

B.Sc. (Hons.) Mathematics

Course Structure and Syllabus
University Campus
(Based on Choice Based Credit System)
Batch 2022 & onwards

DEPARTMENT OF APPLIED SCIENCES (Mathematical Sciences)

VISION

To be among the best mathematics departments in the region and to establish a national reputation as a centre for research and teaching in mathematics. Moreover, the department will contribute to the development of students as mathematical thinkers, and to function as productive citizens.

MISSION

- To discover, mentor, and nurture mathematically inclined students, and provide them a supportive environment that fosters intellectual growth.
- To prepare our undergraduate and graduate students to develop the attitude and ability to apply mathematical methods and ideas in a wide variety of careers.
- To perform widely recognized research in focused areas of mathematical and statistical theory, methodology, and education.
- To advocate for mathematical sciences and UTEP in schools and the local community.

B.Sc. (Honours Mathematics) Program

PROGRAM OBJECTIVES

Objective of the program is to catch young and talented students to motivate them to study Mathematics and to nurture them to develop their mathematical reasoning and logics. Other objectives of the program are to inspire students to pursue study in higher mathematics and grow as a skilful mathematician to cater the needs of knowledgeable society.

Duration: B.Sc. (Hons) Mathematics is a graduate level program offered by the Department of Mathematical Sciences. This is a 3-years program, consisting of six semesters with two semesters per year.

Program Code: BSHM (Bachelor of Science (Hons) in Mathematics)

Eligibility: 10+2 in any stream with Mathematics as one of the subjects with at least 50% marks (45% in case of candidate belonging to reserved category) in aggregate.

PROGRAM EDUCATIONAL OBJECTIVES: At the end of the program, the student will be able to:

PEO1	Apply principles of basic science concepts in understanding, analysis and prediction of mathematical systems.
PEO2	Develop human resource with knowledge, abilities and insight in Mathematics and related fields required for career in academia and industry.
PEO3	Engage in lifelong learning and adapt to changing professional and societal needs.

PROGRAM SPECIFIC OUTCOMES

At the end of the program,

PSO1	Students will be able to understand the nature of Mathematics and shall be ready to study higher 'Abstract Mathematics'.
PSO2	Students will be able to visualize the importance of Mathematics and apply the knowledge of Mathematics in Physical, Chemical and Social Sciences.
PSO3	Students will be able to use latest mathematical tools and software.
PSO4	Students will be able to formulate computer codes to tackle the complex mathematical problems.
PSO5	Students will become more confident due to enhanced level of reasoning, logics, skills and shall be able to understand the needs of the society.

PROGRAM OUTCOMES: At the end of the program, the student will be able to:

PO1	Understand the concepts of different branches of Mathematics.
PO2	Demonstrate expertise to conduct wide range of scientific modelling.
PO3	Apply the concepts of mathematics in areas of mechanics, analysis, calculus, algebra, geometry, mathematical modelling etc., in industry, academia, and day-to-day life.

Scheme of the Program: B.Sc. (Hons.) Mathematics

SEMESTER FIRST

Contact Hrs. 24 Hrs.

S.No.	Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Cr
				L	T	P	Internal	External		
1.	BSHM-101-22	Compulsory	Calculus-I	4	-	-	40	60	100	4
2.	BSHM-102-22		Algebra	5	1	-	40	60	100	6
3.	BSHM-103-22		Programming Lab-I	-	-	4	30	20	50	2
4.	BHHL-115-22		Communicative English	2	-	-	20	30	50	2
5.*	BSHP-111-21	Elective	Optics	3	1	-	40	60	100	4
	BSHP-113-21		Physics Lab-I	-	-	4	30	20	50	2
	UGCA-1902		Fundamentals of Computer and IT	3	1	-	40	60	100	4
	UGCA-1906		Fundamentals of Computer and IT (Laboratory)	-	-	4	30	20	50	2
				Total						20

L: Lectures T: Tutorial P: Practical Cr: Credits

Note*: Physics (BSHP-111-21 & BSHP-113-21) are compulsory for the Students with Non-Medical background. Students without Non-medical background should opt Fundamentals of Computer and IT (UGCA-1902 & UGCA-1906).

