SRI SATHYA SAI INSTITUTE OF HIGHER LEARNING
PRASANTHI NILAYAM
सत्यं वद धर्मं चर

2022

Admissions Prospectus

Undergraduate | Postgraduate | Professional Programmes

The Underlying Philosophy

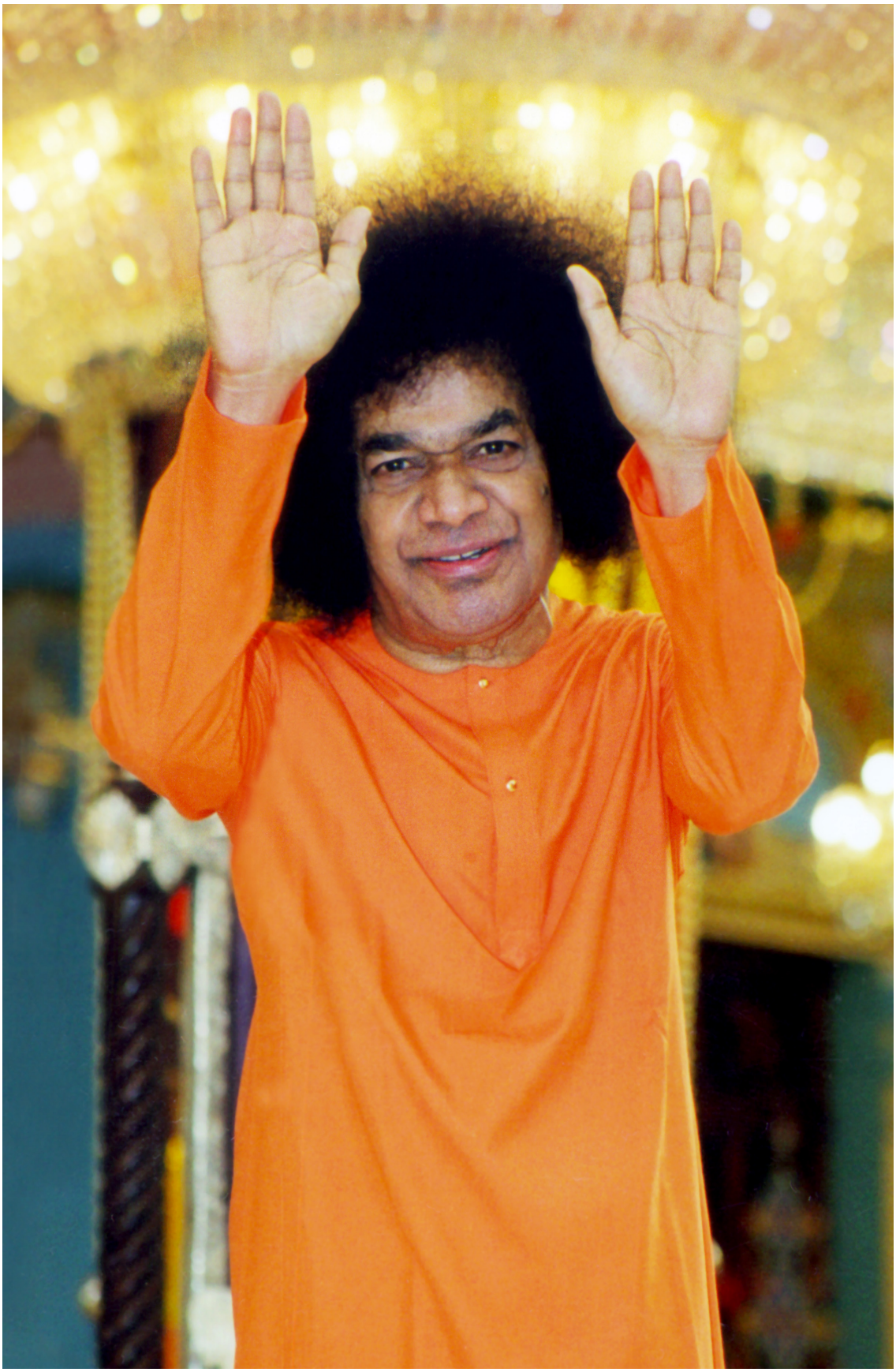
The Sai educational institutions have been established not merely to enable students to earn a living but to make them acquire good traits, lead ideal lives, and give them ethical, moral and spiritual strength. I have established them with a view to inculcate love and teach good qualities to students. They will learn here humility, discipline and faith.

I have established these institutions to impart spiritual education as a main component and worldly education as a secondary one. Education should enable one to cultivate good qualities, character and devotion. The teaching of the university curricula is only the means employed for the end, namely, spiritual uplift, self-discovery and social service through love and detachment.

This will be a Gurukula — a place where teachers and taught will grow together in love and wisdom — and like the ancient system of education, it will develop in its students a broad outlook and promote virtues and morals, which serve to foster noble ideals in society.

This Institute will be a temple of learning where youth are shaped into self-reliant, contented and enterprising heroes of action and self-sacrifice, for the purpose of serving humanity.

SRI SATHYA SAI BABA
Revered Founder Chancellor, SSSIHL



Education softens the heart. If the heart is hard, one cannot claim to be educated.

SRI SATHYA SAI BABA
Revered Founder Chancellor, SSSIHL

Admissions Prospectus 2022

Undergraduate | Postgraduate | Professional Programmes

From the admissions office

Welcome to Sri Sathya Sai Institute of Higher Learning (SSSIHL).

This prospectus is for students interested in applying for undergraduate, postgraduate and professional study at SSSIHL.

The first few pages will give you an introduction to SSSIHL and why the institution is unique. It will give you information on the application process, frequently asked questions, the admissions test & interview schedule and the programmes available for admissions.

The rest of the prospectus is divided into three major colour-coded sections:

Undergraduate Programmes
Postgraduate Programmes
Professional Programmes

Detailed information about the institute and the admissions process can also be found on our website, sssihl.edu.in

Good Luck and Sai Ram!

Admissions Office
Office of the Registrar, SSSIHL

Contents

Introduction

Sri Sathya Sai Values-based Integral Education 6
Integral Education Activities 9
SSSIHL Statistics 2020/21 11
Application Process 13
Programmes for Admissions 14
Programme Descriptions 16

Undergraduate Programmes

B.A. 17
B.B.A. 18
B.Com. (Hons.) 19
B.Sc. in Food and Nutritional Sciences 20
B.Sc. (Hons.) in Computer Science 21
B.Sc. (Hons.) in Mathematics / Physics / Chemistry 22
B.Sc. (Hons.) in Biosciences / Chemistry 24
B.Sc. (Hons.) in Mathematics / Economics / Statistics 25
B.Sc. (Hons.) in Mathematics / Computer Science / Statistics 26
Bachelor of Performing Arts (Music) 27
Diploma in Music 28
UNDERGRADUATE TEST SYLLABUS 29

Postgraduate Programmes

M.A. in English Language and Literature 34
M.A. in Economics 35
M.Sc. in Mathematics 36
M.Sc. in Physics 38
M.Sc. in Chemistry 39
M.Sc. in Biosciences 40
M.Sc. in Food and Nutritional Sciences 41
POSTGRADUATE TEST SYLLABUS 42

Professional Programmes

B.Ed. 47
M.B.A. 48
M.Tech. in Computer Science 50
M.Tech. in Optoelectronics & Communications 51
PROFESSIONAL TEST SYLLABUS 52

Sri Sathya Sai Values-based Integral Education

Sri Sathya Sai Institute of Higher Learning (Deemed to be University), Prasanthi Nilayam, Andhra Pradesh, India, is a visible manifestation of Bhagawan Sri Sathya Sai Baba's vision of education for human transformation.

Bhagawan Baba has designed the system of Sri Sathya Sai Values-based Integral Education in such a manner that between the time a student joins the Institute and graduates there is a deep inner transformation that takes place. This concept is very unique at the institute level.

The Institute hosts over 1441 undergraduate, postgraduate, professional and research students across its four campuses:

For women:
- Anantapur Campus at Anantapur, Andhra Pradesh

For men:
- Prasanthi Nilayam Campus at Puttaparthi, Andhra Pradesh
- Brindavan Campus at Kadugudi, Bangalore, Karnataka
- Muddenahalli Campus at Muddenahalli, Karnataka

Programmes offered include:
- Undergraduate: B.A., B.A. (Hons.), B.Com. (Hons.), B.Sc. & B.Sc. (Hons.), B.B.A., B.P.A.
- Postgraduate: M.A., M.Sc.
- Professional: B.Ed., M.B.A., M.Tech.
- Research: Ph.D.

A Modern Gurukula

Sri Sathya Sai Institute of Higher Learning (SSSIHL) was founded to inculcate ethical and moral values in students along with secular education. This transformation (of students, teachers and staff) has been the guiding principle right from the inception, when Sri Sathya Sai Institute of Higher Learning integrated ethics and values as the undercurrent of every subject taught at the institute. Combined with academic and research excellence, the institute provides a holistic framework of inter-personal development for its students. Its residential character trains the mind, body and spirit of the student in an environment similar to the ancient Indian 'gurukula' system of education, in the most modern context.

