environment, Role of Civil Engineers in the infrastructural Development Introduction to sub-domains of Civil Engineering, Size of Infrastructure Industry, emerging trends in infra spending through public and public-private partnership (PPP), talent shortage, and global trends in workforce mobility and skill demands.

**Unit-II:** Stages in the life of construction – Design, Construction, Maintenance, Repair, Demolition/Recycling; an overview of Indian Standards, units and conversion factors for Lengths, Areas, Volumes and Weights; Opportunities and challenge of India's Infrastructure, Interdisciplinary nature of Civil Engineering Projects.

**Unit-III :** Roads: Types of Roads, Nagpur Road Plan, Components of Road and their function; Bridges: Important parts of bridges, classification of bridges; Types of Dams.

**Unit-IV :** Properties and classification of common building materials – Stones, Bricks, Sand, Limes, Cement, Mortar, Concrete, Steel.

**Unit-V :** Overview of Indian Road Congress, National Highway Authority of India (NHAI) and American Society of Civil Engineers (ASCE), Emerging areas and new technologies in the field of civil engineering.

**Course outcomes :** After successful completion of course, Students are expected to possess an in-depth understanding and knowledge about the scope, current and future trends in infrastructure industry, elementary terminologies, learning resources and career-opportunities in the field of civil engineering and its allied domains.

## References :

1. *Elements of Civil Engineering* by MD Saikia, B Mohan Das, MM Das, PHI Learning Private Limited, 2015
2. *Prakash M.N. Shesha, Ganesh B., A Textbook on Elements of Civil Engineering, PHI Learning Pvt. Ltd.*
3. *Study material provided by the instructor*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE116

Subject : Introduction to Petrochemical Engineering

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

1. To know the role of engineers in the Society & tooaware of different branches of Engineering.
2. To produce employable graduates with the knowledge and competency in Petrochemical Engineering complemented by the appropriate skills and attributes.
3. To understand the vertical integration of petrochemical industry.
4. To learn different areas of study in upstream, midstream and downstream industry.

## Course Content (12 Hours)

- Unit I** Definition of Engineer, role and importance of Engineers in society, Development of engineering as a field, History of Engineering, Major inventions of Engineering and their importance. (2 hours)
- Unit II** Different Branches of Engineering and their area of applications. (2 hours)
- Unit III** Overview of petrochemical, Scope and development of petro-chemical industry, Source of raw materials, precursors, intermediate and finished products viz. chemical & petrochemical compounds, Application of Petrochemicals & it's derived. (4 hours)
- Unit IV** Chemistry of petrochemical hydrocarbons, First & second generation of petrochemicals, Different areas of study in upstream, midstream and downstream industry, Recent trends in Petrochemical Engineering. (4 hours)

## References:

1. Charneal, A and Lafyte, G.L. –PETROCHEMICAL PROCESS- part- I & II, 2<sup>nd</sup>ed, RueGinix, 1986.
2. Dryden C.E. –OUTLINES OF CHEMICAL TECHNOLOGY – 3<sup>rd</sup> Ed. Affiliated. East West press, New Delhi, 1997.
3. Austin, G.T. SHREEVES CHEMICAL PROGRESS INDUSTRIES – 5<sup>th</sup> Ed. Mc. Graw Hill New York 1984.
4. Statistics, D., THE HAND BOOK OF PETROCHEMICALS AND PRODUCTS 3<sup>rd</sup> Edition, Petroleum Information New Delhi.
5. Hindu Survey of Indian Industries 1998, (Article).
6. V. K. BhaskarRao, A TEXTBOOK OF PETROCHEMICAL, Khanna Publishers, New Delhi.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE117  
Semester : I/II

Subject : Fundamentals of Information Technology

For credits & marks refer your scheme

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## Unit I

### Introduction to information technology

Introduction, Data, Defining information, Various form of representing information, Speed and Scope of information, Defining information technology, Information technology in society, Emergence of the digital age, The difference between analog and digital representations of information, Manipulating bits, Advantages of digital technology

## Unit II

Fundamental components of a computer, Factors that affect computer performance, Inside typical computer, Types of computers and their applications, Storage technologies, **Software**, Programming languages, Types of software, The software development process, Open source software.

## Unit III

### Multimedia Data Acquisition and processing

Image acquisition and storage, storage format for pictures, image acquisition with digital camera, capturing a moving image with a video camera, compression of video data, MPEG compression standard, acquiring and storing audio signals, compression of audio signals, audio signal processing.

## Unit IV

IT application in E-Commerce and E-Governance, introduction, different types of E-Commerce with examples, advantage and disadvantage, E-Commerce in INDIA, E-Services, E-Commerce security, Internet security and ethics, technology issues, social issues, introduction to E-Governance, challenges, application, advantage, Internet history, Internet architectural components, Internet applications, Internet open issues

## Unit V

Social impact of IT, introduction, social usage of world wide web, social networking services, privacy, security and integrity of information, disaster recovery, intellectual property rights, application of IT, career in IT, case study of NPTEL.

## References:

1. Pelin Aksoy and Laura Denardis , “Information Technology: In Theory”, CENGAGE Learning.
2. V. Rajaraman, “Fundamental of Computer”, PHI Learning.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE118

Subject : Basic Programming using C & C++

Semester : I/II

For credits & marks refer your scheme

## COURSE OBJECTIVE :

This course is to design to provide a comprehensive study of the C/C++ programming language. It stresses the strengths of C/C++, which provide students with the means of writing efficient, maintainable, and portable code. The nature of C/C++ language is emphasized in the wide variety of examples and applications to learn and acquire art of computer programming.

**UNIT 1:** An overview of C: keywords, Identifiers, variables, constants, operators and expression, basic data types in C, branching statements –if statement, if –else statement, switch case, iterative statements – for loop, while loop, do-while loop, nested loops.

**UNIT 2:** Function: introduction ,function definition ,function call ,passing parameter to the function , Array-introduction ,array declaration ,one dimension array-passing individual elements ,passing entire array, two dimension array- introduction and operations as transpose sum ,difference , operation performed in array-traversal ,insertion deletion , string , string operation .

**UNIT 3:** Structure –structure declaration, initialization, array of structure, size of structure, union- introduction, initializing unions, accessing member of unions by basic program, memory allocation/de allocation –malloc, calloc, free, realloc, Pointers: introduction to pointers, initialization of pointer variable, declaring pointer variables.

**UNIT 4:** C++ :introduction to C++ ,basic program construction ,program statement output using cout and cin class ,object, definition and creation of objects , passing object as function argument- pass by value ,pass by reference ,members of a class-data members and member function ,member function definition .

**UNIT 5:** Function and operation overloading –introduction ,overloading binary operator, arithmetic assignment operator overloading ,inheritance –introduction ,basic concepts -derived class and base class ,basic programming by specifying the derived class accessing base class member, abstract base class ,basic structure of inheritance , polymorphism :introduction and basic programming.

**Course outcome:** upon completion of the subject, students will be able to

1. Understand the basic terminology used in computer programming.
2. Write, compile and debug programs in C/C++ language using class and objects.
3. Use different data types in a computer program and design them involving decision structures, loops and functions.
4. Explain the difference between call by value and call by reference.
5. Understand the dynamics of memory by the use of pointers.

## Reference:

1. Yashavant Kanetkar, "Let us C",BPB publication.
2. Yashavant Kanetkar, "Let us C++", BPB publication.
3. Rajaraman, "Computer Programming in C", PHI Learning.
4. Reema Thareja, "Computer fundamental and programming in C", oxford.
5. E Balagurusamy, "Fundamentals of Computers", TMH.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE119

Subject : Renewable Energy Resources

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

This subject has been introduced for the undergraduate students of B.E. Electrical and Electronics Engineering as an introductory course giving them broad spectrum of the prevalent technologies available in ever expanding field of Renewable Energy.

