



# SYLLABUS

<b>Course Title</b>	<b>CHEMISTRY-IV</b>	
<b>Course Code</b>	BSC401	
<b>Course Credit</b>	Lecture	: 04
	Tutorial	: 03
	Practical	: 00
	Total	: 07
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<b>Molecular Orbital Theory:</b> Concept of Molecular Orbital Theory, Characteristic of Molecular Orbital, Wave function of $H_2^+$ & $H_2$ , Potential energy and Schrodinger's equation for $H_2^+$ & $H_2$ , Derivation of normalized wave function of $H_2^+$ based on M.O.T. Hybridization; Derivation coefficient of wave function of sp, $sp^2$ & $sp^3$ Hybridization.	<b>08</b>
<b>2</b>	<b>Organic Metallic Compounds:</b> Introduction, Classification based on nature of M-C Bond, Preparation, Properties and uses of Organo Lithium compounds, Preparation of Organo Beryllium, OrganoAluminium and Zeise Salts, Structure of Tri Methyl aluminium (Dimer), Zeise Salt [ $PtCl_2-C_2H_4$ ], Ferrocene.	<b>07</b>
<b>3</b>	<b>Hetrocyclic Compounds:</b> Structure and Aromaticity of Furan, Thiophene and pyrrole, Preparation of Furan, Thiophene and pyrrole, Chemical Properties of Furan, Thiophene and pyrrole: Nitration, Sulphonation, Acetylation and Chlorination, Reaction with Organometallic Compounds, Structure and Aromaticity of Pyridine, Basicity of Pyridine, Relative basicity of Pyridine, Pyrrole and Aliphatic amines, Preparation of Pyridine from acetylene, Hantzsch's method, Chemical Properties of Pyridine: Electrophilic Substitution Reactions, Nucleophilic Substitution Reactions.	<b>07</b>
<b>4</b>	<b>Active Methylene Compounds</b> Definition, Keto-enol Tautomerism in Ethyl acetoacetate, Proof for structure of Ethyl acetoacetate [Frankland – Duppa Structure & Geuther Structure], Proof for structure of Ethyl acetoacetate [Claisen Condensation with reaction mechanism], Physical Properties of Ethyl acetoacetate, Chemical Properties of Ethyl acetoacetate, Synthesis from Ethyl acetoacetate: Monocarboxylic acid : Butric acid and Valeric acid, Ketone : 2-Pentanone and 3-Methyl- 2-pentanone, $\alpha, \beta$ – unsaturated acid: Crotonic acid, Dicarboxylic acid : Adipic acid, Diketone : Acetyl acetone and Acetonyl acetone, Keto acid : Levulenic acid Hetrocyclic Compounds : 4- methyl uracil and 2,5-dimethyl pyrrole].	<b>06</b>

