RKUNIVERSITY

# SYLLABUS

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|---|---|
| **Course Title** | **MICROBIOLOGY-II** |
| **Course Code** | BSM211 |
| **Course Credit** | Lecture : 04 |
| | Tutorial : 00 |
| | Practical : 03 |
| | Total : 07 |

**Detailed Syllabus:**

| Sr. No | Name of chapter & Details | Session Allotted |
|---|---|---|
| | Section-I | |
| **1** | **Review of basic chemistry**<br>Chemicals, Elements and structure of Atoms, Molecules and Chemical bonds, Chemical reactions, Water and pH, The scope of Biochemistry | **10** |
| **2** | **Chemistry of Carbohydrates and Proteins**<br>**A. Carbohydrates -** Introduction and Functions of Carbohydrates, Classification of Carbohydrates, Structure of Monosaccharide – Glucose; Structure of Disaccharide – Lactose, Maltose, Sucrose, Structure of Polysaccharide **(**Homopolysaccharide – Starch and Cellulose**,** Heteropolysaccharide – Hyaluronic Acid, Heparin)<br>**B. Proteins -** Introduction and structure of Amino acids, Classification of Amino acids based on structure, Physical and Chemical properties of Amino acids, Introduction to structure and functions of protein, Denaturation of Proteins | **10** |
| **3** | **Chemistry of Lipids and Nucleic Acids**<br>**A. Lipids -** Introduction of Fatty acids and Lipids, Classification of lipids, Function of Lipids, Structure and Properties of Triacylglycerol, Structure and Properties of Steroids<br>**B. Nucleic Acids -** Introduction to Nucleic acid and its building blocks**,** Function of Nucleic acid**,** Structure of DNA**,** Structure of RNA**,** Catalytic RNA – Ribozymes | **8** |
| | **Section - II** | |
| **4** | **Growth, Reproduction and Cultivation of bacteria**<br>Nutritional requirements and nutritional types of Bacteria, Chemical and Physical requirement of Growth : Bacterial media, Physical conditions required for growth, Reproduction of Bacteria, Growth of Bacteria : Growth curve, Synchronous culture and Continuous growth, Pure culture and Cultural characteristics | **15** |
| **5** | **Enzymes**<br>Classification and Properties of Enzymes : Chemical and Physical Properties, Enzyme activity : Nature and Mechanism, Conditions affecting, Determination of | **13** |

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|---|---|---|
| | activity, Inhibition, Mechanism and Regulation of Enzymes activity, Mechanism and Regulation of Enzymes Synthesis, Differences between Prokaryotic and Eukaryotic enzymes regulation | |

**List of Practicals (6 hour per week)**

1. Qualitative analysis of Amino acids and Proteins
2. Qualitative analysis of Carbohydrates
3. Colorimetric estimation of Protein by Folin and Lowry's method
4. Titrimetric estimation of total sugar by Cole's method
5. Colorimetric estimation of reducing sugar by DNSA method
6. Assay of Alpha-Amylase (α-Amylase) by iodometric method
7. Total count of yeast by microscopic method using Haemocytometer
8. Study of liquid/solidified culture media
9. Special staining of bacteria Enumeration of bacterial number by viable count technique (Serial dilution and Plating)
10. Growth curve of Bacteria by colorimetric method and determination of generation time and growth rate of ***E.coli*** by colorimetric method

**Instructional Method and Pedagogy:**

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
   Minimum ten experiments shall be there in the laboratory related to course contents

**Students Learning Outcomes:**

On the completion of the course, students will be able to:

1. Understand the basics concepts of Microbial Chemistry and Physiology
2. Explain basics of the microbial techniques, cell structures and reserve compounds
3. Discuss the structure of carbohydrate, protein, lipid, nucleic acids, their metabolism and role in living organism
4. Elaborate structure, functions and characteristics of enzymes and enzyme kinetics
   Know about growth, production and cultivation of bacteria