**Unit-I : Introduction :** Classification of energy resources, consumption trends of primary energy resources. Merits & demerits of conventional & renewable energy sources. World energy scenario, Indian energy scenario.

**Unit-II : Solar Energy :** Introduction to solar water heater, solar Industrial heating, solar cooker, solar furnace, solar green house, solar desalination. Solar cell, module, panel & array, Basic system for converting solar energy in to electrical energy, maximum power point tracking system. Application of solar cell & PV systems, merit demerit of electrical energy generation from solar energy.

**Unit-III : Wind Energy :** Energy available in the wind, impact of height on wind speed, consideration for wind from site selection. Relative merits & demerits of HAWT & VAWT. Basic component of wind energy conversion system, merits & demerits of electrical energy generation from wind energy.

**Unit-IV : Biomass / Biogas Energy :** Biomass resources, Introduction to Biomass conversion technologies, urban waste to energy conversion. Biogas production from Biomass, classification of biogas plants, basic operational parameters of biogas plant, different configuration of biogas plant.

**Unit-V : Energy Generation through other Renewable Energy Sources:** Geothermal, Ocean thermal, Tidal, MHD generetic. Application of fuel cell in renewable energy. Per unit cost of energy generation from various conventional & renewable energy sources.

**Course outcome:** On successful completion of the course student is expected to have knowledge on various sources of depletable and renewable energy sources, relative merits and demerits of various energy sources, energy crisis ant its solution, components of electrical generation system utilizing various renewable sources.

**Evaluation:** Evaluation will be continuous an integral part of the class through internal assessment.

## References :

1. B.H. Khan, *Non conventional Energy Resources*, Tata Megraw full.
2. Shobh Nath Singh, *Non Conventional Energy Resources*, Pearson.
3. G.D. Rai, *Non Conventional Energy Resources*, Khanna Publishers.
4. G.S. Sauthney, *Non Conventional Energy Resources*, PHI publication.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE120

Subject : Problem Solving Using Computers

Semester : I/II

For credits & marks refer your scheme

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**Unit-I :** Introduction to C language, Features, Character sets, Identifiers, Constants, variables, Keywords, Data Types, Typecasting, Operators, **I/O Statements:** Types of I/O, Formatted and Unformatted console I/O functions, C Program Compilation and Execution, C Instructions- Type declaration instructions, Arithmetic instructions, Control Instructions.

**Unit –II : Control Structures:** Decision Control Structure- *if* Statement, *if-else* Statement, nested *if-else*, logical and conditional operators, Loop Control Structure- *while* and *do-while* loop, *for* loop, *break* and *continue* statements, Case Control Structure- *switch-case-default* statements, comparison between *switch* and *if-else*, uses of *goto* statement.

**Unit –III : Functions:** Introduction, declaration and definition, function prototype, standard library functions, call by value and call by reference, recursion.

**Array:** Introduction, Limitations of Array, Types of Array, Array initialization, retrieving values from Array, passing Arrays to functions.

**Unit –IV : Pointers:** Definition, pointer variables, accessing variables through pointers, pointer declaration and definition, pointer initialization, pointers and functions, pointer to pointers, Applications- Introduction to dynamic memory allocation, pointer to an array.

**Strings:** Introduction to strings, standard library string functions, *strlen()*, *strcpy()*, *strcat()*, *strcmp()*, pointers and strings, array of pointers to strings.

**Unit –V : Structures and Unions:** Introduction, need of structures and unions, structure declaration, Accessing structure elements, Array of Structures, uses of pointers to structures and union.

## Reference Books:

1. *Yashavant Kanetkar, Let Us C, BPB Publication.*
2. *Byron S Gottfried, Programming with C, TMH.*
3. *Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, Pearson Education.*
4. *Behrouz A. Forouzan, Richard F. Gilberg, A Structured Programming Approach Using C, Cengage Learning.*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE121

Subject : Construction Materials

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

The aim of the course is to give knowledge and proficiency in construction as regards to material technology.

### Course content

**Unit-I : Stones , Brick, Mortar and Concrete:** Stones :Occurrence, Classification of Rocks, varieties, Characteristics and their testing, uses, quarrying and dressing of stones, Deterioration of Stones, Retardation of Decay of Stones, Preservation of Stones, Artificial Stones.

Brick : Manufacturing , characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table

Concrete : Ingredients, Grades of Concrete ,Concrete Production ,Special Concrete

**Unit-II : Timber ,Glass , Steel and Aluminium :** Timber: Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, ,Plywood, Particle Board ,Fibre Board, Applications of wood and wood products , Plaster Boards, Adhesives, types of Gypsum Board and their uses  
Glass: What is glass , Nature of Glass, Structure of Glass, Macro Molecular Structure, Main Oxides in Glass, Thermal and Optical Properties ,Effect of Coating,

Steel : Physical Properties of Structural Steel, Grades of Steel

Aluminium : Properties ,Forms ,Uses, Advantages

**Unit-III : Flooring , Roofing ,Plumbing and Sanitary Material:** Flooring and Roofing tiles , Types of Flooring – Marble, Kota stone , wood etc. Type of Roofing , P.V.C. materials, CI , GI, Asbestos pipe , Stone ware pipes

**Unit-IV : Paints, Enamels and Varnishes:** Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and colour wash, Varnish, French Polish, Wax Polish

**Unit-V : Miscellaneous Construction Materials :** Bitumen, Tar and Asphalt their characteristics and uses ,Ultra Poly Vinyl chloride Pipes, Thermal and sound insulating materials, and water proofing materials .

**Course outcome :** The student will be able to identify the use of different materials used in civil engineering

### References

1. DR Askeland, K Balani, *The science and Engineering of Materials*, Cengage Learning.
2. S K Duggal, *Building Materials*, New Age International.
3. P C Vaghese, *Building Materials*, PHI Learning.
4. S.C. Rangwala, *Engineering Materials*, Charotar.
5. M S Shetty, *Concrete Technology*, S. Chand Technical.
6. A M Neville, J J Brooks, *Concrete Technology*, Prentice Hall.

### List of Experiment:

1. Test on Bricks
2. Test on Aggregates
3. Test on Cement
4. Determination of compressive strength of concrete with different cement grades.
5. Determination of workability of concrete by slump test.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE201

Subject : Engineering Physics

Semester : I/II

For credits & marks refer your scheme

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## Course content

### Unit I

**Quantum Physics** – Group and particle velocities & their relationship. Uncertainty principle with elementary proof and applications (determination of position of a particle by a microscope, non existence of electron in nucleus, diffraction of an electron beam by a single slit). Wave function and its properties, energy and momentum operators, time dependent and time independent schrodinger wave equation. Application of time independent schrodinger wave equation to particle trapped in a one dimensional square potential well (derivation of energy eigen values and wave function).

### Unit II

**Wave Optics** – Interference: Fresnel's biprism, Interference in thin films (due to reflected and transmitted light), interference from a wedge shaped thin film, Newton's rings. Diffraction at single slit, and n-slits (diffraction grating). Resolving power of grating. Concept of polarized light, Brewster's laws, Double refraction, Nicol prism.

### Unit III

**Nuclear Physics** – Nuclear liquid drop model (semi empirical mass formula) , nuclear shell model, Linear Particle accelerator's Cyclotron, general description of Synchrotron, Synchrocyclotron, and Betatron. Geiger-Muller Counter.