<b>SECTION-II</b>		
<b>5</b>	<p><b>Chemical kinetics:</b> Introduction, Order and molecularity of a reaction, Zero order reaction, First order reaction &amp; it's characteristics, Second order reaction &amp; it's characteristics, Third order reaction &amp; it's characteristics, Pseudo unimolecular reaction, Method for determining the order of reaction: Graphical method, Ostwald's isolation method, Method of half-life period, Integration method, Theories of reaction rates: Collision theory, The transition state theory, Influence of temperature on reaction rates, Energy of activation, Examples.</p>	<b>07</b>
<b>6</b>	<p><b>The colloidal state:</b> Introduction, Classification of colloidal solutions, Characteristics of hydrophilic and hydrophobic sols, Preparation of colloidal solution : Lyophilic &amp; Lyophobic solution, Preparation methods: Condensation methods such as by Double decomposition, Hydrolysis, Reduction, Oxidation, Exchange of solvent, controlled condensation, change of physical state in short; Dispersion methods such as Bredig's method, by Grinding, Peptization in short, Purification of colloidal solution : Dialysis, Ultrafiltration, Ultra centrifuging; Properties of colloidal solutions: Optical properties such as Tyndall effect, Brownian effect, Color, Electrical properties such as Electrical Charge, Electrical double layer &amp; Zeta potential, Cataphoresis, Electro-osmosis: The Protective colloid (gold number), Application of colloidal state in short.</p>	<b>07</b>
<b>7</b>	<p><b>Ceramics and Refractories:</b> Introduction to Ceramics, Raw materials, Classification based on reduction in Porosity, Manufacturing, Body Preparation using clay slip, Introduction to Refractories, Classification of Refractories. Ceramics and Refractories, Introduction to Ceramics, Raw materials, Classification based on reduction in Porosity, Manufacturing, Body Preparation using clay slip, Introduction to Refractories, Classification of Refractories, Properties of Refractories, Manufacturing, Fire Clay Bricks, manufacture, Properties and uses.</p>	<b>07</b>
<b>8</b>	<p><b>Synthetic Polymers:</b> Introduction, Classification of Polymers, Classification of Polymers when based upon Intermolecular interaction, Classification of Polymers based upon Structure, Type of Polymerization reaction, Addition Polymerization, Free Radical Polymerization, Ionic Polymerization, Ziegler- Natta Polymerization, Stereo Chemistry of Polymer Plastic, Types of Plastics, Thermo Plastic. Thermosetting Plastic.</p>	<b>07</b>
<b>List of Practical (6 Hour/Week)</b>		
<p><b>1. Inorganic Qualitative Analysis:</b> [Minimum ten Inorganic mixtures should be given] Qualitative Analysis of an inorganic mixture containing four radicals, excluding <math>\text{PO}_4^{-3}</math>, <math>\text{CrO}_4^{-2}</math>, <math>\text{Cr}_2\text{O}_7^{-2}</math>, <math>\text{AsO}_3^{-3}</math>, <math>\text{AsO}_4^{-3}</math>, <math>\text{BO}_3^{-3}</math> and <math>\text{S}^{-2}</math></p> <p><b>2. Physicochemical Exercise</b></p> <ul style="list-style-type: none"> <li>• To determine the specific reaction rate of the hydrolysis of methyl acetate / Ethyl acetate catalyzed by <math>\text{H}^+</math> ion at room temperature.</li> <li>• To study the rate of reaction between <math>\text{K}_2\text{S}_2\text{O}_8</math> and <math>\text{KI}</math>.</li> <li>• To study the rate of reaction between <math>\text{KBrO}_3</math> and <math>\text{KI}</math>.</li> <li>• To determine the relative strength of <math>\text{HCl}</math> and <math>\text{H}_2\text{SO}_4</math>.</li> <li>• To determine the temperature coefficient and Energy of activation for the hydrolysis of ester at two different temperatures.</li> <li>• To determine the temperature coefficient and Energy of activation for the reaction</li> </ul>		

between  $K_2S_2O_8$  and KI at two different temperatures

- To determine the rate of adsorption of the given organic acid using animal charcoal.
- Distribution Law: To study the partition co-efficient of benzoic acid between water and benzene / kerosene and hence study the molecular condition of benzoic acid in the solution.

#### Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- 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.
- 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.
- Surprise tests/Quizzes/Tutorials will be conducted.

#### Students Learning Outcomes:

After Successful completion of the above course, students will be able to:

- **Understand** the theory and **application** of organometallic compounds.
- **Understand** MOT of various compounds.
- **Identify** and **understand** fundamental chemistry of heterocycles and active methylene compounds.
- **Calculate** chemical kinetics for different reactions.
- **Understand** fundamentals of colloidal state.
- **Understand** industrial application and preparations of Synthetic Polymers, Ceramics and Refractories.