**Reference Books:**


1. Atlas. R.M.,Microbiology. Wm.C.Brown publishers.
2. Pelzar, M.J., Chan E.C.S., Krieg, N.R., Microbiology. Tata McGraw Hill Publication Co. Ltd. New Delhi.
3. Powar and Daginawala, General Microbiology. Himalaya Publishing House, Mumbai.
4. Tortora, Funke & Case. Microbiology- An introduction. Pearson Education. Delhi.
5. Satyanarayana. U., Biochemistry, Books and allied Pvt. Ltd

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# SYLLABUS

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|---|---|
| **Course Title** | **BOTANY-II** |
| **Course Code** | BSB231 |
| **Course Credit** | Lecture : 04 |
| | Tutorial : 00 |
| | Practical : 03 |
| | Total : 07 |

**Detailed Syllabus:**

| Sr. No | Name of chapter & Details | Session Allotted |
|---|---|---|
| | **SECTION-I** | |
| **1** | **Basic Anatomy of Angiosperm**<br>Tissue systems: Epidermal tissues: general organization, cuticle, trichomes and stomatal types; Secretory tissues: gum and resin ducts, laticifers, hydathodes, floral and extrafloral nectaries.<br>Anatomical studies of monocot and Dicot plants (Root, stem and leaf). | **8** |
| **2** | **Taxonomy of angiosperms**<br>Introduction to systems of classification—Artificial, Natural and Phyllogenetic, Bentham and Hooker's system of classification;<br>Study of the following families,<br>Fabaceae (Malvaceae, Caesalpiniaceae, Papilionaceae), Asteraceae, Solanaceaee, Poaceae. | **10** |
| **3** | **Basics of Plant physiology**<br>Plant-Water Relations: Water Potential; Diffusion; Imbibition; Osmosis; Plasmolysis.<br>Physiology of Flowering: Role of temperature in flowering (Vernalization); Role of light in flowering (Photoperiodism), Photosynthesis,<br>Structure of photosynthetic pigments<br>Water relations: Absorption of $H_2O$ - mechanisms, ascent of sap, various theories. Transpiration (Loss of $H_2O$) - types, mechanism, stomatal movements. | **10** |
| | **SECTION-II** | |
| **4** | **Cell biology**<br>Historical background and cell theory, Cell division (Mitosis and Meiosis), Structure, Composition and Functions of Cell wall, Nucleus, Mitochondria, Chloroplast. Chromosome Organization: Morphology; centromere and telomere; sex chromosomes. | **13** |
| **5** | **Plant pathology**<br>Plant Pathology: Introduction. Classification of Plant Diseases, Symptoms of Plant Diseases, Casual agents of Plant diseases (Virus, Bacteria and Fungi), Selected Plant Diseases: | **15** |

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| | A. White Rust of Crucifier (*Albugo candida*),<br>B. Loose smut of wheat (*Ustilago tritici*). | |

**List of Practicals (6 hour per week)**

1. To Study of Plant families
   - Fabaceae (Malvaceae, Caesalpineadeae, Papilionateae),
   - Astraceae
   - Solanaceae
   - Poaceae

(Classification with reasons, identifying characters, floral formula and floral diagrams, habit, sketch, androecium, gynoecium and TS of ovary; 3-4 botanical and common names of examples)

2. To Study of plant diseases as per theory syllabus.
   - White rust of Crucifer.
   - Loose Smut of Wheat.
3. To Study of various stages of mitosis through permanent slides as well as by preparing squash of onion root tip.
4. To study Osmosis by potato osmoscope method.
5. To extract and separate chloroplast pigments by paper chromatographic technique.
6. To study the phenomenon of plasmolysis.
7. To determine the release of oxygen during photosynthesis under various conditions.
8. To examine the rate of photosynthesis under different colored light.
9. To Compare anatomical studies of root of monocotyledon and dicotyledons.
10. To Compare anatomical studies of stem of monocotyledon and dicotyledons
11. To Compare anatomical studies of leaf of monocotyledon and dicotyledons
12. To Study of various types of tissues from dicot stem (T.S. and L.S.) through fresh material.