### Unit IV

**Solid State Physics** – Qualitative discussion of Kronig Penny model (no derivation), Effective mass, Fermi-Dirac statistical distribution function, Fermi level for Intrinsic and Extrinsic Semiconductors, Zener diode, tunnel diode photodiode , Hall effect Superconductivity : Meissner effect, Type I and Type II superconductors.

### Unit V

**Laser and fibre Optics**- Laser: Stimulated and spontaneous processes, Einstein's A & B Coefficients, transition probabilities, active medium, population inversion, pumping, Optical resonators, characteristics of laser beam. Coherence, directionality and divergence. Principles and working of Ruby, Nd: YAG, He-Ne, Carbon dioxide Lasers with energy level diagrams. Applications of laser.s Fundamental idea about optical fibre , types of fibers, acceptance angle and cone, numerical aperture.



# UIT-RGPV (Autonomous) Bhopal

Subject code-BE202

Subject : Mathematics- II

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

The objective of this course is to review mathematical concepts, which already learnt in I Sem Classes & Their applications in science & Engineering.. This course contains, deep understanding of matrix, differential equations as well as a strong sense of how useful the subject can be in other disciplines of learning.

## Course Contents

**Unit-I : Matrices & Linear Systems** - Rank of a Matrix (By reducing it to Elementary Transformation, Echelon & Normal Forms), Solution of Simultaneous equations by Elementary Transformation Methods, Consistency & Inconsistency of Equations, Eigen Values & Eigen Vectors, Cayley- Hamilton Theorem..

**Unit-II : Ordinary Differential Equations I** – First-Order and First Degree Differential Equations (Separable, Exact, Homogeneous, Linear), First Order and Higher Degree Differential Equations (Solvable for  $p$ ,  $x$ ,  $y$  and Clairauts Form), Linear Higher Order Differential Equations with Constant Coefficients.

**Unit-III : Ordinary Differential Equations II** - Homogeneous Linear Differential Equations, Simultaneous Linear Differential Equations, Second-Order Linear Differential Equations with Variable Coefficients: Solution by Method of Undetermined Coefficients, By Known Integral, Removal of First Derivative, Change of Independent Variable and Variation of Parameters.

**Unit-IV : Partial Differential Equations I** – Definition, Formulation, Solution of PDE ( By Direct Integration Method & Lagranges Method), Non-Linear Partial Differential Equation of First order (Standard I, II, III & IV), Charpit's General Method of Solution Partial Differential equations.

**Unit-V : Partial Differential Equations II** – Partial Differential Equations with Constant Coefficients (Second and Higher Orders Homogeneous and Non- Homogeneous equations), Partial differential Equations Reducible to Equations with Constant Coefficients, The Method of Separation of Variables.

**Course outcomes-** The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concept of matrix, differential equations and their applications.

**Evaluation-** Evaluation will be continuous an integral part of the class as well through external assessment.

## Reference Books:

- 1) Dennis Zill and Warren Wright, *Advanced Engineering Mathematics, Fourth Edition, Jones and Bartlett Student Edition, 2011 (Indian Edition).*
- 2) Potter, Goldberg & Edward, *Advanced Engineering Mathematics, Oxford University Press.*
- 3) C. Ray Wylie, *Advanced Engineering mathematics, McGraw Hill Publishing Company, 2003.*
- 4) Alan Jeffrey, *Mathematics for Engineers and Scientist, CRC Press, 2013.*
- 5) Dean G. Duffy, *Advanced Engineering Mathematics with MATLAB, CRC Press, 2013.*
- 6) E. Kreyszig, *Advanced Engineering Mathematics, John Wiley & Sons Inc.*
- 7) Michael Greenberg, *Advanced Engineering Mathematics, Second Edition, Pearson Education, 2002 (Indian Edition).*
- 8) B.V. Rammana, *Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007.*
- 9) E. A. Coddington, *Ordinary Differential Equations, PHI Learning.*
- 10) G. F. Simmons, *Differential Equations with Applications and Historical Notes, McGraw Hill India.*
- 11) G. Birkhoff and G. C. Rota, *Ordinary Differential Equations, John Wiley and Sons.*
- 12) Shanti Narayan, *A Course of Mathematical Analysis. S. Chand & Co. Delhi.*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE203

Subject : Engineering Mechanics

Semester : I/II

For credits & marks refer your scheme

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**COURSE OBJECTIVE :** To familiarize with different branches of mechanics. To familiarize fundamental concepts of dynamics. To familiarize concept of Center of gravity, Centroid and SFD and BMD.

## Course content

**Unit-I : Introduction to Engineering Mechanics:** Definition, Classification of Engineering Mechanics, Statics, Dynamics, Kinematics, Kinetics etc. Fundamental Laws of Mechanics.

**Resolution and Composition of Forces:** Force, Pressure and Stress, Free Body Diagram, Bow's Notation, Characteristics and Effects of a Force, System of Forces, Resolution of a Force, Composition of Forces, Resultant and Equilibrium Force, Law of Parallelogram of Forces, Law of Triangle of Forces, Polygon Law of Forces, Lame's Theorem, Equilibrium of a Body Under Two or Three or More Than Three Forces. Law of Superposition of Forces. Co-planar, Non Concurrent Forces, Resultant of Coplanar, Non Con-Current Forces, Moment of a Force, Principle of Moments, Varignon's Theorem, Parallel Forces, Resultant of Parallel Forces, Couple, Moment of a Couple.

**Unit-II : Centroid and Centre of Gravity:** Centroid, Centre of Gravity, Determination of Centroid/centre of gravity of basic plane lamina and solid bodies, Centroid of lamina having Composite Sections and hollow section. Determination of Centre of Gravity of Solid Bodies.

**Moment of Inertia:** Basic Concept of Inertia, Definition of Moment of Inertia, Theorems of Moment of Inertia, Radius of Gyration, Polar Moment of Inertia of Standard Sections, Moment of Inertia of Composite Section, Principal Moment of Inertia, Mass Moment of Inertia, Product of Inertia.

**Unit-III : Shear Force and Bending Moment:** Types of Beam, Types of Supports, Types of Loading on Beam and Frame. Shear force diagram (SFD) and bending moment diagram (BMD) of simply supported, Cantilever and Overhanging beams loaded with point load, uniformly distributed load (udl), couple (moment) and varying loads. Significance of SFD and BMD.

**Unit-IV : Trusses:** Concept of Trusses, Introduction of various types of Trusses, Internal and External Indeterminacy in Trusses, Axial forces in the members of trusses, Analyses of Plane trusses by Method of Joint, Method of section and Graphical method.

**Unit-V : Introduction to Dynamics:** Overview of Dynamics, Basic Concepts and Terms Used in Dynamics, displacement, velocity, acceleration and relative motion. Motion- Types of Motion, Simple Harmonic motion, Rectilinear and Curvilinear motion, motion under gravity, Newton's Laws of Motion, Newton's Law of Gravitation.

## Course outcome :

1. An ability to apply knowledge of mathematics, science, and engineering
2. An ability to identify, formulates, and solves engineering problems

**Laboratory :** Experiments as suggested by the course coordinator.

## References

1. KL Kumar, *Engineering Mechanics*, Tata McGraw- Hill Education
2. Ferdinand.P. Beer. E, Russell Johnston Jr., David Mazurek, Philip J Cornwell, "Vector 3. 3. Mechanics for Engineers: Statics and Dynamics", McGraw - Hill
4. Timoshenko, and Young, "Engineering Mechanics", Tata Mc-Graw Hill
5. P.N. Chanchandramouli, *Engineering Mechanics*, PHI Learning Private Limited

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE204

Subject : Concepts in Engineering Design

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

The primary objective of the course is to introduce concepts in engineering design to students from all the engineering disciplines. This course broadly covers the prerequisites for an innovative design followed by concepts of products design cycle right from planning, designing, manufacturing, distributing and its usage.