#### Reference Books:

1. Concise Inorganic Chemistry by J.D.Lee, wileyindia, 5<sup>th</sup> edition 2013
2. Textbook of Inorganic Chemistry by Soni P.L., Sultan Chand & Sons. 20<sup>th</sup> edition 2013
3. Advanced Inorganic Chemistry (3<sup>rd</sup> Edition) - FA.Cotton and G. Wikinson, Wiley Eastern Pvt.Ltd 6<sup>th</sup> edition, 2009
4. Advanced Inorganic Chemistry (Volume II) by Prakash Satya, S.Chand& Company Ltd. New Delhi, 2006
5. Organic Spectroscopy by B. K. Sharma
6. Organic reaction mechanisms by V.K. Ahluwalia, Narosa publishing house 4<sup>th</sup> edition. 2011
7. Advanced Organic Chemistry by ArunBahl and B.S.Bahl, S.Chand& Company Ltd. New Delhi, 18<sup>th</sup> edition 2010.
8. Organic Chemistry by Morrison and Boyd, Pearson Education Delhi 7<sup>h</sup> edition 2011
9. Solomons&Fryhle`s Organic Chemistry by Solomon Graham T.W. andFryhle Craig B., Wiley India (P) Ltd. New Delhi. 10<sup>th</sup> edition.
10. Organic Chemistry Volume -2, I. L. Finar, Pearson publications, New Delhi 2007. 3<sup>rd</sup> edition.
11. A Textbook of Physical Chemistry by P.L.Soni,S.Chand& Company Ltd. New Delhi, 22<sup>nd</sup> edition 2005.
12. Essentials of Physical Chemistry by Bahl B. S. and Tuli G. D., S.Chand& Company Ltd. New Delhi. .



# SYLLABUS

<b>Course Title</b>	<b>MICROBIOLOGY-IV</b>	
<b>Course Code</b>	BSM401	
<b>Course Credit</b>	Lecture	: 04
	Tutorial	: 00
	Practical	: 03
	Total	: 07
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<p><b>Medical Mycology and Parasitology</b></p> <p>General properties of fungi: Classification based on disease, superficial, subcutaneous, deep mycosal opportunistic infections including Mycotoxins, systemic mycoses; Method of collection of samples; Antifungal agents; Mycetoma, Aspergillosis and Candidiass; Filaria, Toxoplasma.</p>	<b>09</b>
<b>2</b>	<p><b>Microbial diseases of Respiratory System</b></p> <p>Causative organism, mode of action, transmission, symptoms, prevention and control; Normal flora of respiratory tract; Bacterial diseases: Scarlet fever, Diptheria, Streptococcal phyringitis; Fungal disease: Histoplasmosis, Coccidioidomycosis, Pneumocystis pneumonia; Viral disease: Viral pneumonia, Respiratory Syncytial virus (RSV), Influenza</p>	<b>09</b>
<b>3</b>	<p><b>Modern Analytical Techniques and Biosensor Technology</b></p> <p>DNA sequencing: Principles and Methods, Automated DNA sequence Analyzer; Blotting techniques and FISH; Electrophoresis; Chemical synthesis of DNA; PCR Technology: Principle, Methods and Applications; Introduction to Cromatography, paper chromatography, Thin layer chromatography</p>	<b>10</b>
<b>SECTION-II</b>		

<b>4</b>	<p><b>Computer Science and Biostatistics</b></p> <p>MS Office: MS word, MS power point, MS Excel; Measures of Central Tendency: Mean, Median and Mode, quartiles, deciles and percentiles (both for raw data and grouped data); Measures of Dispersion: Range, Interquartile Range, Variance, Standard Deviation and Coefficient of Variation; Practical Using MS-Excel; Statistical hypotheses: Null and Alternative hypotheses, Simple and Composite hypotheses; Statistical Tests: Acceptance region and Rejection Region; Types of errors; Significance Tests Distribution: Normal One sample tests for mean: Z test and t-test, Two sample tests for normal distributions: Tests for means (i) when variances are known (ii) Test for equality of means; Confidence Intervals; ANOVA</p>	<b>16</b>
<b>5</b>	<p><b>Microbial disease of Reproductive and Urinary Tract</b></p> <p>Structure and function of urinary system; Normal flora of urinary and reproductive tract; Bacterial disease: Leptospirosis, Cystitis, Bacterial vaginosis; Protozoan disease: Trichomoniasis; Viral disease: Genital Herpes, AIDS, Genital warts</p>	<b>12</b>

#### **List of Practical (6 Hour/Week)**

1. Estimation of Protein by Bradford method
2. Circular paper Chromatography of Amino acids
3. Ascending paper chromatography of sugars
4. Thin Layer Chromatography of Amino acids
5. Agarose Gel Electrophoresis of DNA
6. SDS PAGE of Protein
7. Evaluation of antifungal agent by bioassay method
8. Isolation and identification of candida from clinical specimen
9. To check significance of data derived from an experiment by using ANOVA
10. Basic use of Computer – Use of Excel and power point.