Examination and Evaluation

Theory			
S. No.	Evaluation criteria	Weightage in Marks	Remarks
1	Mid term/sessional Tests	24	Internal evaluation (40 Marks) MSTs, Quizzes, assignments, attendance, etc., constitute internal evaluation. Average of two mid semester test will be considered for evaluation.
2	Attendance	6	
3	Assignments/Seminars/Presentations/Continuous Evaluation	10	
4	End semester examination	60	External evaluation
5	Total	100	Marks may be rounded off to nearest integer.
Practical			
1	Evaluation of practical record/ Viva Voice/Attendance/Seminar/ Presentation	30	Internal evaluation
2	Final Practical Performance + Viva-Voce	20	External evaluation
3	Total	50	Marks may be rounded off to nearest integer.

Instructions for Paper-Setter in B. Sc (Hons.) Mathematics**A. Scope**

1. The question papers should be prepared strictly in accordance with syllabus and format as prescribed by the University.
2. The question paper should cover the entire syllabus with uniform distribution among each unit and weightage of marks for each question.
3. The language of questions should be simple, direct, and documented clearly and unequivocally so that the candidates may have no difficulty in appreciating the scope and purpose of the questions. The length of the expected answer should be specified as far as possible in the question itself.
4. The distribution of marks to each question/answer should be indicated in the question paper properly.

B. Type and difficulty level of question papers

1. Questions should be framed in such a way as to test the student's intelligence and understanding of the applied aspects of the subject. The weightage of the marks as per the difficulty level of the question paper shall be as follows:
 - i) Easy question 30%
 - ii) Average questions 50%
 - iii) Difficult questions 20%
2. The numerical content of the question paper should be up to 40%.

C. Format of question paper

1. Paper code and Paper-ID should be mentioned properly.
2. The question paper will consist of three sections: Sections-A, B and C.
3. Section-A is COMPULSORY consisting of TEN SHORT questions carrying two marks each (total 20 marks) covering the entire syllabus.
4. The Section-B consists of FOUR questions of eight marks each covering Unit I & II of syllabus (Taking two questions from each Unit I & II).
5. The Section-C consists of FOUR questions of eight marks each covering Unit III & IV of syllabus (Taking two questions from each Unit III & IV).
6. Sub-parts of the questions in Section B and C should be preferred for numerical/conceptual questions.
7. Attempt any five questions in all, selecting at least two questions from each of the two sections.

Question paper pattern for MST:

Roll No:	No of pages:
IK Gujral Punjab Technical University- Jalandhar	
Department of Mathematical Sciences	
Academic Session:	
Mid-Semester Test: I/II (Regular/reappear)	Date:
Programmse: B.Sc. (Hons.) Mathematics	Semester:
Course Code:	Course:
Maximum Marks: 24	Time: 1 hour 30 minutes

❖ Note: Section A is compulsory; Attempt any two questions from Section B and one question from Section C.

Section: A		Marks	Cos
1		2	
2		2	
3		2	
4		2	
Section: B			
5		4	
6		4	
7		4	
Section: C			
8		8	
9		8	

Details of Course Objectives

<i>C01</i>	
<i>C02</i>	
<i>C03</i>	
<i>C04</i>	
<i>C05</i>	

SEMESTER-I

BSHM-101-22	Calculus-I	L-4, T-0, P-0	4 Credits		
Pre-requisite: Elementary calculus of senior secondary level.					
Course Objectives: The objectives of this course are to make the students understand the following: <ol style="list-style-type: none"> 1. The fundamental concepts of differential calculus. 2. The geometrical meaning of functions, limits, continuity, derivatives, mean value theorems. 3. Applications of derivatives. 4. The definition of Higher order derivatives and its basic applications. 5. The usability of Higher order derivatives to establish Taylor's theorem, Leibnitz theorem and Maclaurin theorem. 					
Course Outcomes: At the end of the course, the students will be able to					
C01	Understand the basic concepts of Differential and Integral Calculus.				
C02	Visualize all concepts geometrically.				
C03	Sketch curves of the functions intuitively with the help of Differential Calculus.				
C04	Apply the knowledge of Differential and Integral Calculus.				
C05	Understand the fundamental relation between differential and Integral Calculus.				
Mapping of course outcomes with the program outcomes					
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
C01	3	3	2	2	3
C02	3	2	2	2	3
C03	3	2	2	2	3
C04	2	3	2	2	3
C05	3	2	2	2	3