Teachers and students live and grow together in an atmosphere of mutual trust and unity. This helps students develop a wholesome and balanced personality, one where academic competence is inter twined with value systems.

Distinctive Features

Admissions
- Merit-based open admissions policy for all irrespective of income, religion or region
- Quality education provided free for all students

Residential Character
- Residential character where all doctoral research scholars, students, and select teaching faculty reside together in the hostel which enables translation of lessons learnt into practical skills through experiential learning
- Spiritual ambience in an environment of discipline and love
- Cultivation of the spirit of self-reliance, brotherhood and sacrifice through mentoring and personal example

Infrastructure
- Campuses set in spacious and peaceful surroundings
- Well equipped, modern science laboratories and cutting-edge state-of-the-art Research Instruments Facility
- Automated Library using Integrated Library Management System (ILMS) and has digitisation facility and is accessed through the on-line Public Access Catalogue (OPAC) within the campus premises
- Libraries across campuses with over 2,00,000 volumes
- Connected to the National Knowledge Network (NKN)
- Computer and Multimedia learning centres with ultra-high-speed internet connectivity
- International Centre for Sports in the Prasanthi Nilayam Campus and sports facilities in the respective campuses

Academics & Research
- Over 91% examinations pass rate
- Student-Teacher Ratio 8:1
- Integrated five-year programmes combining undergraduate and postgraduate studies for a systematic and graduated learning process
- Research Collaborations with premier Indian and Foreign institutions and Industry
- Interdisciplinary research for societal benefit
- Awareness Programmes and Moral Classes reinforcing human values

Integral Education
- Life lessons learnt through the message of the Revered Founder Chancellor, Bhagawan Sri Sathya Sai Baba
- Application of what is learned in daily life
- Integrating human values with secular knowledge
- Inculcating the spirit of self-reliance and service to society
- Synthesis of science and spirituality for societal benefit
- The concept of integral education that SSSIHL imparts is willingly pursued by all teachers, staff and students.

The Process

Sri Sathya Sai System of Integral Education system is a modern, rational and scientific education system rooted in Indian ethos. It takes the best of both ancient and contemporary learning techniques.

The image on the right forms the basis of the system of Values-based Integral Education at SSSIHL. The base is the concept of a modern Gurukula that sustains all relationships and activities at SSSIHL. It is responsible for creating and sustaining the congenial environment necessary for the teacher-student interaction to grow and develop.

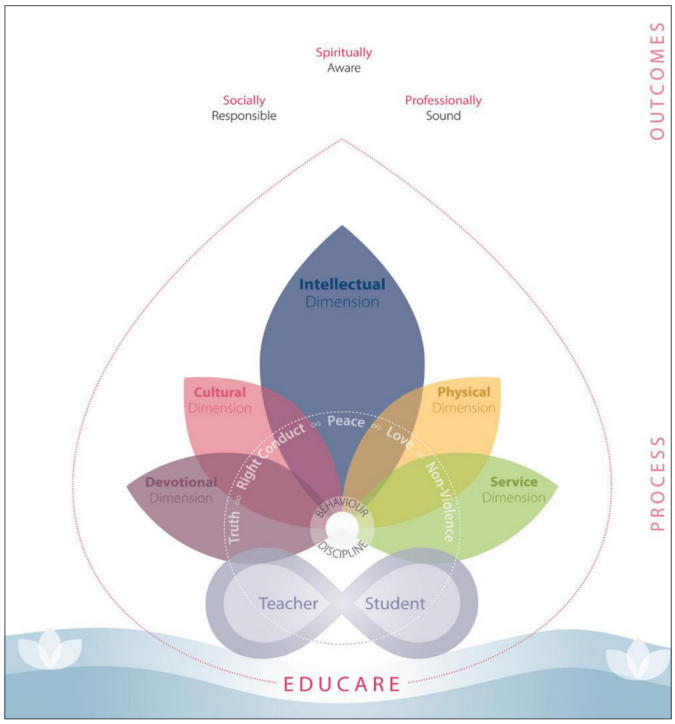
Adherence to discipline and appropriate behaviour are the two important aspects that encompass all interactions.
The five human values of Truth, Right Conduct, Peace, Love and Non-violence form the undercurrent of all the dimensions of integral education.

These dimensions are: Intellectual, Physical, Cultural, Devotional and Service. The key activities for each of these dimensions form the basis of most of the time that students spend at SSSIHL.

Bhagawan Baba purposefully designed the system of Integral Education so that while students spend 60% of their time on academics (intellectual capacities), they also spend 40% time on the development of other qualities. This enables students to inculcate the virtues of team work, self-reliance, empathy, adaptability, discipline and cooperation
(See page 9 for further details.)

Daily Routine
This is a crucial component of this process. Each student's day starts at 5:00 a.m., with a couple of hours spent in prayer, exercise and other vocational pursuits (such as practice sessions for music, band, traditional Indian music and the likes).

Classes commence at 9:00 a.m. After college hours at around 4:00 p.m., students move to the Sports field/Mandir/Prayer hall



Sri Sathya Sai Values-based Integral Education

for participation in sports and games/ congregational chanting (Veda), devotional singing (bhajans) and other spiritual activities. These also include talks by eminent speakers on a variety of spiritual topics. Post dinner, students concentrate on their studies.

Hostel Life

The philosophy of hostel life is based on the approach of community living: each one lives for the other and all live together for a common higher cause.

Students from different states of India, and varied economic and cultural backgrounds live in dormitory-styled accommodation with 6-8 students staying together in a room. The aesthetically pleasing hostel buildings also create a noble ambience for students to live in.

I have established these institutions to impart spiritual education as a main component and worldly education as a secondary one. Education should enable one to cultivate good qualities, character and devotion. The teaching of the university curricula is only the means employed for the end, namely, spiritual uplift, self-discovery and social service through love and detachment.

Sri Sathya Sai Baba
Revered Founder Chancellor, SSSIHL

As a result, the hostel is a miniature model of the world outside with people of different habits, temperaments, lifestyles, language and outlook staying together and working. This develops the qualities of understanding, adjustment, sharing and caring amongst the students. It nurtures virtues like adaptability, tolerance and sacrifice; developing students into noble and responsible citizens.

The ambience is suffused with both discipline and loving care. All doctoral research scholars and one of every five teaching faculty reside with the students in the hostel. The relationship between the students and teachers is very cordial and warm, and the teachers' pay personal attention to the problems of each and every student. The teachers are chosen with extreme care to play an important role in this process. Many of them are alumni of the Institute, dedicated and well versed in integral education. They serve as facilitators and are available at all times for mentoring the students on personal and academic matters.

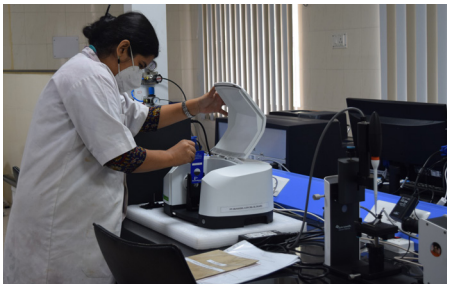
Personal cleanliness, punctuality and regularity, general behaviour, personal etiquette and room cleanliness are the major components of the discipline that is followed at SSSIHL hostels.

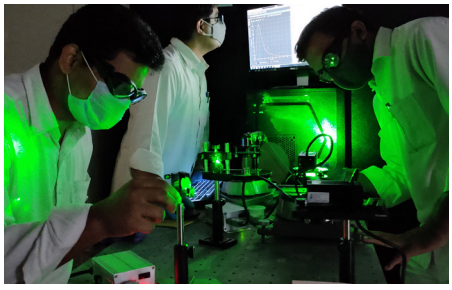
The Outcome

The outcomes of the system of Values-based Integral Education at SSSIHL are threefold. It prepares all graduates to be:

- Spiritually aware
- Socially responsible and
- Professionally sound

It helps develop a strong character and positive qualities in students and nurtures virtues like adaptability, tolerance and sacrifice; shaping them into noble and responsible citizens.





Integral Education Activities

All students at SSSIHL spend 60% of their time at the institute on intellectual activities (primarily on their studies). The rest of the 40% of their time is spent almost equally on activities related to the Integral education dimensions of Devotional, Cultural, Physical and Service, as highlighted below.

Devotional Dimension

- Bhajans (Sankirtan)
- Vedic chants and stotrams
- Meditation & Silent sitting
- Suprabhatam (prayer at dawn)
- Assembly (college prayer)
- Brahmarpanam (food prayer)
- Kshama Prarthana (night prayer)

The activities of the devotional dimension enable a student to connect to his/her Divine inner Self. This inner connection opens the heart and brings forth the feeling of love, compassion and empathy for fellow human beings.

Cultural Dimension

- Celebration of festivals: Republic Day, Eid-al-Fitr, Independence Day, Christmas, Sri Krishna Janamashtami, Ganesh Chaturthi, Ganesha Immersion, Christmas, Ugadi, Sri Ramanavami, etc.
- Brass Band
- Nadaswaram & Panchavadyam ensemble
- Annual Sports & Cultural Meet
- Performing Arts: Music programmes
- Drama & Dance
- Fine Arts: Rangoli, Card making, Photography, Altar making, etc.
- Public Speaking
- Debates and Elocution

From the performing arts to public speaking to the fine arts, the cultural dimension is designed to give students wide opportunities to find an avenue to their individual artistic expression.