## Course content:

Introduction to engineering Design : Its importance, types of designs, design process .case study .  
Problem definition ,detailing customer requirement Kano model customer need assessment .design attributes & objectives .Clarification of objectives , identification of constraints , expression of designing functions in engineering terms . Design specifications, functions for Danbury arm support .  
Conceptual design ,generating design alternatives, evaluating design alternatives and choosing a design, commutation of design by graphical means .prototyping & proofing the design ,,  
Mathematical modeling in design. Engineering economics in design ,design for production , use & sustainability .  
managing a design project . Product Design Cycle, embodiment design, detailed design .selection of design projects.

## Introduction to any one as a case study:

1. Communication Design
2. Industrial Design
3. IT Integrated Design
4. Textile Design
5. Inter disciplinary Design

**Course outcomes :** Student after successful completion of course must possess an understanding of various concepts of design, product design cycle, and significant principles inevitable for design of any engineering product or services.

**Evaluation :** Evaluation will be continuous an integral part of the class as well through external assessment.

## References :

- 1 Clive L Dym,Partic Little ,Elizabeth J Orwn ; *Engineering design –A project based introduction* , Wiley India Edition 2015
- 2 Yousef Hail,Tamer Shahin , *Engineering design Process* , Second Edition ,Engage Learning .2015  
George E. Dieter and Linda C. Schmidt, *Engineering Design*, McGraw Hill Education (India) Pvt. Ltd. Arvid Eide, *Introduction to Engineering Design*, McGraw Hill.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE205

Subject : Fundamental of Electronics Engineering

Semester : I/II

For credits & marks refer your scheme

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**COURSE OBJECTIVE :** The main objective of this course is:

1. To understand the basics of various signals, their properties and concepts of Fourier series.
2. To understand about the basic electronics devices such as diode, their types and applications.
3. To understand the basic digital electronics concepts such as number system and Boolean algebra with logic gates.
4. To understand the basic phenomenon of communication with modulation.

**Course content:**

**Unit-I : Signals:** Introduction, Graphical Representation and Functional Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, triangular Pulse Function, Signum Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Non periodic Signals, Energy and Power Signals, Causal and Non causal Signals, Even and Odd Signals.

**Unit-II : Diode and transistor:** Introduction to Semiconductor theory: Classification of materials Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors: Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Junction Diode, V-I characteristics, specifications of PN Junction Diode, Breakdown in PN Junction Diode, Applications of PN Junction Diode. Zener Diode: V-I Characteristics, Applications of Zener Diode as a regulator. Introduction to transistors: classification, operation and V-I characteristics.

**Unit-III : Number systems:** Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice-versa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and vice-versa, Binary to Hexadecimal Conversion and vice-versa, Octal to Hexadecimal and vice versa etc. Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement. Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers and Introduction to Number Codes.

**Unit-IV : Boolean algebra and logic gates:** Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean algebra, Boolean Functions, Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic etc.

**Unit-V : Communications systems:** Introduction to Communication Systems, Elements of Communication Systems: Transmitter, Channel, Receiver, Noise. IEEE Frequency Spectrum Used in Communication Systems: Frequency Bands, Units of Measurement and Abbreviations, Bandwidth and other Parameters, Spectrum Assignment and Regulation. Introduction to modulation schemes, Need of Modulation, Amplitude Modulation, Frequency Modulation, Communication Media and its Classification: Guided and Unguided Propagation.

**Outcomes:** As an outcome of completing this course, students should be able:

1. To understand the fundamentals of electronic.
2. To understand about the basic electronic components and devices used for different electronic functions.
3. To manage the tools in a basic electronics laboratory.
4. To understand about the basic techniques for analyzing digital logic circuits.

5. To understand about the basic communication process and modulation.

**List of experiments:**

1. To study Characteristics of all the electronics components.
2. To study the electronics instrument: CRO with its block diagram.
3. To study electronics instruments: Function generator, Power Supply, Multimeter and IC Tester.
4. To determine V-I Characteristics of PN junction Diode.
5. To determine V-I Characteristics of Zener Diode.
6. To determine characteristics of half wave rectifier and full wave center-tapped rectifier.
7. To determine characteristics of full wave bridge rectifier.
8. To verify the truth table of all basic logic gates.
9. To implement all basic logic gates using universal gates and verify their truth tables.

**Text books:**

1. A.Anand Kumar, Signals and Systems, PHI.
2. Jacob Millman, Christos C. Halkias, Electronic Devices and Circuits, TMH.
3. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuits Theory, Pearson Prentice Hall.
4. M. Morris Mano, digital logic and computer design, Pearson Prentice Hall.
5. Singh and Sapre, Communication Systems: Analog and Digital, McGraw Hill Education.

**References:**

1. Hwei P. Hsu, *Schaum's Outline of Signals and Systems*, McGraw-Hill.
2. A.V. Oppenheim, A.S. Willsky, S Hamid Nawab, *Signals and Systems*, PHI.
3. *Basics of Electronics Engineering*, Baru, Wiley India Pvt. Ltd.
4. D. P. Kothari and I.J Nagrath, *Basic Electronics*, McGraw Hill Education.
5. AdelS. Sedra and Kenneth C. Smith, *Microelectronic Circuits Theory and Application*, Oxford Publication.
6. DavidA.Bell, *Electronics devices and Circuits*, Oxford Higher Education
7. R. P. Jain, *Modern Digital Electronics*, TMH.
8. W.H. Gothman, *Digital Electronics*, PHI.
9. Proakis, *Fundamentals of Communication Systems*, Pearson Education.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE206

Subject : Fundamentals of Mechanical Engineering

Semester : I/II

For credits & marks refer your scheme

## COURSE OBJECTIVE:

1. To familiarize with the basic concept of Mechanical Engineering
2. To familiarize with the scope of Mechanical Engineering
- 3 To familiarize with the job prospects of Mechanical Engineer

**Materials :** Classification of engineering material ,Composition of Cast iron and Carbon steels, alloy steels their applications. Mechanical properties like strength , hardness, toughness , ductility, brittleness , malleability etc. of materials, Tensile test- Stress-strain diagram of ductile and brittle materials ,Hooks law and modulus of elasticity. Hardness and Impact testing of materials

**Measurement:** Temperature, pressure, velocity, flow, strain & torque measurement ,concept of measurement error & uncertainty analysis , Micrometer ,Dial gauge, Slip gauge ,Sine-bar and Combination set.

**Fluids :** Fluid properties pressure, density and viscosity . Types of fluids , Newton's law of viscosity , Pascals law, Pressure variation with depth , Bernoulli's equation for incompressible fluids , Introduction to Laminar and Turbulent flow , working principle of Hydraulic machines, pumps, turbines, Reciprocating pumps , Torque Converter .

**Thermodynamics :** Thermodynamic system , properties , state , process , Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure ,volume, enthalpy & entropy .

**Steam Engineering :** Classification and working of boilers , mountings and accessories of boilers ,natural and artificial draught , steam properties, use of steam tables, working principle of steam Engine.

**IC Engine :** Working of Two stroke & Four stroke Petrol & Diesel Engine

**Refrigeration:** Methods of Refrigeration , Reverse Carnot cycle ,Basic Working principle of simple vapor Compression Refrigeration System , coefficient of perform (COP), Unit of Refrigeration.

