FYUGP Course Outline for

S. No.	Course Code	Course Title	Credits	Category
1	MTHS100MJ	Calculus I	4	Major
2	MTHS100MN	Accounting I	4	Minor Interdisciplinary
3	x	x	x	Minor Vocational
4		Student to choose	3	Multidisciplinary
5		Technical Writing	3	Ability Enhancement
6	DOMS100SE	Excel for Business	2	Skill Enhancement
7		Digital and Technological Solutions	2	Value-added
		Health and Wellness	2	

B.Sc. Mathematical Sciences

Course Title: Calculus-I
Course Code: MTHS100MJ
Credit hrs. : 4

Semester-I
Category: Major

Course objective: Establish the fundamental theorems and applications of the calculus of single variable functions. Explore the concepts, properties and aspects of the differential calculus of single variable functions, optimization (min/max) problems, and an introduction to integration.

Unit-I:
The tangent and velocity problems, limit of a function, ε-δ definition of a limit, calculating limits using limit laws, continuity, limits at infinity, horizontal asymptote, derivatives and rates of change, derivative as a function.

Unit-II:
Derivatives of polynomial and exponential functions, product and quotient rule, derivatives of trigonometric functions, chain rule, implicit differentiation, derivatives of logarithmic functions, rates of change, exponential growth and decay, linear approximations and differentials

Unit-III:
Maximum and minimum values, the Mean Value Theorem, how derivatives affect the shape of a graph, indeterminate forms and L'Hospital's Rule, curve sketching, optimization problems

Unit -IV:
Antiderivatives, areas and distances, the definite integral, the Fundamental Theorem of Calculus, indefinite integral.

Textbook:

- Calculus – Early Transcendentals by James Stewart

Supplementary books:

- Calculus by Thomas and Finney. Morgan Kaufmann Pub.
- A First Course in Calculus - by Serge Lang,
- Calculus – by Howard Anton
- Integral Calculus - by Hari Krishan
- Calculus I & II by Tom Apostol

B.Sc. Mathematical Sciences

Course Title: Accounting-I
Course Code: MTHS100MN
Credit hrs. : 4

Semester-I
Category: Minor Interdisciplinary

Course Objective:

Introduces the students to basics of financial mathematics like simple interest, compound interest, loan calculation, concept of annuities and also introduces accounts and trial balance of companies and financial institutions.

Unit 1: Cash-flow process, zero-coupon bond, Fixed interest security, Cash on deposit, Equity, Simple interest, Compound interest, Present values, Simple discount, Investing over a period, Nominal rates of interest, Accumulation factors.

Unit 2: Introduction to annuities, Present values - Payments made in arrear, Payments made in advance, Accumulations – Payments made in arrear and advance, perpetuities

Unit 3: Accounting - Meaning, Nature, Functions & Usefulness, Bases of accounting, Classification of accounts, Rules of double entry system, Accounting equation, Generally Accepted Accounting Principles (GAAP), Accounting concepts, Accounting conventions.

Unit 4: Journal, Rules of journalizing, Recording of Transaction Journals, Ledger posting, Trial Balance, Subsidiary Books.

References:

1. An Elementary Introduction to Mathematical Finance – Sheldon Ross
2. Lecture Notes on Actuarial Mathematics – by Jerry Veeh
3. Actuarial Mathematics by Bowers et al, Society of Actuaries, USA. Into
4. Antony R.N. & Recce J.S. "Accounting -Test & Cases", Richard Irwan. Inc. Home Wood Illionois.
5. Aulandam & Raman "Advanced Accounting" Himalyan Pub. House Mumbai.
6. Gupta R.L. & Radhaswamy. M. "Advanced Accounting" Sultan Chand & Sons.New Delhi.
7. Maheswari. S.N "Financial Accounting" Vikas Publishing House. New Delhi.
8. Mukherjee & Hanif"Modern Accounting" Tata McGraw Hill
9. Actuarial material (CT2/CT1)

B.Sc. Mathematical Sciences

Course Title	**:**	Excel for Business	**Semester: I**	
Course Code	**:**	DOMS100SE	**Category:**	Skill Enhancement
Credit hrs.	**:**	2		

Course Objective: Introduces the student's applicability of actuarial calculations using excel data tool pack.