SSSIHL makes every effort to provide the best possible resources—both material and human—so that students excel at their chosen activity. Festivals of major world religions are celebrated, reinforcing the unity among all faiths. Every student is involved in one way or another in the celebration of these festivals.

Physical Dimension

- Sports
- Games
- Jogging
- Exercises and Yogasanas
- Annual Sports & Cultural Meet

Sports and games are a part of the daily routine of all students. From yoga classes to fitness training, from team sports to individual sports, students are encouraged to overcome their limitations and excel in these activities.

SSSIHL has excellent sports facilities.

Service Dimension

- Self-Reliance departments: Electricals, Plumbing (water supply), Audiovisual, general store, dispensary, dietary services, hostel mess, arts & crafts, costumes & props, etc.
- Community living
- Social Work
- Voluntary work
- Community Service
- Prasadam Distribution

The philosophy of service at SSSIHL is based on the concept that divinity pervades all of humanity, and hence when you serve others, you are serving the Divine. Students learn to serve without expecting anything in return, other than the deep inner satisfaction of serving others.

The compulsory residential system, where students live in dormitory-styled accommodation with other students from totally different backgrounds (for a minimum of two years and up to five years or more), provides an excellent foundation for the service dimension.

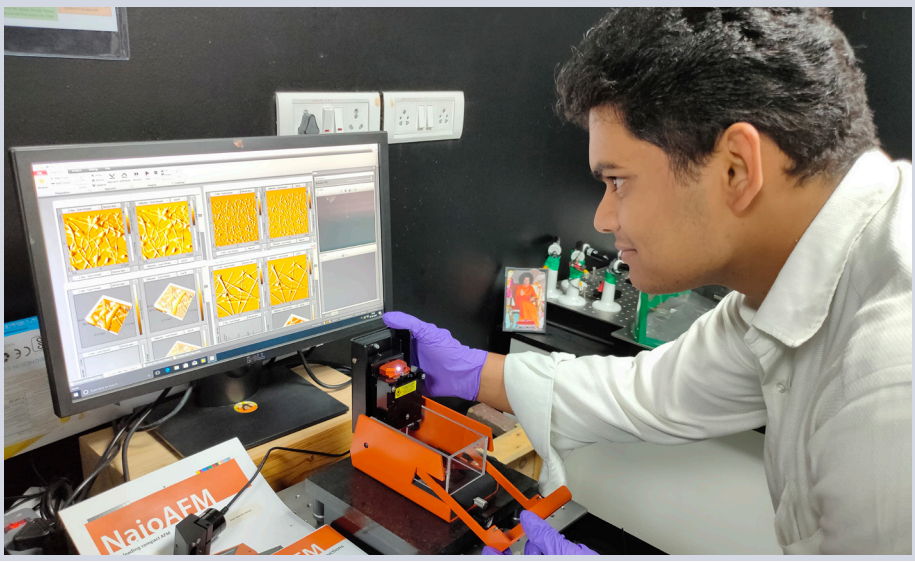
Intellectual Dimension

Apart from academics and research, the activities in this dimension include:

Awareness Courses (Human Values, Ethics and Culture)
These mandatory courses are designed to cultivate a broad view of the human condition in students. The course content (e.g. the Unity of Religions and Faiths, Study of the Indian Epics, etc.) helps trigger self-reflection and enquiry and sensitizes students to the concerns of society, and gets them to think about practical solutions to these problems.

Moral Class (Thursdays)
At each campus, Thursday mornings begin with an hour of inspiring and ennobling talks by speakers focusing on their personal spiritual experiences, messages from sacred scriptures and other elevated and socially relevant themes. It is also used to highlight students' talents in music, dramatics, elocution, debates, quizzes, etc.

Prayer Talks
Every morning before classes commence at the college, all students and teachers gather for the morning assembly. Prayers, veda chanting, bhajans and a few minutes of silent sitting are sometimes followed by a talk by students, faculty members or invited guests on topics related to morals and values.



SSSIHL Statistics 2020/21

Admissions

Total Admissions

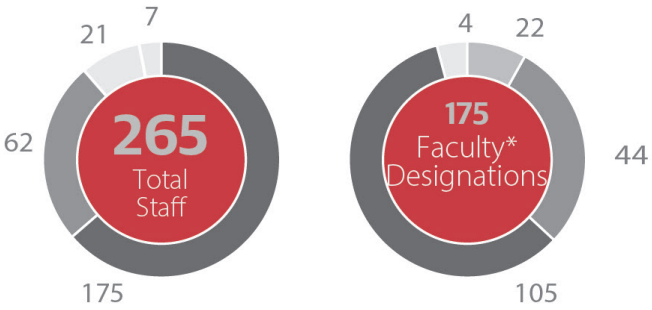
578 /2601

accepted / eligible applicants

Acceptance Rates

Graduates

Staff Profile



175 Faculty*
62 Administrative Staff
21 Technical Staff
7 Library & Sports

**Faculty (inclludes Adjunct)*

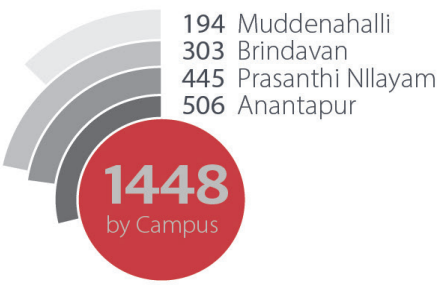
22 Professor
44 Associate Professor
105 Asst. Professor
4 Others

Ph.D.s

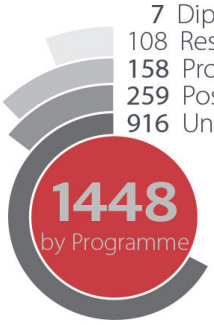
112/156 teachers have Ph.Ds.

Additionally, 22 teachers are currently pursuing a Ph.D.

Student Profile



194 Muddenahalli
303 Brindavan
445 Prasanthi NIlayam
506 Anantapur



7 Diploma
108 Research
158 Professional
259 Postgraduate
916 Undergraduate

108 Doctoral Research Scholars

110 Visiting Faculty & Guest Lecturers

8:1 Student Teacher Ratio

2:1 Student Computer Ratio

Examinations Pass Rates

89% *Undergraduate Programmes*

95% *Postgraduate & Professional Programmes*

₹ 7.07 Crore Expenditure on Equipment & Infrastructure

₹ 3.21 Crore Research & Teaching Grants

₹2.11 Lakhs Expenditure per student / per year

Application Process

Eligibility

The minimum requirements for admissions vary from programme to programme. See the individual Programme pages (page 17 onwards) for detailed information.

Candidates who do not meet the admissions criteria listed for the programme they wish to apply for, will not be eligible for admissions and their applications will not be processed by the Admissions Office and a letter of rejection will be sent out to them.

SSSIHL provides FREE EDUCATION for all programmes of study, which includes: tuition, examinations, laboratory, library, sports and medical expenses.

NOTICE TO ALL APPLICANTS

Given the unique Gurukula system of Values-based Integral Education, where students need to be compulsorily resident at gender-specific hostels and campuses during the entire period of study, only single (bachelor / maiden) students will be admitted.

Dates & Deadlines*

Postgraduate & Professional Programmes

Application Submission by:
05 June 2022

Test & Interviews:
18 - 25 June 2022

Undergraduate & Diploma in Music Programmes

Application Submission by:
18 June 2022

Test & Interviews:
30 June - 12 July 2022

** All dates are tentative only and are subject to change. Please stay tuned to sssihl.edu.in for regular updates.*

Note:

- Kindly ensure that you provide a mobile number and Email ID which are operational while submitting your application as this will be used for communications related to the admission process.
- Ensure you have access to desktop/laptop, mobile phone, and good Internet connectivity
- For any assistance or queries related to admissions, you may email us on admissions@sssihl.edu.in. All emails will be responded to within two working days.
- You may also reach us on the phone numbers given below between 9 PM - 4:30 PM Monday to Saturday, except on national holidays for queries related to Institute admissions only

  +91 9441 911 391
  +91 8555 287239

How to Apply?

1. Visit the Admissions Portal: https://admissions.sssihl.edu.in/
2. Create an account by registering yourself (Applicant) using a valid email ID.
3. Activate your account by clicking on the link received in your email inbox.
4. Login to the admissions portal using your new id and password.
5. Choose the program (UG/PG/ Professional/Diploma) you wish to apply to
6. Generate your Applicant ID Number -Make a note of it.
7. Click on program specific Application Form link
8. Fill in your applicant ID and pay Rs 100/- towards application fee using the SBI portal link provided in the form. Once done, download the payment receipt as PDF and upload it to the form.
9. Fill in the rest of the form and make sure to attach the necessary documents before submitting it
10. Post -Submission, the page will provide a link to download a copy of your application for your reference
11. All your information is transmitted through secure server and is kept fully confidential. Your application information and accompanying credentials are reviewed by the admissions representatives of the Institute to which you are applying as well as by the members of the Institute.