**Evaluation:** Evaluation will be continuous an integral part of the class as well through external assessment.

## Reference Books:

- 1- Kothandaraman & Rudramoorthy, *Fluid Mechanics & Machinery, New Age* .
- 2- Nakra & Chaudhary , *Instrumentation and Measurements, TMH*.
- 3- Nag P.K, *Engineering Thermodynamics , TMH* .
- 4- Ganesan , *Internal Combustion Engines, TMH* .
- 5- Agrawal C M, *Basic Mechanical Engineering ,Wiley Publication*.
- 6- Achuthan M , , *Engineering Thermodynamics ,PHI*.

**List of Experiments:** Theory related Eight to Ten experiments including core experiments as follows :

- 1- Tensile testing of standard Mild Steel specimen.
- 2- Verification of Bernoulli's Theorem .
- 3- Linear and Angular measurement using ,Micrometer , Slip Gauges, Dial Gauge and Sine-bar.
- 4- Study of different types of Boilers and Mountings .
- 5- To find COP of a Refrigeration unit .
- 6- Study of different IC Engines .
- 7- Study of Lathe & Drilling Machines.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE207

Subject : Electronics-1

Semester : I/II

For credits & marks refer your scheme

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**COURSE OBJECTIVE:** The main objective of this course is:

1. To understand the basics of various signals, their properties and concepts of Fourier series.
2. To understand about the basic electronics devices such as diode, their types and applications.
3. To understand the basic digital electronics concepts such as number system and Boolean algebra with logic gates.

**Course content:**

**Unit-I : Signals:** Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, and Sequence Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, triangular Pulse Function, Signum Function, Sinc Function, and Gaussian Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Nonperiodic Signals, Energy and Power Signals, Causal and Noncausal Signals, Even and Odd Signals.

**Unit-II : Fourier series representation of periodic signals:** Introduction, Representation of Fourier series, Existence of Fourier Series, Trigonometric Form of Fourier Series: Evaluation of Fourier Coefficients of the Trigonometric Fourier Series, Cosine Representation (Alternate Form of the Trigonometric Representation), Wave Symmetry: Even or Mirror Symmetry, Odd or Rotation Symmetry, Half Wave Symmetry, Quarter Wave Symmetry. Exponential Fourier Series: Determination of the Coefficients of Exponential Fourier Series, Trigonometric Fourier Series from Exponential Fourier Series, Exponential Fourier Series from Trigonometric Fourier Series, Cosine Fourier Series from Exponential Fourier Series. Properties of Continuous Time Fourier Series: Linearity Property, Time Shifting Property, Time Reversal Property, Time Scaling Property, Time Differentiation Property and Time Integration Property.

**Unit-III : Diode and its circuits:** Introduction to Semiconductor theory: Classification of materials Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors: Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Junction Diode, V-I characteristics, Limiting Values of PN Junction Diode, Breakdown in PN Junction Diode, Applications of PN Junction Diode. Zener Diode: V-I Characteristics, Applications of Zener Diode. Rectifier Circuits: PN Junction Diode as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Full Wave Bridge Rectifier, Clipping Circuits, Clamper Circuits.

**Unit-IV : Number systems:** Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice-versa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and viceversa, Binary to Hexadecimal Conversion and vice-versa, Octal to Decimal and viceversa, Octal to Hexadecimal and vice-versa. Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement. Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers, Codes.

**Unit-V : Boolean algebra and logic gates:** Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean algebra, Boolean Functions, Complement of Boolean Function. Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and

NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic.

**Outcomes:** As an outcome of completing this course, students should be able:

1. To understand the fundamentals of electronic
2. To recognize the basic electronic components and devices used for different electronic functions.
3. To understand about the basic techniques for analyzing digital logic circuits.
4. To understand the functioning and applications of basic electronic Instruments.

**List of experiments:**

1. To study Characteristics of all the electronics components.
2. To study the electronics instrument: CRO with its block diagram.
3. To study electronics instruments: Function generator, Power Supply, Multimeter and IC Tester.
4. To determine V-I Characteristics of PN junction Diode.
5. To determine V-I Characteristics of Zener Diode.
6. To determine characteristics of half wave rectifier and full wave center-tapped rectifier.
7. To determine characteristics of full wave bridge rectifier.
8. To design clipper and clamper circuits and determine their characteristics.
9. To verify the truth table of all basic logic gates.
10. To implement all basic logic gates using universal gates and also verify their truth tables.

**Text books:**

1. A. Anand Kumar, Signals and Systems, PHI.
2. Jacob Millman, Christos C. Halkias, Electronic Devices and Circuits, TMH.
3. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuits Theory, Pearson Prentice Hall.
4. M. Morris Mano, digital logic and computer design, Pearson Prentice Hall.

**References:**

1. Hwei P. Hsu, *Schaum's Outline of Signals and Systems*, McGraw-Hill.
2. A.V. Oppenheim, A.S. Willsky, S Hamid Nawab, *Signals and Systems*, PHI.
3. *Basics of Electronics Engineering*, Baru, Wiley India Pvt. Ltd.
4. D. P. Kothari and I.J Nagrath, *Basic Electronics*, McGraw Hill Education.
5. Adel S. Sedra and Kenneth C. Smith, *Microelectronic Circuits Theory and Application*, Oxford Publication.
6. David A. Bell, *Electronics devices and Circuits*, Oxford Higher Education
7. R. P. Jain, *Modern Digital Electronics*, TMH.
8. W.H. Gothman, *Digital Electronics*, PHI.



# UIT-RGPV (Autonomous) Bhopal

**Subject code-BE208**

**Subject : Fundamentals of Computer Science & Engineering**

**Semester : I/II**

**For credits & marks refer your scheme**

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## **COURSE OBJECTIVE :**

**Computer:** Definition, classification, Organization i.e. CPU, register, Bus Architecture, Instruction Set, Memory & Storage Systems, I/O Devices, and System and Application Software, Computer Application in e-Business, Bio-Informatics, Health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.

**Operating System:** Definition, Function, Types, Management of File, Process & Memory.

Introduction to MS Word, MS Power Point, MS Excel

Introduction to algorithm, Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS Object Oriented Programming, Introduction to C++: Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and Control Structures, I/O Operations, Array, Functions.

Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual Functions, Introduction to Data Structures

Computer Networking: Introduction, Goals, ISO-OSI Model, Functions of different layers. Internet working concepts, Devices, TCP/IP Model, Introduction to Internet, World Wide Web, E-Commerce.

Computer Security Basics: Introduction to Viruses, Worms, Malware, Trojans, Spyware, and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Email Spoofing, Denial of Services (DoS), Cyber Stalking, Logic Bombs, Hacking, Spamming, Cyber Defamation, Pharming Security Measures Firewall, Computer Ethics & Good Practices, Introduction to Cyber Laws about internet fraud, Good Computer Security Habits.

Database Management System: Introduction, File Oriented Approach and Database approach, Data Models, Architecture of Database System, Data Independence, Data Dictionary, DBA, Primary Key, Data Definition Language and Manipulation Languages.

Cloud Computing: Definition, Cloud Infrastructure, Cloud Segments or service delivery models (IaaS, PaaS, SaaS), Cloud deployment models/ types of cloud (public, private, community and hybrid cloud), Pros and Cons of Cloud Computing.