#### **Instructional Method and Pedagogy:**

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- 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.
- Surprise tests/Quizzes/Tutorials will be conducted.

- 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:**

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

- Know the concepts of microbiology and microbial biotechnology.
- Apply knowledge in various strategies involved in microbial biotechnology industries.
- Understand the concept of microbial production of antibiotic, organic acid, vitamins, amino acid and industrial alcohol.

**Text Books:**

1. Gerard J. Tortora, Microbiology: An Introduction (2016), Pearson, 12 edition.
2. A.K. Shrivastava, Fundamentals of Bioanalytical Techniques and instrumentation (2016), Narsa Publication
3. P. ramakrishnan, Biostatistics (2016), Saras Publication.

**Reference Books:**

1. T.K. Attwood & D.J. Parry, Introduction to Bioinformatics, Benjamin Cummings publication.
2. Westhead, Parish and Twyman, Instant notes in Bioinformatics



# SYLLABUS

<b>Course Title</b>	<b>BOTANY-IV</b>	
<b>Course Code</b>	BSB411	
<b>Course Credit</b>	Lecture	: 04
	Tutorial	: 00
	Practical	: 03
	Total	: 07
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<b>Medicinal Botany</b> Ethnomedicine: Scope, History and development of Ethnobotany, Ethnobotany in India, Plants used by the tribal populations: a) Food plants, b) intoxicants and beverages and miscellaneous uses, Outlines of Ayurveda, Siddha, Unani and Homeopathic systems of traditional medicine; Role of AYUSH, NMPB, CIMAP and CDRI;	<b>10</b>
<b>2</b>	<b>Physiology</b> Essential macro and micro elements and their role; deficiency symptoms; Plant hormones auxins, gibberellins, cytokinins, abscisic acid and ethylene, history of their discovery, mechanism of action; Seed dormancy	<b>10</b>
<b>3</b>	<b>Plant breeding</b> Introduction and Objectives of plant breeding, Types of variations, Techniques of hybridization, Plant breeder's knowledge, Green revolution, Mode of propagation, transgenic plants (GMO's)	<b>8</b>
<b>SECTION-II</b>		
<b>4</b>	<b>Ecology</b> Components and properties of Soil – Mineral matter, Soil Air, Soil Water; Soil Solution; Soil organic matter (Humus), Soil organisms; Pollution: Air, Water, Acid rain, Global warming; Phytoremediation; Invasive alien species as threat to biodiversity.	<b>13</b>
<b>5</b>	<b>Advanced techniques in botany</b> Horticulture: Introduction and scope, Bonsai, Floriculture, Bio-fertilizers, Antibiotics, Hydroponics, Biotechnological methods for plant improvement, Adulteration in food – Definition, objects used for adulteration and their side-effects, methods to detect adulteration of food.	<b>15</b>

### List of Practical (6 Hour/Week)

1. To study selected soil properties by spot test.  
a) pH, b) Carbonate, c) Nitrate
2. To prepare traditional herbal formulations
3. To study plant propagation by bulb (Onion) and tuber (Potato).
4. To study plant propagation by leaf (Panfuti) and stem (Ginger).
5. To observe the impact of auxin on seed germination.
6. To observe the impact of abscisic acid on leaf disc.
7. To analyze adulteration in spices.
8. To analyze food colour adulteration.
9. To analyze adulteration in pulses and cereals.
10. To check the Shelf life of cut flowers
11. Comparative study of different soilless cultures
12. To check Seed viability through TTZ test.

### Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- 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.
- Surprise tests/Quizzes/Tutorials will be conducted.
- 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:

After Successful completion of the above course, students will be able to:

- Gain understanding about medicinal plants
- Understand the functional role of plant hormones.
- Apply knowledge in various strategies and techniques involved in botany.
- Understand the concept of plant breeding and ecology.