IMPORTANT:

- **Ensure that you have filled in the Applicant ID in the space provided in the application form WITHOUT FAIL.**
- Please note that falsifying or misinterpreting information on the application will result in rejection of the application for admission.
- Applications have to be submitted online only. Please do not send us the hard-copy.
- Applications which are incomplete or contains invalid entries will not be processed

List of Documents to be Submitted

1. Government approved Photo ID card like Aadhar
2. Latest Photograph of Applicant – in the prescribed format mentioned in the application form.
3. Admission fee Payment Receipt
4. Caste Certificate for SC/ST/OBC
5. Supporting documents
   - For UG – upload self-attested copies of X, XI/XII marksheets.
   - For PG - upload self-attested copies of X,XII and the qualifying degree marksheets
   - For Professional Program – upload self-attested copies of X, XII and the qualifying degree marksheets

Programmes for Admissions

There are separate programmes available for Women and Men applicants, as the institute hosts separate campuses for women and men students.

Successful graduates of selected B.Sc. / B.Sc. (Hons.) programmes can choose to study an integrated postgraduate programme at SSSIHL in certain subjects (subject to meeting the eligibility criteria). These are clearly marked as below:

*** leading to integrated postgraduate programmes in respective subjects**
† leading to integrated postgraduate programme in M.Sc. in Data Science & Computing

For Women Candidates

Undergraduate Programmes (3 years)

B.A.
- In the first two years, a student can choose to study any three subjects from: Economics, Political Science, Philosophy, History & Indian Culture and Advanced English
- In the third year, students' study one major subject (along with the other two basic subjects)

B.Com. (Hons.)

B.Sc. in Food and Nutritional Sciences

B.Sc. (Hons.) in Mathematics* / Physics / Chemistry
- In the first two years of study, all three subjects (Mathematics, Physics and Chemistry) are taught
- In the third year, the subject of specialization will determine the final degree awarded: B.Sc. (Hons.) in Mathematics or B.Sc. (Hons.) in Physics or B.Sc. (Hons.) in Chemistry

B.Sc. (Hons.) in Biosciences* / Chemistry
- In the first two years of study, both subjects (Biosciences and Chemistry) are taught.
- In the third year, the subject of specialization will determine the final degree awarded: B.Sc. (Hons.) in Biosciences or B.Sc. (Hons.) in Chemistry

Postgraduate Programmes (2 years)

M.A. in English Language and Literature

M.Sc. in Mathematics - With an option to specialize in Actuarial Science/Computer Science

M.Sc. in Biosciences

M.Sc. in Food and Nutritional Sciences With an option to specialize in either Applied Nutrition or Food Technology

Professional Programmes (2 years)

B.Ed.

M.B.A.

For Men Candidates

Undergraduate Programmes (3 years)

B.A.

- In the first two years, students will study Economics, Political Science and History & Indian Culture
- In the third year, students major in Economics, along with the other two basic subjects
  Note: In the final year, students will have the option to pursue the ***Honours Programme in Economics*** (subject to meeting the eligibility criteria) in the final year and will be awarded a B.A. (Hons.) in Economics.

B.B.A.

B.Com. (Hons.)

B.Sc. (Hons.) in Computer Science †

B.Sc. (Hons.) in Mathematics* / Physics* / Chemistry*

- In the first two years of study, all three subjects (Mathematics, Physics and Chemistry) are taught
- In the third year, the subject of specialization will determine the final degree awarded: B.Sc. (Hons.) in Mathematics or B.Sc. (Hons.) in Physics or B.Sc. (Hons.) in Chemistry

B.Sc. (Hons.) in Biosciences* / Chemistry*

- In the first two years of study, both subjects (Biosciences and Chemistry) are taught.
- In the third year, the subject of specialization will determine the final degree awarded: B.Sc. (Hons.) in Biosciences, or B.Sc. (Hons.) in Chemistry

B.Sc. (Hons.) in Mathematics* / Economics*/ Statistics

- In the first two years of study, all three subjects (Mathematics, Economics and Statistics) are taught
- In the third year, the subject of specialization (Mathematics or Economics only) will determine the final degree awarded: B.Sc. (Hons.) in Mathematics, or B.Sc. (Hons.) in Economics

B.Sc. (Hons.) in Mathematics* / Computer Science / Statistics

- In the first two years of study, all three subjects (Mathematics, Computer Science and Statistics) are taught
- In the third year, the subject of specialization (Mathematics only) will determine the final degree awarded: B.Sc. (Hons.) in Mathematics

Bachelor of Performing Arts (Music) – 4 years programme

Diploma in Music – 2 years programme

Postgraduate Programmes (2 years)

M.A. in Economics - With an option to specialize in Applied Economics and Financial Economics

M.Sc. in Mathematics - With an option to specialize in either Actuarial Science or Computer Science

M.Sc. in Physics

M.Sc. in Chemistry

M.Sc. in Biosciences

Professional Programmes (2 years)

M.B.A.

M.Tech. in Computer Science

M.Tech. in Optoelectronics & Communications

Programme Descriptions

The following pages will highlight the information for each individual undergraduate, postgraduate and professional programme of study at SSSIHL for 2022 entry.

This includes: the length of the programme, whether it is applicable for women candidates or men or both, the eligibility criteria and a programme description, which includes the courses of study for each year (and semesters).

COMMON COURSES FOR ALL PROGRAMMES

Undergraduate Programmes

LANGUAGES

For the first four semesters of all Programmes, each student must study English as a first language and one of Sanskrit, Hindi, Telugu or Additional English* as a second language depending on availability.

*Additional English can be opted in exceptional cases, where the student does not have an adequate background in Hindi or Telugu or Sanskrit.

ENVIRONMENT COURSE

A course in Environmental Studies and Human Values is also taught for the first two semesters of the degree.

AWARENESS COURSE

A series of courses entitled 'Awareness' are taught for all six semesters of study.

YEAR 1

Semester 1
Sai Education for Transformation (Based on Bhagawan Baba's Life and Teachings)

Semester 2
Unity of Religions

YEAR 2

Semester 3
Study of Classics – I: Ramakatha Rasa Vahini

Semester 4
Study of Classics – II: Bhagavatha Vahini

YEAR 3

Semester 5
Eternal Values for the changing world

Semester 6
Life and its Quest

Postgraduate and B.Ed. Programmes

AWARENESS COURSE

A series of courses entitled 'Awareness' are taught for all six semesters of study.

YEAR 1

Semester 1
Education for Life

Semester 2
God, Society and Man

YEAR 2

Semester 3
Guidelines for Morality

Semester 4
Wisdom for Life

Professional Programmes

AWARENESS COURSE

A course entitled 'Awareness' is taught for all four semesters of study for all Professional Programmes

M.B.A.

YEAR 1

Semester 1
Indian Ethos and Values Part 1

Semester 2
Indian Ethos and Values Part 2

YEAR 2

Semester 3
Values in Management Part 1

Semester 4
Values in Management Part 2

M.TECH.

YEAR 1

Semester 1
Fundamentals of Indian Culture

Semester 2
Sources of Values

YEAR 2

Semester 3
Work Culture, Ethics and Values

Semester 4
SSSIHL's Core Values and Philosophy

UNDERGRADUATE PROGRAMMES

B.A.

Duration: ***3 Years*** | For ***Women*** & ***Men*** Candidates

In the first two years:

Women students can ***choose any three subjects from:*** 1) Economics, 2) Political Science, 3) Philosophy, 4) History & Indian Culture and 5) Advanced English

Men students will study: 1) Economics 2) Political Science and 3) History & Indian Culture

In the third year, students (both men & women) study one major subject (along with the other two basic subjects)

B.A. (Hons) in Economics (Men Students only): Men Students who meet the eligibility criteria at the end of the first two years of study will have the option to pursue the Honours Programme in Economics.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Economics: Economic Analysis I

Political Science: Elements of Political Science

Philosophy: Introduction to Indian Philosophy

History & Indian Culture: Ancient India I

Advanced English: English Literary History & Study of Poetry as a Literary Genre

Semester 2

Economics: Economic Analysis II

Political Science: Elements of Government

Philosophy: Introduction to Western Philosophy

History & Indian Culture: Medieval India

Advanced English: English Language: History & Basic Linguistics

YEAR 2

Semester 3

Economics: Quantitative Methods for Economics

Political Science: Modern Governments I

Philosophy: Twentieth Century Philosophers- Indian and Western

History & Indian Culture: Modern India (1760-1950)

Advanced English: Prose as a Literary Genre

Semester 4

Economics: Development for Economics

Political Science: Modern Governments II

Philosophy: Western Logic (Formal and Symbolic)

History & Indian Culture: Ancient Societies of Egypt, Mesopotamia and China

Advanced English: Drama as a Literary Genre

YEAR 3

Semester 5

Economics: Indian Economy: Structure and Development, Intermediate Micro Economic Theory and a practical course of Introduction to Computer Applications I (Practical)

Political Science: Principles of Public Administration and a major course to be chosen from Indian Political Thought and Western Political Thought

Philosophy: The Philosophy of Upanishads and major course entitled Ethics - Normative and Applied.