Course Title: Calculus-I
Course Code: BSHM-101-22

UNIT-I

Functions, their limits and continuity: Real line, intervals, order properties of real numbers, the least upper bound and the greatest lower bound properties, Archimedean property. Functions, Graphs of functions, Exponential functions, Inverse functions and Logarithmic functions, implicitly defined functions, some special functions, one-one functions, onto functions, composition of functions, limit of a function, calculating limits through limit laws, limits using L' Hospital's rule, The precise definition of limit and continuity (ϵ - δ definition), continuous functions and classification of discontinuities, uniform continuity.

UNIT-II

Differentiation: Derivative of a function, the derivative as a function, derivatives of polynomials and exponential functions, the product and quotient rules, rates of change in natural and social sciences, derivatives of trigonometric, inverse trigonometric, logarithmic, and hyperbolic functions, the chain rule, implicit differentiation, differentiation of determinants.

UNIT-III

Applications of derivative: maximum and minimum values, increasing and decreasing functions, Intermediate value theorems: Rolle's theorem, Lagrange's theorem, Cauchy's mean value theorem, how derivatives affect the shape of graph, concavity, convexity, the second derivative test, points of inflexion.

UNIT-IV

Higher order derivatives, calculation to the n^{th} derivative, determination of n^{th} derivative of rational functions. The n^{th} derivative of the products of power of sines and cosines, Leibnitz's theorem, the n^{th} derivative of the product of two functions, Maclaurin's theorem, Taylor's theorem.

TEXT BOOKS

1. Shanti Narayan and P. K. Mittal, Differential Calculus, S. Chand, 2015

RECOMMENDED BOOKS:

2. James Stewart, Calculus, 5th Edition, Brooks/Cole(Thomson), 2003.
3. Robert Wrede and Murray R. Spiegel, Advanced Calculus, 3rd Edition, Schaum's Outline Series (McGraw Hill), 2010.
4. Maurice D Weir, Frank R. Giordano and Joel Hass, Thomas' Calculus, 11th Edition, Pearson, 2008.
5. N. Piskunov, Differential and Integral Calculus, Mir Publishers, Moscow (CBS Publishers & Distributors, India), 1996.

BSHM-102-22	Algebra	L-5, T-1, P-0	6 Credits		
Pre-requisite: - Complex numbers, Sets, Relation and Functions					
Course Objectives: This course is designed to introduce the basic notions of algebra. The major focus of the course will be on: De Moivre's theorem & its applications, matrices and their use in system of equations; theoretical foundation of theory of equations and their solutions.					
Course Outcomes: At the end of the course, the students will be able to					
C01	Use the De Moivre's theorem for solving problems concerning powers of complex numbers and complex roots of polynomials etc.				
C02	Use matrices in solving system of equations.				
C03	Demonstrate linear independence and dependence of a set of vectors.				
C04	Find inverse of a matrix using Gauss-Jordan method.				
C05	Demonstrate the nature of solutions of polynomial equations and use Cardano's method, Ferrari method and Descarte's method for finding solutions of equations.				
Mapping of course outcomes with the program outcomes					
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
C01	1	3	2	2	3
C02	1	3	2	2	3
C03	2	3	2	2	3
C04	3	3	2	2	3
C05	1	1	2	2	3

Course Title: Algebra
Course Code: BSHM-102-22

Unit I

Polynomials and Complex Numbers: Polynomials, The remainder and factor theorem, Synthetic division, Factored form of a polynomial, Fundamental theorem of algebra, Polar representation of complex numbers, De Moivre's theorem for integer and rational indices and their applications. The n th roots of unity.

Unit II

Roots of a Polynomial: Relations between the roots and the coefficients of polynomial equations, Theorems on imaginary, integral and rational roots Fundamental theorem of symmetric polynomials (without proof). Evaluation of symmetric functions of roots, Rational roots of polynomials with integral coefficients. Descartes rule of sign.