To Study of cell structure from onion leaf peels; demonstration of staining and mounting methods.

**Instructional Method and Pedagogy:**

1. Lectures will be conducted with the aid of multi-media projector, black board, Audio/Video clips etc relevant to the content.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
5. Minimum ten experiments shall be there in the laboratory related to course contents.

**Students Learning Outcomes:**

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

1. State the meaning of scientific terms.
2. Basic of tissue system of plants.

3. Anatomical variation in Dicot & Monocot Plants.
4. Understand the morphology, structure and functions of Plants Families.
5. Learn the taxonomical terminology and understand the meaning of the same.
6. Learn to recognize major plant families in the field.
7. Gain basic understanding about plant physiology.
8. Understand the relation of water, light, temperature with plant.
9. Understand the structure & function of cell & cell organelles.
10. Gain understanding of plant pathogens and its causal agents with an examples.

**Reference Books:**


1. Vasishtha B.R. And Sinha A. K. - Botany for degree students Part 1 ALGAE; S. Chand & Company Ltd, 1st edition, revised 2005.
2. Vasishtha B.R. And Sinha A. K. - Botany for degree students Part 2 FUNGI; S. Chand & Company Ltd, 1st edition, revised 2005.
3. Alexopoulos, Constantine J.;Mims, Charles W; Introductory Mycology; 3rd edition; New Delhi: Wiley Eastern Limited, 1983.
4. Singh V., Pande P.C., Jain D.K.; A Textbook of Botany, 4th Edition; Rastogi publications, 2013.
5. Sharma, O.P.; Plant Taxonomy; 1st edition, reprint; New Delhi: Tata McGraw-Hill Publishing Co. Ltd., 1993(2002)
6. A textbook of Systematic Botany by R.N. Sutaria
7. Plant Physiology and Biochemistry: Salisbury and Ross or Taiz and Zeiger
8. Cell Biology & Genetics" – P.K.Verma

RKUNIVERSITY

# SYLLABUS

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|---|---|
| **Course Title** | **CHEMISTRY-II** |
| **Course Code** | BSC221 |
| **Course Credit** | Lecture : 04 |
| | Practical :03 |
| | Tutorial : 00 |
| | Total : 07 |

**Detailed Syllabus:**

| Sr. No | Name of chapter & Details | Session Allotted |
|---|---|---|
| | **SECTION-I** | |
| **1** | **BONDING AND SHAPES OF MOLECULES**<br>Valance bond theory and its limitations, Hybridization - concept of hybridization: sp {$C_2H_2$, $BeCl_2$}, $sp^2$ {$BF_3$, $C_2H_4$}, $sp^3$ {$CH_4$}, $sp^3d$ {$PCl_5$}, $sp^3d^2$ {$SF_6$}, **Stereochemisry of inorganic molecules:** Sidgwick powell rule, VSEPR Theory. | **07** |
| **2** | **MOLECULAR ORBITAL THEORY**<br>Basic concepts of molecular orbital theory, Characteristics of molecular orbitals with necessary diagram (i.e. bonding, anti-bonding, gerade and ungerade orbitals), Energy level diagram of diatomic molecules of first and second row elements of periodic table and NO & CO molecules,Electronic configuration of the above mentioned molecules and calculation of bond order and magnetic moment, Comparison of MO and VB Theories. | **09** |
| **3** | **ALCOHOL, PHENOLS AND ETHERS**<br>IUPAC Nomenclature of Alcohols(Mono, di and trihydric alcohols), phenols and ethers, Physical properties of alcohols, Chemical properties of alcohols: Reactions of O-H bond cleavage and C-O bond cleavage only reactions, Industrial production of phenol, Physical properties of phenol, Chemical properties of phenol: Reactions of O-H group, Reactions of aromatic ring, Electrophilic substitution reactions, Reimer Tiemann Reaction, Kolbe Schmitt Reaction, Fries Rearrangement – with reaction mechanism, Relative acidity of Alcohols and Phenols, Preparation of Ethers-Williamson Synthesis. Physical Properties of Ethers, Chemical Properties of Ethers: Substitution Reaction, Reaction with $Cl_2$ in dark & Reaction of $Cl_2$ in light, Reactions involving C-O bond cleavage, Hydrolysis reaction with $H_2SO_4$, cold HI and hot HI. | **12** |