History & Indian Culture: Ancient Greek and Roman Civilizations; Tourism and Travel Management and a major chosen from a set of four electives

Advanced English: English for Professional Purposes, Literary Criticism & Theory,

Project Work

Semester 6

Economics: Public Finance and Fiscal Policy, Intermediate Macroeconomic Theory, Introduction to Computer Application II (Practical)

Political Science: Public Personnel Administration and a major course entitled International Politics

Philosophy: General Psychology and a major course entitled Study of Classics- Eastern and Western

History & Indian Culture: Modern World (1750-1945), Principles and Methods of Archaeology and a major chosen from a set of four electives.

Advanced English: Fiction as a Literary Genre, Interdisciplinary Studies in Literature,

Project Work

B.A. (Hons) in Economics

Semester 5

Indian Economy: Structure and Development, Intermediate Microeconomic Theory, Introduction to Computer Applications I (Practical), History of Economic Thought, International Economics

Semester 6

Public Finance and Fiscal Policy, Intermediate Macroeconomic Theory, Introduction to Computer Applications II (Practical), Money, Banking and Financial Institutions, Basic Econometrics

Bachelor of Business Administration (B.B.A.)

Duration: ***3 Years*** | For ***Men*** Candidates only

A comprehensive introduction to Business Administration at the Undergraduate level, the B.B.A. programme will equip the student with a thorough understanding of the theory and practice of Business Management via twenty core courses, taught over three years. What makes this programme unique from others is the focus on Values-based Management, Rural Development and Corporate Initiatives, Sales Management, National Perspectives and Entrepreneurial Development and Schemes – all of which are seamlessly integrated with the undercurrent of ethics and values.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Values Oriented Management, Financial Accounting for Management, Business Communication, Computer Theory and MS Office - Word (Practical)

Semester 2

Organizational Behaviour, Analytical Techniques for Management, Business Economics, Accounting Package and MS Office (Practical)

YEAR 2

Semester 3

Human Resources Management, Financial Management, Company Law and Corporate Accounting, MS Office - Excel (Practical)

Semester 4

Selected Commercial Laws, Costing for Management, Principles of Marketing, MS Office - Access (Practical)

YEAR 3

Semester 5

Taxation, Rural Development and Corporate Initiatives, Banking - Theory and Practice, Management of Operations, Two Electives, Content Management Systems - Web Design 1 (Practical), Comprehensive Viva voce

Semester 6

National Perspectives, Management Accounting, Management Information Systems, Entrepreneurship Development, Two Electives, Content Management Systems - Web Design 2 (Practical)

ELECTIVES

Marketing Group
Consumer Behaviour & Marketing Research, Rural Marketing, Promotion & Customer Relationship Management, Retail Marketing

Finance Group
Accounting for Financial Services, Financial Markets & Institutions, Financial Services Investment, Analysis and Portfolio Management, Fundamentals of Insurance, Regulation and Management of Insurance

Human Resources Management Group
Human Resources Development, Labour Welfare & Social Security, Industrial Relations & Labour Law, Employee Training and Development

Information Technology
E-Commerce, IT Basics, Business Analytics

B.Com. (Hons.)

Duration: ***3 Years*** | For ***Women*** & ***Men*** Candidates

The B.Com. (Hons.) Programme will impart basic knowledge and skills in all the important subjects in the field of commerce. It will equip students thoroughly in the field of accounting, finance and taxation. The programme will help students prepare for advanced studies in finance and management and also professional courses in accounting, costing, financial analysis, insurance and corporate secretary-ship. Significant amount of time will also be spent on fostering ethical and moral attitudes to help students become better professionals in the financial services sector and in conducting business and serving industry after graduation.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Business Communication, Financial Accounting I, Business Economics, Introduction to Quantitative Techniques, Introduction to Computers (Practical)

Semester 2

Principles of Management, Financial Accounting II, Business Environment, Quantitative Techniques I, Word Processing and Presentation Software (Practical)

YEAR 2

Semester 3

Company Law, Corporate Accounting, International Business, Quantitative Techniques II Accounting Package (Practical), Commerce Workshop I (Practical)

Semester 4

Business Statistics, Accounting for Financial Services, Elements of Costing Spreadsheet Applications Foundations (Practical), Commerce Workshop II

YEAR 3

Semester 5

Elements of Income Tax, Banking Theory, Law & Practice, Financial Management, Two Electives, Spreadsheet Applications - Advanced (Practical), Commerce Workshop III

Semester 6

Principles of Marketing, Commercial Law, Auditing, Two Electives, Data Analytics (Practical - Optional), Commerce Workshop IV, Comprehensive Viva voce

ELECTIVES - Semester 5

Foreign Trade Procedures Fundamentals of Insurance Methods of Costing Advanced Accountancy Essentials of Ecommerce

ELECTIVES - Semester 6

Management of International Business, Regulation and Management of Insurance, Management Accounting Investment, Analysis Retail Management

B.Sc. in Food and Nutritional Sciences

Duration: ***3 Years*** | For ***Women*** Candidates only

The nutritionist plays an increasingly important role as health has become a mainstream and topical issue in society. The programme is a scientific study of health and chemical aspects of food. It provides a strong academic training in nutrition and the related disciplines of food science, physiology, biochemistry and microbiology. Students will get a thorough understanding of the role of diet and nutrition in health and the prevention of major diseases.

The programme content is wide and varied, ranging from the key scientific properties of food to the development of new and innovative food products. It provides an exciting opportunity for students to develop an in-depth scientific understanding of food, as well as important critical thinking and innovation skills needed by the food industry.

The programme is designed to provide an understanding of both the biological and social science perspectives. Students receive basic theoretical and practical training in three major areas—Public Health Nutrition, Dietetics & Food Science and Quality Control—which can be their chosen career specializations for further postgraduate or doctoral research study.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Only candidates with subject combinations in XII Standard of Mathematics/Physics/Chemistry or Botany/Zoology/Chemistry are eligible to apply.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Introductory Food Science, Applied Chemistry, Human Physiology, Introductory Food Science (Practical), Applied Chemistry (Practical), Human Physiology (Practicals).

Semester 2

Biochemistry, Microbiology, Principles of Culinary Science and Art, Biochemistry (Practical), Microbiology (Practical), Principles of Culinary Science and Art (Practical)

YEAR 2

Semester 3

Fundamentals of Nutrition, Basic Food Chemistry, Food Preservation Techniques, Fundamentals of Nutrition (Practical), Basic Food Chemistry (Practical), Food Preservation Techniques (Practical)

Semester 4

Human Nutrition, Bakery and Confectionery, Nutrition in Health, Computer Basics and Applications, Human Nutrition (Practical), Bakery and Confectionery (Practical), Nutrition in Health (Practical)

YEAR 3

Semester 5

Functional Foods and Nutraceuticals, Dietetics, Sports Nutrition, Institutional Food Management, Ergonomic Science, Dietetics and Sports Nutrition (Practical), Institutional Food Management and Ergonomic Science (Practical)

Semester 6

Food Product Development, Food Processing Technologies, Food Quality Assurance and Evaluation, Community Nutrition, Nutrition in Emergencies and Disasters, Food Product Development, Food Processing Technologies and Food Quality Assurance & Evaluation (Practical), Community Nutrition (Practical)

B.Sc. (Hons.) in Computer Science

Duration: ***3 Years*** | For ***Men*** Candidates only

This programme leads to the integrated postgraduate programme in ***(subject to meeting the eligibility criteria)*****:**
M.Sc. in Data Science and Computing

The programme consists of comprehensive courses in core and advanced computing. Some of the main areas include Computer Architecture, System Software, Theoretical Computer Science, Web and Computer Networks, Mathematics, Databases, Technology and Programming. Students also have a wide choice of electives in the final semester.

The strong foundational learning in theory will be supplemented by skill development via practicals, programming and exposure to real world situations through the software projects in the last semester. Students will also learn to embrace cutting-edge technologies related to computer science. They will also get ample opportunities for creative expression via seminars where they will be expected to present (written as well as oral) new topics, new inventions, and articles from magazines and research journals related to advanced topics in computing.

Graduates of the programme will be well-equipped to pursue postgraduate programmes in the field of computer science, such as M.Sc. in Computer Science, Master of Computer Applications, M.Sc. in Computer Science and Applications, M.Sc. in Data Science and Computing, etc.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- In XI / XII Standard, Mathematics (including Algebra, Geometry, Calculus and basic Statistics) must be studied
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Foundations in Algebra and Geometry, Digital Circuits and Logic Design, Introduction to Programming Languages, C-Programming Lab I (Practical)

Semester 2

Foundations in Calculus, Fundamentals of Computer Organization, Data Structures and Algorithm Analysis in C, C-Programming Lab II (Practical)

YEAR 2

Semester 3

Ordinary Differential Equations, Probability and Statistics, Object Oriented Programming, C++ Programming Lab (Practical), Seminar I

Semester 4

Linear Algebra, Statistical Inference, Operating System, Java Programming Lab (Practical), Seminar II

YEAR 3

Semester 5

Computer Oriented Numerical Analysis, Data Mining, Network Essentials, Database Management System, Software Engineering, SQL and Python Lab (Practical), Web Programming Lab (Practical)

Semester 6

Two Electives, Introduction to High Performance Computing, High Performance Computing Lab (Practical), Advanced Java Lab (Practical), Software Project (Practical), Comprehensive Viva voce

ELECTIVES

Graph Theory, Discrete Mathematics, Internet of Things, Problem Solving with Artificial Intelligence, System Software Information, Retrieval Cyber-Physical Systems, Microprocessor, Embedded Computing

B.Sc. (Hons.) in Mathematics / Physics / Chemistry

Duration: ***3 Years*** | For ***Women*** & ***Men*** Candidates

This programme leads to the integrated postgraduate programmes in *(subject to meeting the eligibility criteria)***:**
M.Sc. in Mathematics (Men and Women) / M.Sc. in Physics (Men only) / M.Sc. in Chemistry (Men only)

- In the first two years of study, all three subjects (Mathematics, Physics and Chemistry) are taught.
- In the third year, the subject of specialization will determine the final degree awarded: B.Sc. (Hons.) in Mathematics or B.Sc. (Hons.) in Physics or B.Sc. (Hons.) in Chemistry. The courses will be from the chosen area of specialization.