## **List of experiments:**

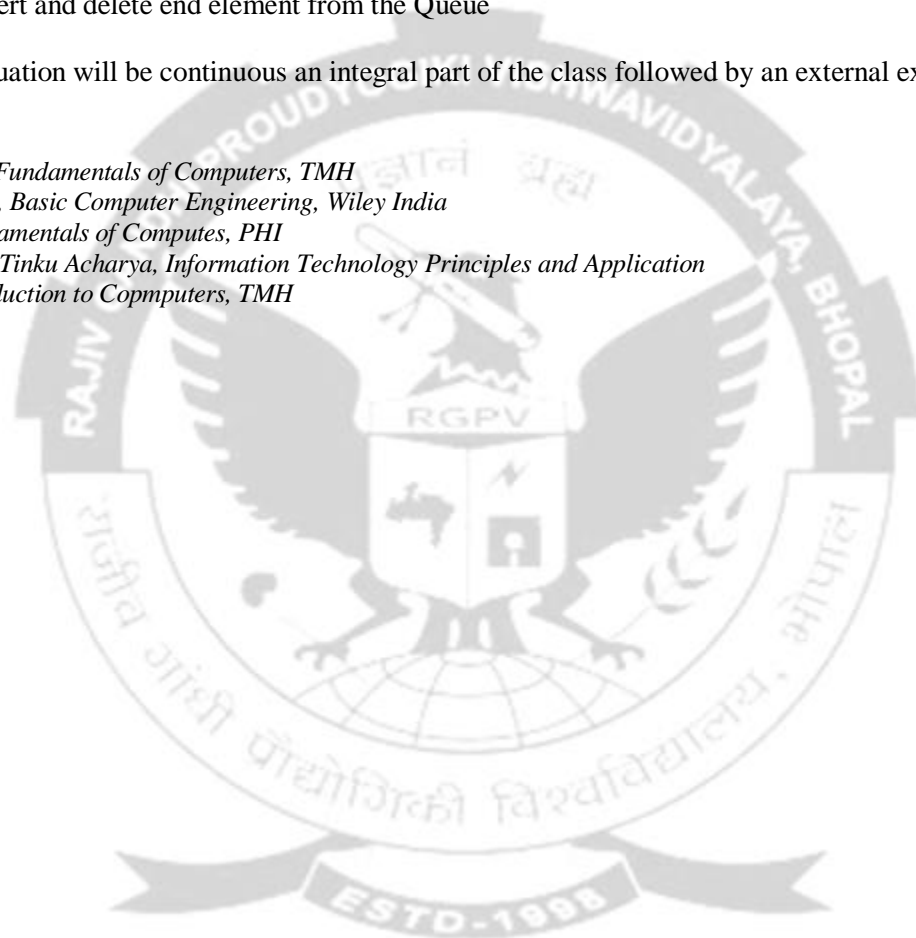
1. Study and Practice of Internal & External DOS Commands
2. Study and Practice of Basic LINUX Commands - ls, cp, mv, rm, chmod, kill, ps etc.
3. Study and Practice of MS Windows - Folder Related Operations, My Computer, Window-Explorer, Control Panel
4. Creation and Editing of Text Files using MS Office (MS Word)
5. Creation and Operating of Spreadsheet using MS Excel

6. Creation and Editing Power Point Slides using MS Power Point
7. Creation and Manipulation of Database Tables using SQL in MS Access
8. WAP to illustrate Arithmetic Expressions
9. WAP to illustrate Arrays
10. WAP to illustrate Functions
11. WAP to illustrate constructor & Destructor
12. WAP to illustrate Objects & Classes
13. WAP to illustrate Operator Overloading
14. WAP to illustrate Function Overloading
15. WAP to illustrate Derived Classes & Inheritance
16. WAP to insert and Delete end Element from the stack
17. WAP to insert and delete end element from the Queue

**Evaluation :** Evaluation will be continuous an integral part of the class followed by an external examination.

**References :**

*E Balaguruswamy, Fundamentals of Computers, TMH*  
*Silakari and Shukla, Basic Computer Engineering, Wiley India*  
*V Rajaraman, Fundamentals of Computes, PHI*  
*Ajoy Kumar Ray & Tinku Acharya, Information Technology Principles and Application*  
*Peter Norton, Introduction to Copmputers, TMH*



# UIT-RGPV (Autonomous) Bhopal

Subject code-BE209

Subject : Environmental Sciences

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it, environmental ethics and its protection through lectures, presentations, documentaries and field visits.

## Course content :

**Unit-I : Introduction:** Domestic and Global Environmental concerns, principles of sustainable development, Sustainable agriculture, organic farming, bio-fuels, Threats for sustainability

**Unit-II : Environmental Ethics & Legislations:** Enforcement of Environment laws in India – The water act, The Air (Prevention and Control of Pollution) Act, 1981, The Environment (Protection) Act, 1986, Environmental Auditing

**Unit-III : Environmental Pollution:** Air Pollution – sources, types of air pollutants, National Ambient Air Quality Standards, Controlling Air Pollution. Water pollution – sources, types of water pollutants, water quality indicators, water quality standards. Soil Pollution - types of soil pollutants: industrial wastes, pesticides, fertilizers and manures, salination of soil, Controlling Soil Pollution.

**Unit-IV : Environmental Challenges:** Local Challenges - Solid Waste – Impact of solid waste on natural resources, Deforestation; Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading.

## Unit-V :

**Sustainable habitat, Industrialization and urbanization:** Concept of Green Building, Volatile Organic Compounds (VOC), GRIHA Rating, LEED Rating, HVAC, Hybrid Car Technology, Industrial ecology, India's renewable energy capacity. Green Technology & Green Business: Green Business, Green Computing, E-waste management.

**Course outcomes :** Student after successful completion of course must possess an understanding of environment, eco-system and its consequences of unbalancing the environment. After successful completion of this course, student will earn 2 credits.

## References :

1. R. Rajagopalan, *Environmental Studies*, Oxford IBH Pub, 2011.
2. Kogent Learning Solutions Inc., *Energy, Environment, Ecology and Society*, Dreamtech, 2012.
3. Rag, R. L, Ramesh, LekshmiDinachandran, *Introduction to sustainable engineering*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE210

Subject : Computer Programming

Semester : I/II

For credits & marks refer your scheme

**Unit-I : Object Oriented Programming-** Introduction, Generations of programming languages, programming paradigms, Features of OOP, merits and demerits, applications of object oriented programming.

**Basics of C++ Programming-** Introduction, data types, variables, input/output statements, compiling and executing C++ programs, operators, type conversion and type casting, decision control and looping statements.

**Unit-II : Functions-** Introduction, declaration and definition, function prototype, function call, passing parameters to function, storage classes, inline functions, function overloading, recursion versus iteration.

**Arrays-** Introduction, declaration, storing and accessing elements of array, single and multidimensional arrays, operations on arrays.

**Strings-** Introduction, declaration, operations on Strings, character manipulation functions, Array of Strings.

**Unit-III : Classes and Objects-** Introduction, declaration, inline and member functions, Access specifiers, creating objects and accessing object members, dynamic memory allocation, nested classes, friend function, constructors and destructors, types of constructors, constructor overloading, Operator overloading.

**Inheritance and polymorphism-** Introduction, Types of Inheritance, function overriding, pointers to derived class, run-time polymorphism, virtual function, pure virtual function.

**Unit-IV : File Handling-** Introduction, streams in C++, stream classes, File input/output with streams, stream errors, file modes, types of files, input-output functions, file pointers, Error handling in file input/output.

**Unit-V : Templates-** Introduction, uses of templates, function templates, class templates.

**Exception Handling-** Introduction, types of exceptions, try and catch statements, multiple catch statements, throwing exceptions.