### Reference Books:

1. Text book of Botany by N. S. Panchal & M. M. Jani
2. Plant Physiology by Pandey and Sinha
3. Plant Physiology by V. Verma
4. Cytogenetics by Sudan rajan
5. College Botany by Das, Dutta and Ganguli
6. Text book of Botany by B. P. Pandey; Mishra
7. Ecology and Environment by P.D. Sharma
8. Plant Breeding by B.D.Singh
9. Biotechnology by B D Singh / PK Gupta





# SYLLABUS

<b>Course Title</b>		<b>PHYSICS-IV</b>
<b>Course Code</b>		BPH 401
<b>Course Credit</b>	Lecture	: 04
	Tutorial	: 00
	Practical	: 03
	Total	: 07
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<b>Diffraction:</b> Introduction, Two types of Diffraction, Fresnel's Explanation of the Rectilinear propagation of light (up to equation, Zone Plate, Action of Zone Plate, Comparison between Zone plate & convex lens, Fraunhofer diffraction at Double Slit (Geometry Method), Plane diffraction grating, Theory of grating, Determination of wavelength, Prism & Grating Spectra.	<b>8</b>
<b>2</b>	<b>Lasers:</b> Interaction of Radiation with matter (Spontaneous and stimulated emission), Einstein's Relations, Light amplification & conditions, Population Inversion, Pumping, Metastable states, The principle pumping schemes, Optical Resonance, Types of Lasers Nd:YAG Laser, CO <sub>2</sub> Laser, Ruby Laser, He-Ne Laser, Semiconductor Laser, Applications	<b>7</b>
<b>3</b>	<b>Fiber Optics:</b> Optical Fibers, Critical angle of Propagation, Modes of propagation, Acceptance angle, Fractional refractive index change, Numerical Aperture, Types of Optical Fibers, Applications, Military Applications, Optical fiber Sensors, Medical Applications, Fiber optic communication, Advantage.	<b>7</b>
<b>4</b>	<b>Oscillators:</b> Sinusoidal oscillators, Positive feedback, Barkhausen Criterion, Different types of transistor oscillators, Colpitt's Oscillator, Hartley Oscillator, Phase Shift Oscillator, Wein Bridge Oscillator.	<b>6</b>
<b>SECTION-II</b>		
<b>5</b>	<b>Modulation and Demodulation:</b> Radio broadcasting, transmission & reception, Modulation, Types of Modulation, Amplitude Modulation, Transistor AM Modulator, Limitations of Amplitude Modulation, Frequency Modulation, Demodulation, Essentials of demodulation, AM diode detector, Types of AM radio receivers.	<b>8</b>

<b>6</b>	<b>Solid State Devices:</b> Types of Field Effect Transistors, Junction Field Effect Transistors, Working principle of JFET, Symbol, Importance of JFET, Difference between JFET & Bipolar Transistor, Output Characteristics of JFET, Advantages of JFET, Parameters of JFET(only definition), MOSFET, Unijunction Transistor, Equivalent circuit of UJT, Characteristics of UJT, Advantages & Applications of UJT, Thermistor	<b>8</b>
<b>7</b>	<b>Digital Electronics:</b> Analog and Digital Signal, Binary number system, Logic gates, OR gate AND gate, NOT gate, Combination of basic logic gates, NAND gate as universal gate, Encoders and Decoders, Advantages and disadvantages of Digital electronics, Boolean algebra, Boolean theorems, De Morgan's Theorems.	<b>7</b>
<b>8</b>	<b>Optoelectronic Devices:</b> Photo Transistor, LCD, Solar cell, Light Dependent Resistor, Light operated Relay, (a)Flame failure Relay, (b)Smoke Detector, (c)Twilight Switch, (d)Temperature Control Circuit	<b>5</b>

#### List of Practical (6 Hour/Week)

1. Determine the modulus of rigidity by Maxwell's needle.
2. Determine the modulus of rigidity by Statistical method.
3. Find the focal length & Refractive index of Convex lens by Optical lever.
4. Determination of  $I$  using mercury light by Diffraction gratings.
5. Resolving power of prism.
6. Resolving power of telescope.
7. Energy band gap of thermistor.
8. Study of Characteristics of Solar Cell.
9. Characteristics of Field Effect Transistor. Determination of  $m, R_d, G_m$ .
10. Characteristics of Uni Junction Transistor.
11. Verification of truth table of AND, OR, NOT, NAND & NOR gate.
12. NAND gate as Universal gate.
13. Study of Zener Diode as voltage regulating characteristics.
14. Study of Characteristics of Photo Transistor.
15. FET as Voltmeter.
16.  $e/m$  by Thomson's method.

#### Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- 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.
- Surprise tests/Quizzes/Tutorials will be conducted.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- 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 diffraction, stimulated emission, optical communication, oscillator, modulation-demodulation, JFET, UJT, Thermistor and optoelectronic devices.
- Apply the concept of diffraction, optical sensors, logic gates, solar cell and relay circuit.
- Perform the practical of rigidity, diffraction, solar cell, FET, UJT, logic gates and photo transistor.

- Conclude the results of logic gates.
- Compare the results of different sensing devices.

**Reference Books:**

1. A Text Book of Optics N.Subrahmanyam, BrijLal&M.N.Avadhanulu, S.Chand& Co.
2. Engineering Physics by R.K.Gaur, S.L.Gupta, DhanpatRai Publications.
3. Principles of Electronics by V.K.Mehta&Rohit Mehta., S.Chand Company.
4. Modern Physics by R.Murugesan&KiruthigaSivaprasath, S.Chand Comp.
5. Waves and Oscillations by BrijLal and Subrahmaniam. S.Chand comp.



# SYLLABUS

<b>Course Title</b>	<b>Mathematics - IV</b>	
<b>Course Code</b>	BMT 411	
<b>Course Credit</b>	Lecture	: 4
	Practical	: 3
	Tutorial	: 0
	Total	: 7
<b>Detailed Syllabus:</b>		
<b>Sr. No.</b>	<b>Name of chapter &amp; Details</b>	<b>Sessions Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<b>Sequence and Series:</b> Sequence, convergence properties of sequences, infinite series, series of positive terms, the geometric series, the integral test and the comparison test, D'almbert's ratio test and Cauchy's root test.	<b>8</b>
<b>2</b>	<b>Higher order ODE:</b> Linear ODEs (generalities) complimentary function as and particular integrals, linear dependence and independence of functions, Wronskians, Abel-Liouville formula, use of a known solution (for reduction of order) method of variation of parameter.	<b>10</b>
<b>3</b>	<b>Linear ODEs With constant coefficient and the Cauchy Euler equation:</b> The characteristic polynomial and indicial polynomial, discussion of the case of complex roots and repeated roots, extracting the real form of the solution via Euler's formula $e^{i\theta} = \cos\theta + i\sin\theta$ , method of undetermined coefficient for finding the particular integral for special right hand sides. (Forcing functions) both for constant coefficient ODEs as well as Cauchy Euler ODEs.	<b>10</b>
<b>SECTION-II</b>		
<b>4</b>	<b>Descriptive statistics:</b> Measures of Central Tendency: Mean, Median and Mode, quartiles, deciles and percentiles (both for raw data and grouped data) Measures of Dispersion: Range, Interquartile Range, Variance, Standard Deviation and Coefficient of Variation.	<b>8</b>
<b>5</b>	<b>Correlation and Regression:</b> Introduction, types of correlation – positive or negative, simple, multiple or partial. Coefficient of correlation, methods of studying correlation – scatter diagram method, Karl Pearson's product moment method, Spearman's rank	<b>8</b>

	correlation method. Regression, lines of regression, methods of finding regression lines - scatter diagram method, method of least squares. Examples of all methods for correlation and regression.	
6	<b>Statistical hypothesis:</b> Null and Alternative hypothesis, Simple and Composite hypothesis Statistical Tests: Acceptance region and Rejection Region. Types of errors. Significance Tests Distribution: Chi-square test, F-test and t-test.	8
7	<b>ANOVA:</b> One way ANOVA Two way ANOVA	4

#### Laboratory course:

1. Check the convergence of the series by geometric series and Integral test.
2. Check the convergence of the series by comparison test, D'almbert's ratio & Cauchy's root test.
3. Find complementary function, particular integrals, Wronskians, of the ODEs.
4. Find solution of ODE by method of variation of parameter.
5. Find the roots of Linear ODEs and find Euler's formulae  $e^{i\theta} = \cos\theta + i\sin\theta$ .
6. Find solution of ODE by method of undetermined coefficient,
7. Find mean, median, mode, quartiles, deciles and percentiles.
8. Find standard deviation and coefficient of variation.
9. Apply statistical Tests (t & F tests) for one samples.
10. Apply statistical Tests (chi-square test) for one samples.
11. Find one way ANOVA.
12. Find two way ANOVA.