| SECTION-II | | |
|---|---|---|
| 4 | **ELECTROCHEMISTRY**<br>Introduction, Types of Cell, Half-cell, Reversible and irreversible cell, Convention sign, Types of Electrodes, Standard Electrode Potential, Electrolytic Cell, Galvanic Cell, Emf series, Representation of Cell, Nernst Equation and its applications. | **08** |
| 5 | **CATALYSIS**<br>Introduction, Types of Catalyst, Functions, Theories, Acid base Catalyst, Enzyme Catalyst, Applications. | **06** |
| 6 | **BASIC PRINCIPLES OF QUALITATIVE ANALYSIS**<br>Introductions, Factors affecting qualitative analysis: common ion effect, solubility product ($K_{sp}$), Use of $NH_4Cl$ and $NH_4OH$ in Qualitative Analysis, Use of HCl and $H_2S$ in Qualitative Analysis, Numerical on common ion effect and Ksp, Necessary explanation with chemical equations in: Charcoal test, Cobalt nitrate test, Borax bead test, Flame test. | **06** |
| **7** | **Water Analysis**<br>Analysis of hardness of water in terms of: Total solid and volatile solid, Non-filterable solid and non-filterable volatile solid, Filterable solid, Total solid, Total suspended Solid, Acidity, Basicity or Alkalinity, Turbidity,<br>Various method of determination of hardness of water. | **08** |

**List of Practicals (6 hour per week)**

**A. Inorganic qualitative analysis (Two Radical)**

Aim: Determine the inorganic qualitative analysis of salts.

NaCl, $Na_2CO_3$, KCl, $KNO_3$, KBr, $KCrO_4$, $K_2Cr_2O_7$, $NH_4Cl$, $(NH_4)_2CO_3$, $MgSO_4$, $CuSO_4$

**B. Volumetric analysis**

1. Estimation of the amount of cu+2 in the given CuCl2.2H2O solution using 0.01 M EDTA solution.
2. Estimation of the amount of Ni+2 in the given NiSO4.7H2O solution using 0.01 M EDTA solution.
3. Estimation of the amount of Zn+2 in the given ZnCl2 solution using 0.01 M EDTA solution.
4. Estimation of total hardness of water by EDTA.
5. Determination of acetic acid in commercial vinegar using 0.1 M NaOH.
6. Determination of alkali in antacid using 0.1 M HCl.

**Instructional Method and Pedagogy:**

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Tutorials will be conducted. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
4. Surprise tests/Quizzes/Tutorials will be conducted.

**Students Learning Outcomes:**

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

1. **Draw** the structures of various metal complexes based on MOT.
2. **Identify** the different types of organic reactions
3. **Apply** the concept of electrochemistry in chemical reaction
4. **Identify** different values related to water analysis