## Reference Books:

1. *BJARNE STROUSTRUP, The C++ Programming Language, AWL, Addison-Wesley.*
2. *James P Cohoon and Jack W Davidson, Programming in C++, TMH.*
3. *Robert Lafore, Object Oriented Programming in C++, Galgotia Publications.*
4. *D Ravichandran, Programming with C++, TMH.*
5. *Yashavant P. Kanetkar, Let Us C++, BPB, Publications.*
6. *Ira Pohl, Object-Oriented Programming Using C++, Pearson Education.*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE211

Subject : Rural Outreach

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

The main objective of introducing this course is to sensitize students about the *socio-cultural* aspects of the rural areas parochial to their Institute. Students are expected to observe, investigate and learn about the following aspects of the rural region:

- I. Demographics, Literacy, Geographical parameters of the Village.
- II. Schemes of government of India and State of Madhya Pradesh in operation in the villages
- III. Social/ Cultural aspects ranging from popular dance forms, music and customs of the concerned village
  - There will be **NO EXAMINATION** in **BE- 211 Rural Outreach**. The grades earmarked will be awarded on the basis of internal Assessment.
  - This course shall be done by the students in a self-study mode. Study methodology shall comprise of combining field visits, case studies, analyzing policy documents from different government departments, discussions with field officers, active NGO's and so on.
  - The faculty associated with the course shall evaluate the candidate and grade him.
  - For evaluation purpose, students are expected to submit a *hand-written summary* on the government schemes and policies for the socio-cultural development of the concerned village. This shall be followed by final submission of two case studies covering broad spectrum of socio-cultural issues ranging from life in slums, infant mortality, watershed management, potability of water, animal welfare etc. These case studies (handwritten) shall be submitted to the mentor for the final evaluation of the coursework.

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE212

Subject : Data Structure

Semester : I/II

For credits & marks refer your scheme

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## Unit 1: Introduction

Data, data type, data object. Types of data structure – primitive & non-primitive, linear & non-linear. Operations on data structures – traversing, searching, inserting, deleting. Complexity analysis – worst case, best case, average case. Time – space trade off, algorithm efficiency, asymptotic notations – big oh, omega, theta.

## Unit 2: Arrays & Structure

Introduction, declaration of arrays, operations on arrays – inserting, deleting, merging of two arrays, 1 dimensional & 2 dimensional arrays, row & column major representation, address calculation in array, storing values in arrays, evaluation of polynomial – addition & representation. **Searching & sorting** – Introduction, sequential search, binary search, Fibonacci search, indexed sequential search, hashed search. Types of sorting with general concepts – bubble, heap, insertion, selection, quick, heap, shell, bucket, radix and merge sort with complexity analysis.

## Unit 3: Stacks & Queues

Basic concept of stacks & queues, array representation of stacks, operation on stacks – push, pop, create, getTop, empty, linked representation of stack, multiple stack. Application of stack – Conversion: infix, prefix, postfix and evaluation of arithmetic expression. Linked representation of queue, operations on queue – insertion & deletion. Types of queue with functions – circular, deque, priority queue. Applications of queues – job scheduling, Josephus problem.

## Unit 4: Linked List

Introduction – basic terminology, memory allocation & deallocation for linked list. Linked list variants – head pointer, head node, types linked list – linear & circular linked list. Doubly linked list, creation of doubly list, deletion of node from doubly linked list, insertion of a node from doubly linked list, traversal of doubly linked list. Circular linked list – singly circular linked list, circular linked list with header node, doubly circular linked list. Applications of linked list – polynomial representation & garbage collection.

## Unit 5: Trees

Basic terminology – general tree, representation of general tree, types of trees, binary tree- realization and properties, traversal in binary trees – inorder, preorder, postorder, applications of trees.

## References :

1. Varsha H. Patil “Data Structure Using C++” Oxford.
2. Rajesh K. Shukla “Data Structures Using C & C++” Wiley India.
3. Reema Thareja “Data Structure Using C” Oxford.
4. D. S Malik “Data Structure Using C++” Second Edition Cengage.
5. Kushwaha and Mishra “Data Structure: A programming Approach with C”, PHI Learning.
6. A. K Sharma “Data Structure Using C” Pearson.

# UIT-RGPV (Autonomous) Bhopal

**Subject code-BE213**

**Subject : Electrical & Electronics Materials**

**Semester : I/II**

**For credits & marks refer your scheme**

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## **COURSE OBJECTIVE**

The primary objective of the course is to introduce concepts about the properties, characteristics, applications and limitations of Electrical & Electronics engineering materials.

### **Course contents :**

**Unit I :** Crystal structure of materials, crystal systems, unit cells and space lattices and defects, Classes of Engineering Materials – Metals & alloys, ferrous and non-ferrous alloys, low alloy steels, aluminium alloys, copper alloys, stainless steels, cast iron, ceramics, organic polymers and composite material. Classification of solids from electrical engineering point of view. Conducting material – properties of conductors, characteristics of good conductor material, commonly used conducting materials, conductor materials for overhead lines, types of conductors, conductor for underground cables, conductor materials used in electrical machines, resistor materials, types of resistors, materials for bus bar.

**Unit II :** Dielectric Materials: Dielectric strength, factors affecting dielectric strength, dielectric loss, dissipation factor, factors affecting dielectric loss, permittivity & polarization, charging and discharging of dielectric, conduction through dielectric. Application of dielectric, different types of capacitors and materials used for them. Insulating materials, their– thermal and chemical, mechanical & electrical property. Insulating materials like ceramic, mica, glass, rubber, resins, wax varnishes, Class of insulator. Transformer oils & their testing. Piezoelectricity & Ferro electricity.

**Unit III :** Concept of energy band diagram for materials - conductors, semiconductors and insulators Applications of semi conductor materials: type of semi conductors, working and applications of semiconductors, Temperature sensitive elements, photoconductive cells, photo voltaic cells; Varistor, Hall effect generator, LCD, Light dependent resistors, LEDs, piezo – electric materials, semiconductor laser and its characteristics, photo conductors – photo diodes, avalanche photo diode, photo transistors.

**Unit IV :** Classification of magnetic materials: Dia-magnetism, Para magnetism, Ferro-magnetism, magnetization curve, hysteresis loop, Magnetostriction, Factors affecting permeability and hysteresis, Anti – ferromagnetism, Ferromagnetism, Magnetic resonance, B-H curve for different magnetic materials, loss of magnetism, impurities in ferromagnetic materials, soft and hard magnetic materials, ferrites

**Unit V :** Superconductivity & it's application. Materials of MHD generator, Thermoelectric generators, Thermionic conductors, Physical properties &Electrical properties of SF<sub>6</sub>, Specification of SF<sub>6</sub> gas for GIS application, Advantages and Applications of SF<sub>6</sub>, Nanomaterials, Ultra Light materials and metallic foams,

### **Course outcome :**

Student after successful completion of course is expected to possess an understanding of basic of Electrical & Electronics engineering materials.

### **Evaluation :**

Evaluation will be continuous.

## References:

1. A.J. Dekker; *Electrical Engineering Materials*; PHI.
2. William F Smith, JavadHashemi, Ravi Prakash 'Material science and engineering', McGraw Hill.
3. James F. Shackelford, Madanapalli K. Muralidhara 'Introduction to Materials Science for Engineers', Pearson
4. Ian P. Jones 'Materials Science for Electrical and Electronics Engineers' Oxford university press
5. C. S. Indulkar and S. Thruvengadem; *Electrical Engineering Materials*; S. Chand.
6. TTTI Madras; *Electrical Engineering Materials*; TMH.
7. John Allison; *Electrical Engineering Material s & Devices*; TMH.
8. Kasap; *Electronic Materials and devices*; TMH
9. V. Raghvan; *Material Science & Engineering*; PHI.
10. S.P. Seth & P.V. Gupta; *Electrical Engineering Materials*; Dhanpat Rai.





# UIT-RGPV (Autonomous) Bhopal

Subject code-BE214

Subject : Construction Techniques

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

The aim of the course is to give knowledge and proficiency in construction techniques that are implemented in construction industry .