Unit III

Cubic and Biquadratic Equations: Strum's theorem (statement only), Solution of cubic equation using Cardano's method, and biquadratic equation by Descartes method and Ferrari's method.

Unit IV

System of Equations: Systems of linear equations (homogeneous and non-homogeneous), Row reduction and echelon forms, Row rank, column rank and their equivalence, Vector equations, The matrix equation $Ax = b$, Solution sets of linear systems, Gauss elimination method, Consistency of Linear System of equations, Augmented matrices, The inverse of a matrix, Gauss Jordan method.

RECOMMENDED BOOKS:

- Andreescu, Titu & Andrica Dorin, Complex Numbers from A to...Z. (2nd ed.). Birkhäuser (2014).
- Dickson, Leonard Eugene First Course in the Theory of Equations. The Project Gutenberg E-Book (<http://www.gutenberg.org/ebooks/29785>), (2009)
- Kolman, Bernard, & Hill, David R., Introductory Linear Algebra with Applications (7th ed.). Pearson Education, Delhi. First Indian Reprint 2003.

BSHM-103-22	Programming Lab-I	L-0, T-0, P-2	2 Credits		
Pre-requisite: Knowledge of basic concepts in Mathematics, such as, graphs, functions, conics, matrices etc.					
Course Objectives: This course is designed to introduce the basic knowledge of computer programming t simple algebraic operations on matrices and to visualize the geometry of curves and conics. two dimensions. The major focus of this course will be on geometric definition of two-dimensional shapes and a rigorous discussion on their properties and use.					
Course Outcomes: At the end of the course, the students will be able to					
C01	Explain the basic concepts of programming.				
C02	Apply the knowledge of programming in different Matrix Operations.				
C03	Use programming in plotting and visualization of graphs of algebraic and transcendental functions.				
C04	Obtain Surface of revolution of curves.				
C05	Study further the tracing of conics.				
Mapping of course outcomes with the program outcomes					
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
C01	1	3	3	3	3
C02	1	3	3	3	3
C03	2	2	3	3	3
C04	3	3	2	2	3
C05	2	3	2	2	3

Course Title: Programming Lab-I

Course Code: BSHM-103-22

The following topics to be practiced using MATLAB:

- i) Introduce the programming through MATLAB
- ii) Perform Matrix Operations, such as, Addition, Multiplication, inverse, Transpose etc.
- iii) Plot the graphs of algebraic and transcendental functions (For example, e^{ax+b} , $\log(ax + b)$, $\frac{1}{ax+b}$, with constants a, b, etc.)
- iv) Obtain the surface of revolution of curves.
- v) Trace of conics in Cartesian Coordinates /Polar Coordinates.
- vi) Applications of derivative.

RECOMMENDED BOOKS:

1. Higham, D.J. and Higham, N.J., MATLAB Guide, 2nd Edition. Society for Industrial and Applied Mathematics (SIAM), 2005.
2. Gilat, A., MATLAB: An Introduction with Applications, 5th Edition. John Wiley & Sons, 2014.

BHHL-115-22	Communicative English	L-2, T-0, P-0	2 Credits				
Pre-requisite: Basic proficiency in Communication Skills							
Course objectives:							
<ul style="list-style-type: none"> • To help the students become proficient in LSRW-Listening, Speaking, Reading & Writing skills • To help the students become independent users of the English language • To develop in them vital communication skills, integral to their personal, social, and professional interactions • To teach them the appropriate language of professional communication • To prepare them for the job market in their respective domains of specialization. 							
Course Outcomes: At the end of the course, the students will							
C01	acquire basic proficiency in reading & listening, writing and speaking skills						
C02	be able to understand spoken and written English language, particularly the language of their chosen technical field.						
C03	be able to converse fluently.						
C04	be able to produce their own clear and coherent texts.						
C05	become proficient in professional communication such as interviews, group discussions, office environments, important reading skills as well as writing skills and thereby will have better job prospects.						
Mapping of Course Outcomes with the Program Specific Outcomes							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
C01	2	2	2	3	2	2	2
C02	3	2	2	3	2	3	3
C03	2	3	3	2	2	3	3
C04	2	2	3	3	3	2	3
C05	2	1	1	3	1	1	3