**Reference Books:**


1. Concise Inorganic Chemistry by J.D.Lee, wiley india, 5th edition 2013.
2. Textbook of Inorganic Chemistry by Soni P.L., Sultan Chand & Sons. 20th edition 2013.
3. Advanced Inorganic Chemistry (3rd Edition) - FA.Cotton and G. Wikinson, Wiley Eastern Pvt. Ltd 6th edition, 2009.
4. Advanced Inorganic Chemistry (Volume II) by Prakash Satya, S.Chand & Company Ltd. New Delhi, 2006.
5. Organic reaction mechanisms by V.K. Ahluwaliya, Narosa publishing house 4th edition. 2011.
6. Advanced Organic Chemistry by Arun Bahl and B.S.Bahl, S.Chand & Company Ltd. New Delhi, 18th edition 2010.
7. Organic Chemistry by Morrison and Boyd, Pearson Education Delhi 7h edition 2011.
8. Solomons & Fryhle`s Organic Chemistry by Solomon Graham T.W. and Fryhle Craig B., Wiley India (P) Ltd. New Delhi. $10^{th}$ edition.
9. Organic Chemistry Volume -2, I. L. Finar, Pearson publications, New Delhi 2007. $3^{rd}$ edition.
10. A Textbook of Physical Chemistry by P.L.Soni, S.Chand & Company Ltd. New Delhi, $22^{nd}$ edition 2005.
11. Essentials of Physical Chemistry by Bahl B. S. and Tuli G. D., S.Chand & Company Ltd. New Delhi.
12. Elements of Physical Chemistry by Atkins Peter and Paula Julio, Oxford University press New Delhi, $6^{th}$ edition.
13. Industrial Chemistry by B. K. Sharma.

RK UNIVERSITY

# SYLLABUS

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|---|---|
| **Course Title** | **MATHEMATICS-II** |
| **Course Code** | BMT201 |
| **Course Credit** | Lecture : 4 |
| | Practical : 3 |
| | Tutorial : 0 |
| | Total : 7 |

**Detailed Syllabus:**

| Sr. No | Name of chapter & Details | Session Allotted |
|---|---|---|
| | **SECTION-I** | |
| **1** | **Linear Algebra:** Vector spaces and their elementary properties, subspaces, Linear dependence and independence, basis and dimension, direct sum of vector spaces. | **7** |
| **2** | **Matrices:** Definitions, Notations, Types of matrices, Algebra of Matrices, Determinants, Special matrices, Elementary Transformations (or operations), Rank of a matrix, Determination of rank of a matrix, Inverse of a matrix by Elementary transformations, Consistency of a system of linear simultaneous equations. | **10** |
| **3** | **Eigen values and Eigen vectors of matrices**: Characteristic equation, Eigen values and Eigen vectors of a matrix, Cayley-Hamilton's theorem and its use in finding inverse of a matrix, Application of matrices to solve a system of linear (both homogeneous and non-homogeneous) equations. | **7** |
| **4** | **Applications of matrices**: Balancing Chemical equations by using Matrix, Solve Chemical Linear problems by using Matrix. Find area and volume by using Matrix. | **4** |
| | **SECTION-II** | |
| **5** | **Partial Differentiation:** Functions of two or more variables, Continuous functions of two variables, Continuity at a point, Limit of a function of two variables, Partial Derivatives, Geometrical representation of a Function of two variables, Homogeneous Functions, Theorem on Total Differentials; Composite Functions; Differentiation of Composite functions; Implicit Function; Jacobians; Definition, Jacobian of Function of Function, Jacobian of Implicit Functions | **10** |
| **6** | **Multiple Integrations:** Double integral, Change of order of integration, Change of variable in multiple integral, Triple integral | **10** |
| **7** | **Applications of Multiple Integrations:** | **8** |

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| | Find the area & volume by using multiple integrals. Find density and mass by using multiple integrals. | |

**List of Practicals (6 hour per week)**

**By Using Scilab performing all the experiments:**

1. (A) To input row vectors and column vectors.

   (B) To input square and rectangular matrices.
2. (A) To obtain addition, subtraction and multiplication, division of matrices.

   (B) To obtain sub matrices of given matrix and to delete row and columns.
3. (A) To find minors, cofactors, and adjoint of a matrix.

   (B) To find inverse of the matrix using adjoint of a matrix.

   (C) To learn functions zeros, ones, eye, rand, det(), inv(), function for transpose.
4. To draw the graph of a circle.
5. To draw the graph of a parabola.
6. To draw the graph of an ellipse.
7. To draw the graph of a hyperbola.
8. To draw graph of trigonometric functions.
9. To draw graph of inverse trigonometric functions.
10. To draw graph of exponential functions and logarithmic functions.
11. To draw graph of hyperbolic functions.