#### Students Outcomes:

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

- Understand different concept of Higher order ODEs & their solution and able to relate them with real life problems.
- Choose proper statistical methods & statistical tests for particular & specific problem.
- Analyze problems or situations by statistical methods & statistical tests.

#### Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, Audio/Video clips etc. relevant to the content.
- 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.
- Surprise tests/Quizzes/Tutorials will be conducted.

- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum ten practical's shall be there in the tutorial related to course contents.

**Reference books:**

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley, 1999.
2. Calculus by T. M. Apostol, Wiley Eastern, Volume-2, 1980.
3. Basic Biostatistics for Pharmacy by Prin. G. C. Patel and Dr. G. K. Jani, Atul Prakashan, 2<sup>nd</sup> Edition.
4. Biostatistics by P. Ramakrishnan, Saras Publication.
5. Advanced Engineering Mathematics by Dr. K. R. Kachot, Mahajan Publishing House, 7<sup>th</sup> Edition.



# SYLLABUS

<b>Course Title</b>	<b>BASICS OF COMPUTER APPLICATIONS</b>	
<b>Course Code</b>	CE451	
<b>Course Credit</b>	Lecture	: 03
	Tutorial	: 00
	Practical	: 00
	Total	: 03
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
1	<b>Computer Fundamentals:</b> Introduction to Computers, Applications, History, Computer Organization, Input and Output Devices, Storage Devices, Classification of Computers, Hardware & Software	<b>22</b>
2	<b>Introduction to Operating System, Windows &amp; its Utilities</b> Introduction to Operating System- Functions of Operating Systems and their characteristics; DOS: Introduction, Basic DOS commands; Windows: Introduction to Windows, Features of Windows, Types & Versions, Overview of File System, Basic operations with File System: Working with Control Panel Creation of Users, Installation/Un-Installation of Applications, Drivers.	
3	<b>Working with Office</b> Document Writer: Creating, Editing & Navigating, Formatting, Working with Table, Mail Merge, Macros; Spreadsheet: Working with Sheets, Formatting Sheets, Data Filters, Formulas, Graphs & Charts, Analyzing Data, Macros. Presentation: Creating Presentation, Designing, Editing, Animation, Inserting Sounds, Movies and Charts, Usage of Hyperlinks.	
4	<b>Networking and Internet</b> Computer Network, Networking Devices & Technologies, Introduction to Internet, Web Surfing, Overview of Browsers, Email Providers, Creating & Working with Emails, Email Groups, Video Conferences.	
<b>SECTION-II</b>		
5	<b>Google Apps – I</b> Moving from Office to Google Drive: Google docs: Creating Document, Upload, Edit Document, Sharing, Limitation of Google Docs, Google sheets: Creating Sheets, Upload, Edit Sheets, Sharing, Limitation of Google Sheets, Google slide: Creating Slide, Upload, Edit Slide, Sharing, Limitation of Google Slide.	<b>23</b>
6	<b>Google Apps - II</b> Google Calendar: Creating and Viewing Events, Inviting others, Notifications Google Forms: Usage of Various Components, Designing & Sharing	