Course Title: Communicative English

Course Code: BHHL-115-22

UNIT I-(Literature)

(A) *The Poetic Palette* (Orient Black Swan, Second Edition, 2016)

The following poems from this anthology are prescribed:

1. Pippa's Song: Robert Browning
2. I Sit and Look Out: Walt Whitman
3. Women's Rights: Annie Louise Walker

(B) *Prose Parables* (Orient Black Swan, 2013)

The following stories from the above volume are prescribed:

1. Grief: Anton Chekov
2. The Doctor's Word: R.K. Narayan
3. The Doll's House: Katherine Mansfield

UNIT-II

Vocabulary: Synonyms, Antonyms; Standard Abbreviations; One-word substitution

Grammar: Subject-Verb Agreement; Noun- Pronoun Agreement; Use of phrases and clauses in sentences; Sentence Structures; Transformation of Sentences

UNIT-III

Reading and Understanding: Comprehension; Summarizing; Paraphrasing; Translation (from Hindi/Punjabi to English and vice-versa); Précis Writing

UNIT-IV

Mechanics of Writing & Speaking Skills: Business letters; Report writing; Career Documents- Job applications, Resume/CV writing, Conversations & Dialogues, Formal Presentations; Dynamics of Group Discussion.

Text & Reference Books:

1. John Eastwood, *Oxford Practice Grammar*, Oxford University Press, 2014.
2. Michael Swan, *Practical English Usage*, OUP, 1995
3. F.T. Wood, *Remedial English Grammar*, Macmillan, 2007.
4. William Zinsser, *On Writing Well*, Harper Resource Book, 2001.
5. Sanjay Kumar and Pushp Lata, *Communication Skills*, Oxford University Press, 2011.
6. Liz Hamp-Lyons and Ben Heasley, *Study Writing*, Cambridge University Press, 2006.

BSHP-111-21	Optics	L-3, T-1, P-0	4 Credits									
Pre-requisite: Understanding of senior secondary level Physics and Mathematics												
Course Objectives: The objective of the course is to develop basic understanding of Interference, Diffraction and Polarization among students. They also learn about the LASER and its applications. Students will be equipped with knowledge to measure wavelength, refractive index, and other related parameters, which will act as a strong background if he/she chooses to pursue physics as a career.												
Course Outcomes: At the end of the course, the student will be able to												
C01	Identify and illustrate physical concepts and terminology used in optics and other related wave phenomena											
C02	Analyze and understand coherence and phenomenon of interference and their applications											
C03	Acquainted with Fresnel's and Fraunhofer's diffraction and their applications.											
C04	Get thorough knowledge of the polarization of light, changes upon reflection and transmission and will learn to analyze the polarization in optical systems.											
C05	Describe the different types of lasers, its principle, properties and applications of laser beam.											
Mapping of course outcomes with the program outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	1	2	1	-	1	2	1	2	3	2	2
C02	2	2	1	2	1	1	1	1	1	3	1	1
C03	3	2	2	2	1	1	2	1	1	3	1	1
C04	2	2	2	2	1	1	2	1	1	3	1	1
C05	2	2	2	2	1	1	2	1	1	3	1	1

Course Title: Optics

Course Code: BSHP-111-21

PART-A

UNIT I

Interference: Definition and properties of wave front, Temporal and Spatial Coherence, Young's double slit experiment, Lloyd's single mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films, Fringes of equal inclination (Haidinger Fringes), Newton's Rings: Measurement of wavelength and refractive index, Interferometer: Michelson Interferometer-(1) idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, Fabry-Perot interferometer.

UNIT-II

Diffraction: Huygens Principle, Huygens-Fresnel Diffraction theory, Fraunhofer diffraction: Single slit. Circular aperture, Rayleigh criterion of resolution, Resolving Power of a telescope, Double slit, Multiple slits, Diffraction grating, Resolving power of grating. Fresnel Diffraction: Fresnel's Assumptions, Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light, Theory of a Zone Plate: Multiple Foci of a Zone Plate, Fresnel diffraction pattern of a straight edge and circular aperture.