**Instructional Method and Pedagogy:**

1. Lectures will be conducted with the aid of multi-media projector, black board, Audio/Video clips etc. relevant to the content.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
5. Minimum ten practical's shall be there in the tutorial related to course contents.

**Students Learning Outcomes:**

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

1. **Understand** different concept of matrices and able to relate them with real life problems.
2. **Solve** linear systems of equations of chemistry by using concepts of matrices.
3. **Balance** chemical equations by using matrices.
4. **Find** area and volume of chemical or liquid by using multiple integrals.
5. **Realize** importance of Matrices & Multiple integrals in Physical calculus, Quantum & Wave mechanics, Thermodynamics.

**Reference Books:**


1. Matrix Methods and Differential Equations, Wynand. S. Verwoerd, 1st Edition.
2. Theory and Problems of Matrix Operations by Richard Bronson, Tata McGraw-Hill, 2008.
3. Integral Calculus by Shanti Narayan, S. Chand Higher Academic, Revised Edition.
4. Differential equations by Shanti Narayan, S. Chand Higher Academic, 10th Revised Edition.

5. A Text book of Calculus, S. C. Arora and Ramesh Kumar, Pitamber Publishing Company Ltd., Delhi.
6. Introduction to Scilab by Michael Baudin from the Scilab consortium, 2010.

| RKUNIVERSITY | SYLLABUS |
|---|---|
| **Course Title** | **PHYSICS-II** |
| **Course Code** | BPH201 |
| **Course Credit** | Lecture : 4 |
| | Practical : 3 |
| | Tutorial : 0 |
| | Total : 7 |

**Detailed Syllabus:**

| Sr. No | Name of chapter & Details | Session Allotted |
|---|---|---|
| | **SECTION-I** | |
| **1** | **Waves:**<br>Wave motion, Differential equation of a wave motion, Particle velocity and wave velocity, Newton's formula for velocity of sound in air and velocity of sound in water, Laplace's correction , velocity of sound in isotropic solids, velocity of transverse waves along a stretched string, Laws of transverse vibrations of strings, Verifications of Laws of vibrations, Melde's experiment | **6** |
| **2** | **Optics**<br>Dispersion, Dispersive Power, Fermat's Principle, Law of reflection & Law of refraction from Fermat's Principle<br>***Interference:-***<br>Interference, Conditions for interference of light, Types of Interference, Interference in thin films, Newton's rings, Determination of wave length of Sodium light using Newton's rings. | **8** |
| **3** | **Semiconductor Diode:**<br>Semiconductor diode, Crystal diode rectifiers, Half wave rectifier, Efficiency of half wave rectifier, Full-wave rectifier, Centre-tap full wave rectifier, Full wave bridge rectifier, Efficiency of full-wave rectifier, Ripple factor, Comparison of rectifiers, Filter circuits, Types of filter Circuits , Voltage stabilization , Zener diode, Zener diode as voltage stabilizer. | **8** |
| **4** | **Special Purpose Diodes:**<br>Light emitting diode, LED voltage and current, Advantages of LED, Multicolour LEDs , Applications of LED, Photo diode, Photo-diode operation, Characteristics of Photo-diode, Applications of Photo-diode, Optoisolator. | **6** |
| | **SECTION-II** | |
| **5** | **Transistors:**<br>Transistor, Transistor Action, Transistor connections, Common base connection, Characteristics of common base connection, Common emitter connection, Characteristics of common emitter connection, Common collector connection, | **8** |