Honours in ***Mathematics*** (Year 3): Students strengthen their basics of Mathematics as they pursue advanced courses such as Abstract Algebra, Linear Algebra, sophistications of Complex analysis, Topology, Numerical Methods etc. and software laboratory courses such as Introduction to C Programming and Data Structure and File handling using C during the last two semesters. Those who wish to pursue Computer Science may choose elective courses from a list of well-structured elective courses. Moreover, students with eligible CGPA at the Honours level with creditable performance will get admitted to the M.Sc. in Mathematics programme. Besides getting very good training in Mathematics, this programme provides opportunities to Mathematics graduates for specialization in Computer Science or Actuarial Science.

Honours in ***Physics*** (Year 3): The 3-year B.Sc. (Hons.) in Physics offered by the Department of Physics has been designed to provide a strong foundation in fundamental physics concepts that form the very basis of advanced scientific inventions. The curriculum presents a blend of science and technology, with the physics theory courses complimented by hands-on practical courses conducted in well-equipped laboratories. The unique program also offers training in advanced electronics, microprocessors and assembly language programming through its theory and lab courses. Additionally, students are trained in computational techniques and simulations. The program also offers two software courses on Python programming spread over two semesters, that train the students in coding and using programming skills for various applications, through a mini-project. The program aims at inspiring students to pursue Science at the Masters level and beyond, but also prepares them to branch out into allied fields like electronics, technology and programming.

Honours in ***Chemistry*** (Year 3): The emphasis is on teaching the fundamental principles of Chemistry that cover topics under each of the major branches of Chemistry such as Inorganic, Organic and Physical, and giving training in appropriate experimental methods. Electives (including interdepartmental) are being introduced for Chemistry Honours students that enable the incorporation of emerging fields into the syllabus as and when the need arises. The graduating student will be exposed to almost every aspect of the subject - Theoretical, Applied, Instrumental, Computational and Experimental.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Mathematics: Multivariable Calculus, Foundations of Mathematics

Physics: Electronics I: Analog and Digital, Electronics Laboratory I (Practical)

Chemistry: Principles of Structure and Bonding, Laboratory Course in General Chemistry (Practical

Semester 2

Mathematics: Probability, Methods of Ordinary Differential Equations

Physics: Optics, Optics Laboratory (Practical)

Chemistry: Chemical Thermodynamics, Laboratory Course in Titrimetry and Thermodynamics (Practical)

YEAR 2

Semester 3

Mathematics: Introduction to Real Analysis/ Mathematical Methods - I, Introduction to Linear Algebra

Physics: Classical Mechanics, Mechanics Laboratory (Practical)

Chemistry: Chemical Kinetics and Equilibria, Laboratory Course in Chemical Kinetics and Equilibria (Practical)

Semester 4

Mathematics: Real Analysis/ Mathematical Methods - II, Algebraic Structures I

Physics: Electromagnetism, Electromagnetism Laboratory (Practical)

Chemistry: Chemistry of Organic Functional Groups, Laboratory Course in Methods and Synthesis in Organic Chemistry (Practical)

YEAR 3

Semester 5

Mathematics: Complex Analysis, Topics in Linear Algebra, Topology, Elective I, Elective II, Software Lab I - Introduction to C Programming (Practical)

or

Physics: Physics: Mathematical Physics, Modern Physics, Thermal Physics, Electronics II: Analog Systems and Applications, Computational Techniques in Physics, General Physics Laboratory I (Practical), Electronics Laboratory II (Practical), Python Programming Laboratory I (Practical)

or

Chemistry: Chemistry of Elements, Applications of Thermodynamics and Surface Chemistry, Dynamic Aspects of Organic Chemistry, Chemistry of Biological Molecules, Quantum Chemistry, Environmental and Green Chemistry, Laboratory Course in Inorganic and Physical Chemistry (Practical), Laboratory Course in Organic Chemistry and Biochemistry (Practical), Project / Laboratory Course in Computer Applications I (Practical)

Semester 6

Mathematics: Algebraic Structures II, Numerical Methods, Methods of Differential Equations, Elective III, Elective IV, Software Lab II - Data Structure and File Handling using C (Practical)

or

Physics: Solid State Physics, Nuclear Physics, Quantum Mechanics, Atomic and Molecular Spectroscopy, Microprocessors, General Physics Laboratory II (Practical), Microprocessors Laboratory (Practical), Python Programming Laboratory II (Practical)

or

Chemistry: Advanced Inorganic Chemistry, Analytical Chemistry, Synthetic Organic Chemistry, Applications of Spectroscopy, Theoretical Aspects of Spectroscopy, Materials of Industrial Importance, Laboratory Course in Inorganic and Analytical Chemistry (Practical), Laboratory Course in Synthetic Organic Chemistry and Spectroscopic Techniques (Practical), Project / Laboratory Course in Computer Applications II (Practical)

ELECTIVES

Mathematics group
Geometry, Combinatorics, Elementary Number Theory, Graph Theory, Continuum Mechanics, Operations Research, Linear Programming, Introduction to Coding Theory, Discrete Mathematics

Computer Science group
Introduction to Computer Science, Fundamentals of Computer Systems, Data Structures and Algorithms, Mathematical Logic for Computer Science, Design of Algorithms

B.Sc. (Hons.) in Biosciences / Chemistry

Duration: ***3 Years*** | For ***Women*** & ***Men*** Candidates

This programme leads to the integrated postgraduate programmes in *(subject to meeting the eligibility criteria): M.Sc. in Biosciences (Men and Women) / M.Sc. in Chemistry (Men only)*

- In the first two years of study, both subjects (Biosciences and Chemistry) are taught
- In the third year, the subject of specialization will determine the final degree awarded: B.Sc. (Hons.) in Biosciences or B.Sc. (Hons.) in Chemistry.

Honours in ***Biosciences*** (Year 3): Much emphasis is laid on getting students abreast with the newly emerging areas of Biological Sciences. Practical courses—including hands-on training in laboratory techniques—enhance students' understanding of the basic and applied theoretical concepts. These include morphological and anatomical aspects gained earlier along with structure-function relationships that exist among organisms and applications developed in the field of Biological Sciences for improving the quality of Man's life.

Honours in ***Chemistry*** (Year 3): The emphasis is on teaching the fundamental principles of Chemistry that cover topics under each of the major branches of Chemistry such as Inorganic, Organic and Physical, and giving training in appropriate experimental methods. Electives (including interdepartmental) are being introduced for Chemistry Honours students that enable the incorporation of emerging fields into the syllabus as and when the need arises. The graduating student will be exposed to almost every aspect of the subject - Theoretical, Applied, Instrumental, Computational and Experimental.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Biosciences: Plant Diversity I (Algae, Fungi and Bryophytes), Animal Diversity I (Invertebrata), Plant Diversity I (Practical), Animal Diversity I (Practical)

Chemistry: Principles of Structure and Bonding, Laboratory Course in General Chemistry (Practical)

Semester 2

Biosciences: Plant Diversity II (Pteridophytes, Gymnosperms and Morphology of Angiosperms), Animal Diversity II (Chordata), Plant Diversity II (Practical), Animal Diversity II (Practical)

Chemistry: Chemical Thermodynamics, Laboratory Course in Titrimetry and Thermodynamics (Practical)

YEAR 2

Semester 3

Biosciences: Plant Diversity III (Taxonomy, Anatomy and Embryology of Angiosperms), Developmental Biology (Embryology of Animals), Plant Diversity III (Practical), Developmental Biology (Practical)

Chemistry: Chemical Kinetics and Equilibria, Laboratory Course in Chemical Kinetics and Equilibria (Practical)

Semester 4

Biosciences: Biostatistics, Bacteriology and Virology, Biostatistics (Practical), Bacteriology and Virology (Practical)

Chemistry: Chemistry of Organic Functional Groups, Laboratory Course in Methods and Synthesis in Organic Chemistry (Practical)

YEAR 3

Semester 5

Biosciences: Plant Physiology, Animal Physiology, Cell Biology, Ecology and Environmental Biology, Instrumentation, Plant Physiology (Practical), Animal Physiology (Practical), Cell Biology (Practical), Ecology and Environmental Biology (Practical), Instrumentation (Practical)

or

Chemistry: Chemistry of Elements, Applications of Thermodynamics and Surface Chemistry, Dynamic Aspects of Organic Chemistry, Chemistry of