Course Contents

	Learning Objectives	Excel Topics
1	Excel Basics	Naming Cells and Ranges, Descriptive statistics functions, Display options (Custom views, Freeze panes).
2	Developing charts in Excel	Bar chart, Stacked bar chart, line chart, dynamic charting (this uses the OFFSET function).
3	Some useful functions	IF, SUMIF, SUMIFS, COUNTIF, COUNTIFS, COUNT, COUNTA.
4	Interest and Amortization	FV, PV, PMT, PPMT, IPMT, RATE, NPER.
5	Data Handling Wizards	Sort, Filter, Text-to-Columns, Remove Duplicates, Consolidate, Data Validation.
6	Data Handling Functions	VLOOKUP, HLOOKUP, text functions, MATCH, INDEX..
7	Cash Flow Analysis	NPV, XNPV, IRR, XIRR, GOAL SEEK.
8	Sensitivity Analysis	Data Tables and Scenario Manager.
9	Optimization	Using the SOLVER add-in to solve some important problems in Finance and the industry.
10	Linear Regression	LINEST, STEYX, INTERCEPT,SLOPE, FORECAST, TREND, ANALYSIS TOOLPAK Add-in.
11	Exploring Data	Pivot table and Pivot Chart.
12	Visual Basic for Applications (VBA)	VBA can tackle situations that an analyst faces in his routine work for which Excel does not have a 'readymade' answer.

Textbooks:

- Excel 2007 for Starters by M. McDonald.
- Analyzing Business Data with Excel by G. Knight
- Mathematical Modeling with Excel by B. Albright.

B.Sc. Mathematical Sciences

Course Title : Technical Writing
Course Code :
Credit hrs. : 3

Semester: I
Category: Ability Enhancement

Unit I:

Communication: Language and communication, differences between speech and writing, distinct features of writing. Writing Skills; Selection of topic, thesis statement, developing the thesis introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.

Unit II:

Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.

Unit III:

Role of a Technical writer, Principles of Technical Writing, Documentation deliverables, Printed documentation and Online Help Systems, working with images and illustrations, Understanding Audience/Readers, Collecting and Organizing information, Drafting information verbally and visually, Producing Information.

Suggested Reading:

a. Alfred, Gerald, Charles T. Brusaw, and Walter E.Oliu. Handbook of Technical Writing. St. Martin's Press, 2003. Print.

b. Byrne, D. Teaching Writing Skills. UK: Longman, 1988. Print.

c. Rizvi, M Ashraf. Effective Technical Communication, The McGraw-Hill companies.

d. Prasad, P. The Functional Aspects of Communication Skills, Delhi.

e. Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.

f. Technical Communication: Principles and Practice, Second Edition by Meenakshi Raman and Sangeeta Sharma, Oxford Publications.

Course Type: Foundation/Introductory Course	Credits: (L-2, T-0, P-0)
Units: 2	Max Marks:
Course Title: Health and Wellness	Course Code:

Course Objectives:

1. To help understand the importance of a healthy lifestyle
2. To familiarize students about physical and mental health
3. To create awareness of various life style related diseases
4. To provide understanding of stress management

Unit I. Introduction to Health & Wellness **(15 lectures)**

Define and differentiate health and wellness. Importance of health and wellness Education. Local, demographic, societal issues and factors affecting health and wellness. Diet and nutrition for health & wellness. Essential components of balanced diet for healthy living with specific reference to the role of carbohydrates, proteins, fats, vitamins & minerals. Malnutrition, under nutrition and over nutrition. Processed foods and unhealthy eating habits. Body systems and common diseases. Sedentary lifestyle and its risk of disease. Stress, anxiety, and depression. Factors affecting mental health. Identification of suicidal tendencies. Substance abuse (Drugs, Cigarette, Alcohol), de-addiction, counselling and rehabilitation.