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| | Comparison of transistor connections, Commonly used Transistor connection, Transistors load line analysis , Operating point, Cut off and saturation points | |
| **6** | **Crystallography:**<br>Crystallography (Type of Solid, Periodic arrays of Atoms, Translation vector, Lattice & Basis, Crystal structures, Unit cell and Primitive cell), Bravais lattices in three dimensions, Miller indices , Some Crystal structures:– NaCl, CsCl, Diamond | **6** |
| **7** | **X-rays:**<br>Production of X-rays, Origin of X-ray, X-ray Spectrum, Intensity Measurement of X-rays , Wave nature of X-ray, Laue's Spot & Uses, Bragg's Spectrometer, Theory of Diffraction , Bragg's Law, Compton effect, Properties of X-ray, Practical applications of X-rays industrial, scientific, medical). | **6** |
| **8** | **Natural Radioactivity:**<br>Radioactivity, Natural and Artificial Radioactivity, General Properties of Radioactive Radiation, Properties of -rays, Properties of -rays, Properties of -rays, Radioactive Disintegration,7 Law of Radioactive Disintegration , Decay Constant, Half-life Period Average life | **8** |

**List of Practicals (6 hour per week)**

1. Determined frequency of a tuning fork using Melde's Experiment.
2. Study reverse bias characteristic of a Zener Diode.
3. Determine wavelength of a light using Newton's Ring.
4. Study the Transistor Characteristic.
5. Study the forward bias characteristic of a P-N Junction diode.
6. Study the Diode as a Rectifier.
7. Find the magnetic moment using Deflection Magnetometer.
8. Find dispersive power a prism using Spectrometer.
9. Study Characteristic of Photodiode.
10. Study Dispersive curve of Prism.

**Instructional Method and Pedagogy:**

1.Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.

2.Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.

3.Surprise tests/Quizzes/Tutorials will be conducted.

4.The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.

5.Approximately ten experiments shall be there in the laboratory related to course contents.

**Students Learning Outcomes:**

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

- Understand basic concepts of waves, dispersion, reflection and refraction, semiconductor, there working and its application, crystal and its structure, X-ray, radioactivity
- Apply the concept of crystal structure, x-rays and radioactivity.
- Perform the practical of crystal, semiconductor.

  Conclude the result of reflection and refraction, structure of crystal.

**Reference Books:**

- Engineering Physics by R.K.Gaur, S.L.Gupta, Dhanpat Rai Publications.
- Principles of Electronics by V.K.Mehta & Rohit Mehta., S.Chand Company.
- Modern Physics by R.Murugeshan & Kiruthiga Sivaprasath, S.Chand Comp.
- Waves and Oscillations by Brij Lal and Subrahmaniam. S.Chand comp.
- Principles of Optics by Mathur & Pandya
- Atomic Physics by J.B.Rajam. S.Chand & Company Ltd
- Elements of Electronics by M.K.Bagde & S.P.Singh. S.Chand
- Electronic Devices & Circuits. By Allen Mottershed

**Useful Web site for e-leaning**

1. www.physic.about.com
2. www.physic.org
3. www.Physicsclassroom.com
4. www.howstuffworks.com
5. www.colorado.edu/physics/2000
6. www.ndrs.org. physic.com
7. www.physlinc.com
8. www.fearofphysics.com
9. www.hyper physics.com

| RK UNIVERSITY | **SYLLABUS** |
|---|---|
| **Course Title** | **ENVIRONMENTAL SCIENCE** |
| **Course Code** | BES201 |
| **Course Credit** | Lecture : 03 |
| | Tutorial : 00 |
| | Practical : 00 |
| | Total : 03 |

**Detailed Syllabus:**

| Sr. No | Name of chapter & Details | Session Allotted |
|---|---|---|
| | **SECTION-I** | |
| **1** | **Introduction of Environment**<br>I. Definition and scopes of Environment<br>II. Components of Environment.<br>III. Importance of Environmental Science for Concern Educational Field.<br>IV. Technology of Clean technology.<br>V. Man Environment Relationship. | **22** |
| **2** | **Ecological Aspects of Environment**<br>**I.** Concept of Ecology & Eco System<br>**II.** Structure of Eco System<br>**III.** Bio-Geo-Chemical Cycle<br>• Water Cycle<br>• Nitrogen cycle<br>• Carbon Cycle<br>• Oxygen Cycle<br>• Sulphur Cycle<br>**IV.** Food Chain , Food Web<br>**V.** Ecological Pyramid and their Types.<br>**VI.** Biodiversity & Biodiversity Index | |
| **3** | **Water and Air Pollution**<br>**I.** Sources of Water<br>**II.** Type of Impurities in waste water<br>**III.** Removal Method of Impurities | |