Biological Molecules, Quantum Chemistry, Environmental and Green Chemistry,

Laboratory Course in Inorganic and Physical Chemistry (Practical), Laboratory Course

in Organic Chemistry and Biochemistry (Practical), Project / Laboratory Course in Computer Applications I (Practical)

Semester 6

Biosciences: Genetics and Evolution, Biotechnology, Introductory Molecular Biology, Biological Chemistry, Introductory Immunology, Biotechnology (Practical), Introductory Molecular Biology (Practical), Biological Chemistry (Practical), Genetics (Practical) and Introductory Immunology (Practical)

or

Chemistry: Advanced Inorganic Chemistry, Analytical Chemistry, Synthetic Organic Chemistry, Applications of Spectroscopy, Theoretical Aspects of Spectroscopy, Materials of Industrial Importance, Laboratory Course in Inorganic and Analytical Chemistry (Practical), Laboratory Course in Synthetic Organic Chemistry and Spectroscopic Techniques (Practical), Project / Laboratory Course in Computer Applications II (Practical)

B.Sc. (Hons.) in Mathematics / Economics / Statistics

Duration: ***3 Years*** | For ***Men*** Candidates only

This programme leads to the integrated postgraduate programmes in *(subject to meeting the eligibility criteria): M.Sc. in Mathematics / M.A. in Economics*

- In the first two years of study, all three subjects (Mathematics, Economics and Statistics) are taught
- In the third year, the subject (students will take courses in only that subject) of specialization (Mathematics or Economics only) will determine the final degree awarded: B.Sc. (Hons.) in Mathematics, or B.Sc. (Hons.) in Economics

Honours in ***Mathematics*** (Year 3): Students strengthen their basics of Mathematics as they pursue advanced courses such as Abstract Algebra, Linear Algebra, sophistications of Complex analysis, Topology, Numerical Methods etc. and software laboratory courses such as Introduction to C Programming and Data Structure and File handling using C during the last two semesters. Those who wish to pursue Computer Science may choose elective courses from a list of well-structured elective courses. Moreover, students with eligible CGPA at the Honours level with creditable performance will get admitted to the M.Sc. in Mathematics programme. Besides getting very good training in Mathematics, this programme provides opportunities to Mathematics graduates for specialization in Computer Science or Actuarial Science.

Honours in ***Economics*** (Year 3): The Economics programme provides rigorous training in micro and macro-economic theory, quantitative analysis and some areas of applied economics such as finance, international economics, public finance and development economics. On the whole, there is considerable emphasis on quantitative orientation in all courses. Part of the training includes computer applications using data relating to the Indian economy. Graduating students can further pursue an MBA or a Master's degree in economics.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Mathematics: Multivariable Calculus, Foundations of Mathematics

Economics: Economic Analysis I

Statistics: Introductory Statistics

Semester 2

Mathematics: Linear Programming, Methods of Ordinary Differential Equations

Economics: Economic Analysis II

Statistics: Probability Theory and Distributions

YEAR 2

Semester 3

Mathematics: Introduction to Real Analysis, Introduction to Linear Algebra

Economics: Mathematics for Economics

Statistics: Statistical Inference

Semester 4

Mathematics: Real Analysis, Algebraic Structures I

Economics: Development Economics

Statistics: Applied Statistics

YEAR 3

Semester 5

Mathematics: Complex Analysis, Topics in Linear Algebra, Topology, Elective I,

Elective II, Software Lab I - Introduction to C Programming (Practical)

or

Economics: Indian Economy: Structure and Development, Intermediate Micro Economic Theory, Introduction to Computer Applications I (Practical), History of Economic Thought, International Economics

Semester 6

Mathematics: Algebraic Structures II, Numerical Methods, Methods of Differential Equations, Elective III, Elective IV, Software Lab II - Data Structure and File Handling using C (Practical)

or

Economics: Public Finance and Fiscal Policy, Intermediate Macroeconomic Theory, Introduction to Computer Applications II (Practical), Money Banking and Financial Institutions, Basic Econometrics

B.Sc. (Hons.) in Mathematics / Computer Science / Statistics

Duration: ***3 Years*** | For ***Men*** Candidates only

Limited seats are available for this programme

This programme leads to the integrated postgraduate programmes in *(subject to meeting the eligibility criteria): M.Sc. in Mathematics*

- In the first two years of study, all three subjects (Mathematics, Computer Science and Statistics) are taught
- In the third year, only Mathematics course will be taught, leading to the final degree awarded: ***B.Sc. (Hons.) in Mathematics***.

The programme is built on the four paradigms to study science: Theory, Experiment, Data Analysis and Simulation. In the first two formative years, the focus is given on Computer Science training in the current, modern context. This includes: The use of a computer more as a tool for problem solving, Data Structures with Python, Database or Information system (including associated lab work), Data Visualization, Artificial Intelligence (AI) and Web Technology and Design.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling from a recognized board (CBSE or equivalent)
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Mathematics: Multivariable Calculus, Foundations of Mathematics

Computer Science: Introduction to Information System, Introduction to Information System (Practical)

Statistics: Introductory Statistics

Semester 2

Mathematics: Linear Programming, Methods of Ordinary Differential Equations

Computer Science: Problem Solving using Computers, Python Lab (Practical)

Statistics: Probability Theory and Distributions

YEAR 2

Semester 3

Mathematics: Introduction to Real Analysis, Introduction to Linear Algebra

Computer Science: Data Visualization, Data Visualization Lab (Practical)

Statistics: Statistical Inference

Semester 4

Mathematics: Real Analysis, Algebraic Structures I

Computer Science: Artificial Intelligence, Fundamentals of Linux/Unix Systems Lab (Practical)

Statistics: Applied Statistics

YEAR 3

Semester 5

Mathematics: Complex Analysis, Topics in Linear Algebra, Topology, Elective I,

Elective II, Software Lab I - Introduction to C Programming (Practical)

Semester 6

Mathematics: Algebraic Structures II, Numerical Methods, Methods of Differential Equations, Elective III, Elective IV, Software Lab II - Data Structure and File Handling using C (Practical)

Bachelor of Performing Arts (Music)

Duration: ***4 Years*** | For ***Men*** Candidates only

The Department of Music at the Prasanthi Nilayam Campus for Men offers full time residential programmes in music in Carnatic (South Indian) system as well as Hindustani (North Indian) system in Vocal and Instrumental streams. The department offers five major disciplines.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling (with music as one the subject) from a recognized board (CBSE or equivalent) OR
- 10+2 years of schooling with Diploma in Music from a recognized board (CBSE or equivalent) OR
- 10+2 years of schooling from a recognized board (CBSE or equivalent) with minimum two years of training from a reputed Guru **
- Either passed or appeared for Final exams at XII level before Admissions Test. If not appeared for XII Standard exams, X and XI Standard marks will be considered.
- Age: Preferably below 19 years as of 31st May in the year of admission. Age may be relaxed to **21 years** depending on the merit of the case

** Candidates who have not studied Music as one of the subjects in X/XII qualifying examination must have studied Music for not less than two years in a recognized Institution OR got training in Music for not less than two years from a well-known teacher/guru. Such candidates shall be required to submit a certificate issued by the teacher/ institution.

MAJORS & ELECTIVES

The department offers four major disciplines. ***Students can opt one major and one elective***. In the first two years both major and elective subjects are taught and in the third year only the chosen major subject is taught. Candidates will have to choose one major and one related elective subject from the above. The elective subjects offered will be based on the aptitude of the candidates.

MAJORS	ELECTIVES
Carnatic Vocal	Carnatic Instrumental Veena ***or*** Carnatic Instrumental Mridangam ***or*** Hindustani Vocal
Carnatic Instrumental Mridangam	Carnatic Vocal ***or*** Carnatic Instrumental Veena ***or*** Hindustani Instrumental Tabla
Hindustani Vocal	Hindustani Instrumental Tabla ***or*** Hindustani Instrumental Sitar ***or*** Carnatic Vocal
Hindustani Instrumental Sitar	Hindustani Vocal ***or*** Hindustani Instrumental Tabla ***or*** Carnatic Instrumental Veena
Hindustani Instrumental Tabla	Hindustani Vocal ***or*** Hindustani Instrumental Sitar ***or*** Carnatic Instrumental Mridangam

Facilities: The Department of Music has facilities not just for imparting education in Music but is also equipped with computerized audio recording facility, a well-equipped library with a good number of books relating to Music as well as Sai spiritual literature. A huge digital music collection of great maestros with the latest multipurpose music system is available in the library for the benefit of the students. Musical instruments required for the purpose of classroom teaching and for practice sessions are provided.

Visiting Artistes: Artistes from various corners of the world visit Prasanthi Nilayam as pilgrims. They are invited to visit the Sri Sathya Sai Institute of Higher Learning, from time to time and give lecture demonstrations. Great maestros like Sri Umayalpuram Sivaraman (Mridangam Vidwan), Sri Komanduri Sheshadri (Violin Vidwan), Sri Hariharan (Ghazal Singer), Sri Naiveli Santana Gopalan (Carnatic Vocal Vidwan), Suresh Wadkar (North Indian Classical Singer), Smt Anuradha Krishnamurthy (Carnatic Vocal Vidwan), Padmashri Palanivel (Thavil Vidwan) and Prof. Yella Venkateswara Rao (Mridangam Vidwan) are some of the artists whose expertise richly benefits students, particularly during interactive sessions.