PART-B

UNIT-III

Polarization: Plane polarized light, Representation of Unpolarized and Polarized light, Polarization by Reflection, Brewster's law, Malus Law, Polarization by Selective absorption by Crystals, Polarization by Scattering, Polarization by Double Refraction, Nicol Prism, Huygen's theory of Double Refraction, Polaroid, Elliptically and Circularly polarized lights, Quarter and Half wave plates.

UNIT-IV

Laser and Application: Lasers, Spontaneous emission, Stimulated absorption, Stimulated emission, Einstein coefficients, Einstein relations, Conditions for Laser actions, Population inversion, Different types of Laser Pumping mechanism: Optical Pumping, Electric Discharge and Electrical pumping, Resonators, Two, Three and Four level laser systems, Ruby laser, He-Ne gas Laser, Semiconductor laser, CO₂ laser, applications of laser: Holography, Principle of Holography.

Text and Reference Books:

1. Optics: A.K. Ghatak (Tata-McGraw Hill), 1992.
2. Fundamentals of Optics: F.A. Jenkins and H.E. White (McGraw Hill), 1981.
3. A Textbook of Optics: Subrahmaniyam N. & et al., S. Chand Publishing, 2006.
4. O. Svelto: Principles of Lasers, Springer Science & Business Media, 2010.

BSHP-113-21	Physics Lab-I	L-0, T-0, P-4	2 Credits									
Pre-requisite (If any): High-school education												
Course Objectives: The aim and objective of the lab course is to introduce the students to the formal structure of electromagnetism and phenomenon of wave optics so that they can use these as per their requirement.												
Course Outcomes: At the end of the course, the student will be able to												
C01	Able to verify the theoretical concepts/laws learnt in theory courses.											
C02	Trained in carrying out precise measurements and handling sensitive equipment.											
C03	Understand the methods used for estimating and dealing with experimental uncertainties and systematic "errors".											
C04	Learn to draw conclusions from data and develop skills in experimental design.											
C05	Document a technical report which communicates scientific information in a clear and concise manner.											
Mapping of course outcomes with the program outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
C01	3	3	2	2	2	1	2	1	2	3	2	3
C02	3	3	1	-	2	2	1	1	1	3	2	3
C03	3	3	2	-	2	1	2	1	1	3	2	3
C04	3	2	2	2	-	2	2	1	1	3	2	3
C05	2	2	2	2	-	2	2	1	1	3	2	3

Course Title: Physics Lab-I

Course Code: BSHP-113-21

Note: Students are expected to perform about 8-10 experiments from the following list, selecting minimum of 6-7 from the Physical Lab and 2-3 from the Virtual lab.

List of experiments:

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the laser beam characteristics like; wavelength, aperture, spot size, etc. using diffraction grating.
3. To study the diffraction using laser beam and thus to determine the grating element.
4. To study wavelength and laser interference using Michelson's Interferometer.
5. To find the refractive index of a material/glass using spectrometer.
6. To find the refractive index of a liquid using spectrometer.
7. To determine the angle of prism and resolving power of a prism.
8. To study the magnetic field of a circular coil carrying current using a Steward and Gees Tangent Galvanometer.
9. Determine the radius of circular coil using the Circular coil.
10. To study B-H curve using CRO.
11. To find out polarizability of a dielectric substance.
12. To find out the horizontal component of earth's magnetic field (B_h).

Text and Reference Books:

1. A Textbook of Practical Physics, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal.
2. Engineering Practical Physics, S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
3. Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press.
4. Practical Physics, C L Arora. S. Chand & Company Ltd.
5. <http://www.vlab.co.in>

UGCA-1902	Fundamentals of Computer and IT	L-3, T-1, P-0	4 Credits
Pre-requisite: NA			
Course Outcomes: At the end of the course, the student will be able to			
CO1	Understanding the concept of input and output devices of Computers		
CO2	Learn the functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices.		
CO3	Understand an operating system and its working, and solve common problems related to operating systems		
CO4	Learn basic word processing, Spreadsheet and Presentation Graphics Software skills.		
CO5	Study to use the Internet safely, legally, and responsibly		

Course Title: Fundamentals of Computer and IT
Course Code: UGCA-1902

UNIT-I

Human Computer Interface: Concepts of Hardware and Software; Data and Information.