Unit II. Management of Health and Wellness. **(15 lectures)**

Healthy foods for prevention and progression of Cancer, Hypertension, Cardiovascular, and metabolic diseases (Obesity, Diabetes, Polycystic Ovarian Syndrome). Types of Physical Fitness and its Health benefits. Modern lifestyle and hypo-kinetic diseases; prevention and management through exercise. Postural deformities and corrective measures. Spirituality and mental health. Role of Yoga, asanas and meditation in maintaining health and wellness. Role of sleep in maintenance of physical and mental health.

Suggested Books:

1. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell.
2. Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021.
3. Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve Well-Being by Nashay Lorick, 2022
4. Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu & Jeff Lumiri, 2018.
5. Physical Activity and Mental Health by Angela Clow & Sarah Edmunds, 2013.

Course Type: Foundation/Introductory Course	**Credits**: (L-2, T-0, P-0)
Unitization: 2 Units	**Max. Marks**: _____
Course Title: Digital and Technological Solutions	**Course Code:** _____

Course Objectives:

- *To gain familiarity with digital paradigms*
- *To sensitize about role & significance of digital technology*
- *To provide know how of communications & networks*
- *To bring awareness about the e-governance and Digital India initiatives*
- *To provide a flavour of emerging technologies – Cloud, Big Data, AI 3D printing*

Course Outcome:

1. Knowledge about digital paradigm.
2. Realisation of importance of digital technology, digital financial tools, e-commerce.
3. Know how of communication and networks.
4. Familiarity with the e-governance and Digital India initiatives
5. An understanding of use & applications of digital technology.
6. Basic knowledge of *AI, machine learning and big data*

Teaching Methodology:

S. No	Type of teaching methodology	Credit	Credit hours
1	Taught Courses = Lectures by Subject Expert	2	30 hours Teaching + 60 hours out of class activities such as preparation, assignments, independent reading, study, problem solving

Course Contents:

UNIT I

Introduction & Evolution of Digital Systems. Role & Significance of Digital Technology. Information & Communication Technology & Tools. Computer System & it's working, Software and its types. Operating Systems: Types and Functions. Problem Solving: Algorithms and Flowcharts.

Communication Systems: Principles, Model & Transmission Media. Computer Networks & Internet: Concepts & Applications, WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking. Computer Based Information System: Significance & Types. E-commerce & Digital Marketing: Basic Concepts, Benefits & Challenges.

UNIT II

Digital India & e-Governance: Initiatives, Infrastructure, Services and Empowerment. Digital Financial Tools: Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit/Debit Cards, e-Wallets,

Internet Banking, NEFT/RTGS and IMPS, Online Bill Payments and PoS. Cyber Security: Threats, Significance, Challenges, Precautions, Safety Measures, & Tools.

Emerging Technologies & their applications: Overview of Cloud Computing, Big Data, Internet of Things, Virtual Reality, Blockchain, Robotics, Artificial Intelligence, 3-D Printing. Future of Digital Technologies.

TEXT BOOKS:

1. Fundamentals of Computers by E Balagurusamy- Tata Mc GrawHill
2. Data Communications and Networking by Behrouz A. Forouzan – McGraw Hill

REFERENCE BOOKS:

1. "Cloud Computing- Principals and Paradigms" by Buvya, Broberg, and Gosciniski- Wiley
2. "E commerce" by Laudon.
3. "Artificial Intelligence- A Modern Approach by Russel and Norving" – Pearson Education.
4. "Internet of Things" by Samuel Greengard – MIT Press
5. "Introduction to Computers by Peter Norton" - Tata McGraw Hill
6. "E-Commerce Concepts, Models, Strategies"- C.S.V. Murthy
7. "Basics of Artificial Intelligence and Machine Learning" by Dheeraj Mehrotra – Notion Press.
8. "Big Data for dummies" by Hurwith, Nugent,Halper, Kaufman, Wiley & Sons – Wiley.