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| | ▪ Suspended Parties<br>(Settling, Co-agulation, Filtration)<br>▪ BOD, COD and Organic Impurities<br>($CaOCl_2$ , $Cl_2$, $CaCO_3$)<br>▪ Inorganic Impurities<br>(Soda Lime, Hot Soda, Ion- Ex change.)<br>**IV.** Water Treatment Plant<br>**V.** Water Quality Std by 'WHO'<br>**VI.** Structure of Atmosphere<br>**VII.** Sources of Air Pollutant.<br>**VIII.** Control of Industrial Air Pollution<br>▪ Bag House Method<br>▪ Cyclone Separator<br>▪ Scrubber.<br>▪ Catalytic Converter<br>▪ ESP(Electro Static Precipitator)<br>**IX.** Current Air quality Standards by WHO.<br>**X.** Prevention of Water & Air Pollution | |
| **SECTION-II** | | |
| **4** | **Noise & Land Pollution.**<br>**I.** Noise & Sound Levels<br>**II.** Types of Noise & Effect on Human<br>**III.** Control of Noise Pollution<br>**IV.** Structure of Lithosphere<br>**V.** Classification of Solid Waste<br>Base on Sources<br>▪ Domestic Solid Waste<br>▪ Commercial Solid Waste<br>▪ Industrial Solid Waste<br>▪ Institutional Solid Waste<br>▪ Bio Medical Solid Waste<br>▪ Agriculture Solid Waste<br>▪ Electronic Solid Waste<br>▪ Radioactive Solid Waste<br>**VI.** 4 R Principle.<br>**VII.** Disposal of Solid Waste<br>▪ Land Fill.<br>▪ Incineration.<br>▪ Vermicomposting. | **23** |
| **5** | **Natural Resource**<br>**I.** Natural resources and associated problems<br>**II.** Renewable & Non Renewable Resources.<br>**III.** Forest Resources<br>Water Resources | |

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|---|---|---|
| | Mineral Resources Use, Overuse & Management<br>Energy Resources | |
| **6** | **Human Population Dynamic**<br>**I.** Population Growth<br>**II.** Exponential Population Growth<br>**III.** Logistic Population Growth<br>**IV.** Demographic Projection of Human Population<br>**V.** Global Environmental problems. ( GHE, Acid rain, Ozone depletion)<br>**VI.** Calculation of Population by<br>▪ Arithmetic Progression Method<br>▪ Geometrical Progression Method<br>▪ Incremental Increase Method<br>▪ Declining Growth Method | |

**Instructional Method and Pedagogy:**

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Tutorials will be conducted.

**Students Learning Outcomes:**

At the end of the semester students are able to:

1. Understand and realize the multidisciplinary nature of the environment, its components, and interrelationship between man and environment.
2. Comprehend the importance of ecosystem, biodiversity and natural bio geo chemical cycle.
3. Correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevention.
4. Identify different types of environmental pollution and control measures.
5. Develop practice to make lifestyle eco-friendly.

**Reference Books:**

1.Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Second Edition, 2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.

2.Basics of Environmental Studies by Prof Dr N S Varandani ,2013 Publisher: LAP Lambert Academic Publishing , Germany

3.Environmental Studies by Anindita Basak ,2009 Publisher: Drling Kindersley(India)Pvt. Ltd Pearson

4. Textbook of Environmental Studies by Deeksha Dave & S S Kateva , Cengage Publishers.

5.Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley & Sons.

6.Environmental Studies by R. Rajagopalan, Oxford University Press

7.Environmental Studies by Benny Joseph, TMH publishers

8.Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by : S K Kataria & Sons New Delhi

9.Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw Hil