Functional Units of Computer System: CPU, registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.

Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter.

Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.

Data Representation: Bit, Byte, Binary, Decimal, Hexadecimal, and Octal Systems, Conversions and Binary Arithmetic (Addition/ Subtraction/ Multiplication) Applications of IT.

UNIT II

Concept of Computing, Types of Languages: Machine, assembly and High-level Language; Operating system as user interface, utility programs.

Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors.

UNIT-III

Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs.

Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

UNIT-IV

Electronic Payment System: Secure Electronic Transaction, Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card E-Money, Bit Coins and Crypto currency, Electronic Fund Transfer (EFT), Unified Payment Interface (UPI), Immediate Payment System (IMPS), Digital Signature and Certification Authority. Introduction to Bluetooth, Cloud Computing, Big Data, Data Mining, Mobile Computing and Embedded Systems and Internet of Things (IoT)

RECOMMENDED BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. A. Goel, Computer Fundamentals, Pearson Education, 2010.
3. P. K. Sinha & P. Sinha, Fundamentals of Computers, BPB Publishers, 2007.
4. R.K. Jain, IT Tools, Khanna Publishing House.
5. Satish Jain, Ambrish Rai & Shashi Singh, Introduction to Information Technology, Paperback Edition, BPB Publications, 2014.
6. www.sakshat.ac.in
7. <https://swayam.gov.in/course/4067-computer-fundamentals>

UGCA-1906	Fundamentals of Computer and IT Laboratory	L-0, T-0, P-4	2 Credits
Pre-requisite (If any): NA			
CO1	Familiarizing with Open Office (Word processing, Spreadsheets and Presentation).		
CO2	To acquire knowledge on editor, spread sheet and presentation software.		
CO3	The students will be able to perform documentation and accounting operations.		
CO4	Students can learn how to perform presentation skills.		

Course Title: Fundamentals of Computer and IT (Laboratory)

Course Code: UGCA-1906

List of experiments:

- **Word Orientation:** The instructor needs to give an overview of word processor. Details of the four tasks and features that would be covered Using word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.
 - 1) Using word to create Resume:
Features to be covered: Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.
 - 2) Creating an Assignment
Features to be covered: Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
 - 3) Creating a Newsletter
Features to be covered: Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs
 - 4) Creating a Feedback form
Features to be covered: Forms, Text Fields, Inserting objects, Mail Merge in Word.

- **Excel Orientation:** The instructor needs to tell the importance of Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered Excel - Accessing, overview of toolbars, saving excel files.
 - 1) Creating a Scheduler
Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text
 - 2) Creating an Assignment
Features to be covered: Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
 - 3) Creating a Newsletter
Features to be covered: Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs
 - 4) Creating a Feedback form
Features to be covered: Forms, Text Fields, Inserting objects, Mail Merge in Word.

- **Presentation Orientation:**
 - 1) Students will be working on basic power point utilities and tools which help

them create basic power point presentation.

Topic covered includes: PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows

2) This session helps students in making their presentations interactive.

Topics covered include: Hyperlinks, Inserting–Images, ClipArt, Audio, Video, Objects, Tables and Charts

3) Concentrating on the in and out of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation.

Topics covered includes: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes, etc), Inserting – Background, textures, Design Templates, Hidden slides, Auto content wizard, Slide Transition, Custom

4) Animation, Auto Rehearsing

5) Power point test would be conducted. Students will be given model power point presentation which needs to be replicated

➤ **Internet and its Applications:** The instructor needs to tell the how to configure Web Browser and to use search engines by defining search criteria using Search Engines

1) To learn to setup an e-mail account and send and receive e-mails.

2) To learn to subscribe/post on a blog and to use torrents for accelerated downloads.

3) Hands on experience in online banking and making an online payment for any domestic bill.

RECOMMENDED BOOKS:

1. R.K. Jain, IT Tools, Khanna Publishing House.
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
3. Turban, Rainer and Potter, Introduction to information technology, John Wiley and Sons.
4. Joseph Brady & Ellen F Monk, Problem Solving Cases in Microsoft Excel, Thomson Learning.