## Course contents :

**Unit-I :** Foundation: Type of soils, bearing capacity, soil stabilization and improvement of bearing capacity, settlement and safe limits. Spread foundations, wall footings, grillage foundations well foundation, causes of failure and remedial measures; under reamed piles, foundation on shrinkable soils, black cotton soil, timbering for trenches, dewatering of foundations. Brick arch foundation. Simple methods of foundation design, Damp proof courses,

**Unit-II :** Masonry and Walls: Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, Brick cavity walls, code provisions regarding load bearing and non load bearing walls. Common defects in construction and their effect on strength and performance of walls, designed Brick masonry, precast stone masonry block, Hollow concrete block, plastering and pointing, white and colour washing, distempering, dampness and its protection, Design of hollow block masonry walls,

**Unit-III :** Doors, Windows, Ventilators and Stairs: Types based on material etc., size, location, fittings, construction sunshades, sills and jambs, RCC doors/windows frames.

**Unit-IV :** Stairs, Lifts ,Escalators and Belt Conveyor :

Stairs -Definition , Types , Requirement ,Ramps ,Lift –Component Parts ,Types , Escalators –Component Parts , Speed and Slope ,Location ,Installation , Belt Conveyor – Types and Uses .Ropeways – Definition , Types , Uses .

**Unit-V :** Floors and Roofs : Types, minimum thickness, construction, floor finishes, Flat roofs, RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Channel unit, cored unit, Waffle unit, Plank and Joist, Brick panel, L-Panel, Ferrocement roofing units, water proofing .Services : Water supply & Drainage, Electrification, Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation, Repairs to damaged & cracked buildings, techniques and materials for low cost housing., Repairs techniques for floors & roofs.

**Course outcome :** The student will be able to identify the techniques that are used in civil engineering

## Experiments :

1. To find Compressive strength of Brick
2. To construct a brick masonry
3. To identify different types of masonry
4. To identify different types of roofing
5. Site visit.

## References:

1. S.C. Rangwala, *Building Construction*, Charotar Publishing House .
2. P.Puroshottam Raj ,*Construction Material and Technique* , Pearson
3. B.C. Punmia; *Building Construction* ,Laxmi Publication

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE215

Subject : Energy & Environmental Sciences

Semester : I/II

For credits & marks refer your scheme

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**Unit –I :** Energy- Sources of Energy: Renewable & Non-Renewable, Fossil fuel, Coal, Oil, Gas , Geothermal, Hydrogen, Solar, Wind, Hydel, Nuclear sources.

**Unit –II :** Ecosystem- Segments of Environment.: Atmosphere, Hydrosphere, Lithosphere, Biosphere. Cycles in Ecosystem-Water, Carbon, Nitrogen, Biodiversity: Threats and conservation, Food Chain.

**Unit –III :** Air Pollution & Sound Pollution Air pollution: Air pollutants, classification,(Primary & secondary Pollutants) ,Adverse effects of pollutants. Causes of Air pollution –Chemical & Photochemical, Green House effect, Ozone layer depletion, Acid rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage)- Industrial and non-industrial.

**Unit- IV :** Water Pollution- Water pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. Soil pollution- Soil profile, pollutants in soil, their adverse effects, controlling measures.

**Unit- V :** Society & Ethics- Impact of waste on society. Solid waste management ( Nuclear,Thermal, Plastic, Medical, Agriculture, Domestic and e-wastes). Ethics and moral values, Ethical Situations, Objectives of ethics and its study. Preliminary studies regarding Environmental Protection Acts, Environmental Impact assessment.

## Reference :

1. Harris,CE, Prichard MS, Rabin's MJ, 'Engineering Ethics"; Cengage Pub.
2. Rana SVS; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW " Ethics in information Technology "; Cengage.
4. Svakumar ; Energy Environment & Ethics in society; TMH
5. A K De " Environmental Chemistry"; New Age Int. Publ.
6. B K Sharma, "Environmental Chemistry"; Goel Publ House.
7. Bala Krishnamurthy; " Environmental management"; PHI
8. Gerard Kiely, " Environmental Engineering"; TMH
9. Miller GT JR; living in the Environment :Thomson/Cengage
10. Cunningham WP and MA ; principles of Environment Sc; TMH
11. S N Pandey & S P Mishra; Environment and Ecology, Ane Books Pvt Ltd
12. Anil Kumar & K SudhakarEnergy ,Environment,Ecology & Society, B S Publications,
13. A text book of Energy ,Environment,Ecology & Society, A B Saxena; New Age International Publishers

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE216

Subject : Electronic Workshop

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVE :

The main objective of this course is:

1. To understand the basics of various active & passive electronic components
2. To understand the operation of various instruments like CRO, Function generator & multi-meter.
3. To understand the basics of bread board & PCB designing.

## Course content:

1. Study of Electronic components, all types of discrete active and passive devices, display devices, integrated components/circuits with their packing's etc., Electro mechanical components; switches, sockets, connectors (BNC, TNC and N types connectors) etc., Electromagnetic components; coils-different types of magnetic and ferrite cored, potted components, relays, step up and step down transformers etc.
2. To learn operation of Function generator, multi meter and DC power supply.
3. To learn operation of CRO & Measurement of voltage, frequency and Phase Angle.
4. PCB design of a small circuit and etching.
5. Soldering and de soldering exercises using discrete components and ICs for a specific circuit requirement

Note: During lab sessions students have to prepare charts also for various lab components as mentioned above.

**Outcomes:** As an outcome of completing this workshop, students should be able:

1. To recognize the basic electronic components and devices.
2. To operate the basic Electronic Instruments.
3. To make small circuits on bread boards and check their continuity.
4. To design PCBs for small circuits.

## References:

1. Zbar, P.B. *Basic Electronics. A Text-Lab Manual, 7th Edition, TMH, 1995.*
2. James M. Kirkpatrick, *Electronic drafting and Printed Circuits board design, Galgotia Publisher, 1988.*
3. Paul B. Zbar, *Industrial Electronics, A Text – Lab Manual, 3<sup>rd</sup> Edition, TMH, 1983.*
4. Harper, *Handbook of Electronic Component, 2<sup>nd</sup> Edition, 1997.*
5. Goyal & Khetan, *A Monograph of Electronic Design, 2<sup>nd</sup> Edition, 1983, Khanna Pub.*
6. Mottershed Allen, *Electronic Devices & Circuits, 2<sup>nd</sup> Edition, 2006 PHI.*

# UIT-RGPV (Autonomous) Bhopal

Subject code-BE217

Subject : Electrical Workshop

Semester : I/II

For credits & marks refer your scheme

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## COURSE OBJECTIVES :

The objective of this course is to familiarize 1<sup>st</sup> year Electrical & Electronics students with various commonly used Electrical & Electronic devices/Components & Instruments. This course will also cover simple house wiring circuits.

## Course content:

1. Specification of standard supply system. Identify different types of cables/wires and switches and their uses.
2. Identify different types of fuses & fuse carriers, MCB and ELCB, MCCB with ratings and usage.
3. Wiring for simple house wiring circuit such as florescent lamp, fans, staircase, godown/tunnel wiring.
4. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, Main switch and Energy meter
5. Compare specification of different types of tools, wires, cables, switches, batteries for a given application.
6. Wiring of backup power supply including inverter.
7. Power rating of commonly used home appliances such as bulbs, fans, heaters, geysers, electric iron, mixer grinder, pumps, exhaust fans, oven, microwave oven etc.

## Expected Outcome :

After completion of the course student should have an idea about various types of house wirings, related components and their ratings.