	<b>Google Sites:</b> Introduction to Templates, Creating/Editing Pages, Publishing Sites	
7	<b>Google Apps - III</b> Google Classrooms: Capturing your Classroom's, Communicating with students Google Maps, Exploration of Google Earth, Usage of Google Groups to Promote Online Discussion.	
8	<b>Applications &amp; Online Tools</b> Working with pdf, Conversion from pdf into various formats, Basics of Origin - Graphing, Exploration of Data, Analysis of Data, E-Books, Online Videos, Edmodo, Canvas.	
<b>Instructional Method and Pedagogy:</b>		
<ol style="list-style-type: none"> <li>1. Lectures will be conducted on the basis of Classroom Response Systems with the use of multimedia projector and black board.</li> <li>2. Assignments based on course contents will be given at the end of each unit/topic and will be evaluated at regular interval.</li> <li>3. Experiments will be based on the practical curriculum and will be evaluated at regular interval</li> </ol>		
<b>Students Learning Outcomes:</b>		
<p>On the completion of the course, students will be able to :</p> <ul style="list-style-type: none"> <li>• <b>Explore</b> the fundamental of computer, hardware, software.</li> <li>• <b>Demonstrate</b> proficiency in the use of email.</li> <li>• <b>Compose</b> various documentation skills of open office and Google collaboration tools in daily routine work.</li> <li>• <b>Adapt</b> data management and manipulation skills in daily routine work.</li> </ul>		
<b>Text book:</b>		
<ol style="list-style-type: none"> <li>1. Title : Microsoft Office 2007 Bible, Wiley India New Delhi Author(s): Walkenbach John Tyson Herb WempenFaithe Prague Cary, N. Groh Michael, R. Aitken Peter, G. Bucki Lisa.</li> <li>2. Title : The Internet, Prentice Hall of India Publication Author(s) : Douglas E. Comer.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Title : Learn Microsoft Office 97, BPB Publications New Delhi Author(s): Russell Stuart.</li> <li>2. Title : Google Drive &amp; Docs in 30 Minutes (2nd Edition): The unofficial guide to the new Google Drive, Docs, Sheets &amp; Slides by IAN IAMONT</li> </ol>		
<b>Additional Resources:</b>		
<ol style="list-style-type: none"> <li>1. <a href="http://www.originlab.com">www.originlab.com</a></li> <li>2. <a href="http://www.officetutorials.com">www.officetutorials.com</a></li> <li>3. <a href="https://gsuite.google.com/learning-center">https://gsuite.google.com/learning-center</a></li> <li>4. <a href="http://www.basicknowledge101.com/subjects/internet.html">http://www.basicknowledge101.com/subjects/internet.html</a></li> </ol>		





# SYLLABUS

<b>Course Title</b>		<b>BASICS OF BUSINESS MANAGEMENT</b>	
<b>Course Code</b>		BBC108	
<b>Course Credit</b>		Lecture	: 03
		Tutorial	: 00
		Practical	: 00
		Total	: 03
<b>Detailed Syllabus:</b>			
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>		<b>Session Allotted</b>
<b>SECTION-I</b>			
<b>1</b>	<b>Introduction to Management and Business Organization:</b> What is Management? Why management is Important for any Business? Levels of Management in the organization, Skills Required to be a Good Manager, Roles of Manager, Modern principles of Management, Coordination-The essence of Managing, Basic Functions of Management. Forms of Business Organization: Sole Proprietorship form, Partnership form of Business Organization, Joint Hindu Family form of Business Organization, Cooperative Society.		<b>22</b>
<b>2</b>	<b>Planning and Decision Making:</b> What is Planning? Importance of Planning, Elements of sound Plan, How to do planning? Role of Decision Making, Types of Decisions, How to make the decisions?		
<b>3</b>	<b>Organizing:</b> Organization as a Structure, Forms of Organization Structure, Organization as a Process :Authority and Responsibility, Delegation – Centralization and Decentralization		
<b>SECTION-II</b>			
<b>4</b>	<b>Managing Human Resources:</b> Recruitment and selection, Training and Development, Performance appraisal and its importance, Motivation and its importance, Techniques to Motivate Employees.		<b>23</b>
<b>5</b>	<b>Leadership and Managing Team</b> Importance of Leadership, Leadership Styles and its Suitability, Leadership Vs. Management, Team Building, Levels of Conflicts and its effects, Ways to manage Conflicts, Channels and media of Communication in the organization.		
<b>6</b>	<b>Functional Areas (Scope) of Management:</b> Marketing Management – Functions, Scope, Importance; Financial Management-Functions, Scope, Importance; Production and Operation Management-Functions, Scope, Importance.		

**Instructional Method and Pedagogy:**

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- 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.
- 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.
- Surprise tests/Quizzes/Tutorials will be conducted.

**Students Learning Outcomes:**

After Successful completion of the above course, students will be able to:

- Understand the fundamental concepts of Business management, basic roles of manager and managerial functions in organization.
- Relate, discuss, and present management practices, managerial roles, and procedures.
- Recognize the management practices and its importance in today's Business world

**Text book:**

1. Management: Theory and Practice by C.B.Gupta, by Sultanchand&Sons
2. Management: A Global and Entrepreneurial Perspective by Weihrich Heinz, Koonz, Harold , Tata McGraw-Hill