Diploma in Music

Duration: ***2 Years*** | For ***Men*** Candidates only

This Diploma Course, under the Department of Music, is offered in two streams viz., Carnatic and Hindustani systems in the following disciplines: **Carnatic Vocal, Veena, Mridangam, Hindustani Vocal, Sitar and Tabla.**

ELIGIBILITY REQUIREMENTS

- Passed X Std. of study from a recognized board (CBSE or equivalent)
- Foundation Course (or equivalent) in Music from a recognized College / Institution
- Age: Above 16 years and below 20 years as of 31st May in the year of admission

Note: Candidates who are especially talented, with a family background in Professional Music and other Fine Arts will also be considered. In such cases, the candidate must produce documentary evidence.

COURSES TAUGHT

Carnatic System

Year 1

Main Stream DC (Vocal): Theory, General English, Vocal Practical
Main Stream DC (Veena): Theory, General English, Veena Practical
Main Stream DC (Mridangam): Tala Theory, General English, Mridangam Practical
Ancillary Stream DC (Vocal): Ancillary Vocal Practical
Ancillary Stream DC (Veena): Ancillary Veena Practical
Ancillary Stream DC (Mridangam): Ancillary Mridangam Practical

Year 2

Main Stream DC (Vocal): Theory, General English, Vocal Practical
Main Stream DC (Veena): Theory, General English, Veena Practical
Main Stream DC (Mridangam): Tala Theory, General English, Mrudangam Practical
Ancillary Stream DC (Vocal): Ancillary Vocal Practical
Ancillary Stream DC (Veena): Ancillary Veena Practical
Ancillary Stream DC (Mridangam): Ancillary Mridangam Practical

Hindustani System

Year 1

Main Stream DH (Vocal): Theory, General English, Vocal Practical
Main Stream DH (Sitar): Theory, General English, Sitar Practical
Main Stream DH (Tabla): Tala Theory, General English, Tabla Practical
Ancillary Stream DH (Vocal): Ancillary Vocal Practical
Ancillary Stream DH (Sitar): Ancillary Sitar Practical
Ancillary Stream DH (Tabla): Ancillary Tabla Practical

Year 2

Main Stream DH (Vocal): Theory, General English, Vocal Practical
Main Stream DH (Sitar): Theory, General English, Sitar Practical
Main Stream DH (Tabla): Tala Theory, General English, Tabla Practical
Ancillary Stream DH (Vocal): Ancillary Vocal Practical
Ancillary Stream DH (Sitar): Ancillary Sitar Practical
Ancillary Stream DH (Tabla): Ancillary Tabla Practical

UNDERGRADUATE TEST SYLLABUS

The admission test syllabus is based on XI/XII Std. of CBSE. The question paper will be of Multiple-Choice type.

- There will be negative marking for all multiple-choice questions.
- The **General English / Verbal Skills test** is compulsory for all undergraduate programmes
- **Model Test Papers** are available on the website - sssihl.edu.in

Question Paper Pattern

B.A. / B.Sc. / B.Sc. (Hons.) / B.Com. (Hons.)
Each candidate is required to answer a paper in General English and three subject papers in the combination chosen. The General English question paper contains multiple choice questions, comprehension, and paragraph/ email/ letter writing. The 3 Subject Papers (viz., M/P/C, B/Z/C, A/C/E etc.,) consist of 40 Multiple Choice questions each.

Exam duration is around three hours.

B.B.A.
Each candidate is required to answer tests to ascertain Verbal Skills, Numerical Skills and Reasoning Skills. Each Test contains 40 Multiple choice questions, total number of Questions being 120. In addition, there will a short essay test.

Exam duration is around two hours and forty minutes.

B.Sc. (Hons.) in Computer Science
Verbal skills - 40 questions
Short Essay Test
Mathematical Skills - 60 questions
Logical Reasoning and Quantitative Aptitude - 60 questions.

ADMISSIONS SUBJECT TEST COMBINATIONS

The following is a list of the ***Admissions Test Subject Combinations*** for various Undergraduate programmes. As indicated in the Undergraduate application form, applicants must choose from the combinations available. For the remaining programmes, there are specific test papers. Test syllabi for each subject are given in the pages that follow. A student can apply for more than one course if the entrance exam for the selected courses does not clash.

B.A.	Economics, History, Political Science
	Advanced English, History, Political Science
B.Com. (Hons.)	Accountancy, Commerce, Economics
	Accountancy, Commerce, Mathematics
	Accountancy, Commerce, Statistics
	Accountancy, Economics, Mathematics
Bachelor of Business Administration (B.B.A.) **(For Men Applicants only)**	Specific Test Paper
B.Sc. (Hons.) in Computer Science **(For Men Applicants only)**	Specific Test Paper
B.Sc. in Food and Nutritional Sciences **(For Women Applicants only)**	Mathematics, Physics, Chemistry
	Botany, Zoology, Chemistry
B.Sc. (Hons.) in Mathematics / Physics / Chemistry	Mathematics, Physics, Chemistry
B.Sc. (Hons.) in Biosciences / Chemistry	Botany, Zoology, Chemistry
B.Sc. (Hons.) in Mathematics / Economics / Statistics **(For Men Applicants only)**	Mathematics, Economics, Statistics
	Mathematics, Physics, Chemistry
B.Sc. (Hons.) in Mathematics / Computer Science / Statistics **(For Men Applicants only)**	Mathematics, Computer Science, Statistics

GENERAL ENGLISH

- Comprehension (with objective answers)
- Objectives on basic grammar (articles, punctuation, parts of speech etc.
- Paragraph writing/ letter/e-mail writing (in about 200 words)

MATHEMATICS

- ***Algebra and Trigonometry:*** Sets, Relations and functions; Complex Numbers; Matrices and Determinants; Quadratic Equations; Permutations and Combinations; Mathematical Induction and its applications; Binomial theorem and its applications; Sequences and Series; Trigonometry.
- ***Calculus:*** Differential Calculus; Integral Calculus; Differential Equations.
- ***Two-Dimensional Geometry.***
- ***Statistics:*** Measures of Central tendency and Dispersion; Probability.

PHYSICS

- ***Measurements:*** Fundamental and derived units – length, mass and time measurements; Accuracy and precision of measuring instruments, errors in measurement – significant figures; Dimensions - dimensions of physical quantities – dimensional analysis.
- ***Scalar and vector quantities:*** Addition and subtraction of vectors, unit vector, resolution of vectors, rectangular components, multiplication of vectors - scalar, vector products.
- ***Mechanics and Kinematics:*** Motion in a straight line, position time graph, speed and velocity, uniform and non-uniform motion, uniformly accelerated motion; Motion in two dimensions; projectile motion; Force and inertia, Newton's laws and their applications; unit of force – impulse; law of conservation of linear momentum and its applications; Equilibrium of concurrent forces – triangle law, parallelogram law; Uniform circular motion, angular velocity, angular acceleration; relation between linear and angular velocities. Centripetal force; Work done by a constant force and a variable force; unit of work. Potential and kinetic energy, work – energy theorem; Collisions – Elastic and in-elastic collisions in one dimension; Moment of inertia and its physical significance – radius of gyration; angular momentum. Torque – conservation of angular momentum.
- ***Gravitation:*** The universal law of gravitation; acceleration due to gravity and its variation with the altitude, latitude, depth and rotation of the Earth.
- ***Solids:*** Elastic behaviour, stress – strain relationship, Hooke's law; three types of moduli of elasticity.
- ***Periodic motion:*** Period, frequency, displacement as a function of time. Simple harmonic motion – amplitude, frequency, phase – uniform circular motion as SHM. Oscillations of a spring; Energy in SHM. kinetic and potential energies.
- ***Wave motion:*** longitudinal and transverse waves – relation between frequency, wavelength and velocity of a wave, Superposition principle, Interference – intensity and sound level; beats, standing waves – standing waves in strings and pipes – sonometer – resonance air column – fundamental mode and harmonics. Doppler effect.
- ***Thermodynamics and Kinetic theory:*** Laws of thermodynamics; heat conduction, convection, radiation; kinetic theory of gases.
- ***Optics:*** Reflection of light – reflection at plane and curved surfaces; total internal reflection; determination of velocity of light – Michelson's method; refraction – spherical lenses – thin lens formula, lens makers formula – magnification – power of a lens – combination of thin lenses in contact; refraction of light through a prism – dispersion – spectrometer – determination of μ – rainbow; optical instruments – microscope, telescope, resolving power.
- ***Electrostatics and Current Electricity:*** Electric charges, conductors, insulators, charging by induction, properties of electric charge, coulomb's law, forces between multiple charges, electric field, electric field lines, electric flux, electric dipole, dipole in uniform external field, electrostatic potential, potential due to point charge, electrostatics of conductors, capacitors, capacitance, parallel plate capacitor, energy stored in capacitors, combination of capacitors.
- ***Electric current, Electric current in conductors:*** ohm's law - electrical energy and power, combination of resistance, Kirchoff's law, wheat stone bridge network, metre bridge, potentiometer.
- ***Moving Charges, Magnetism and Electromagnetic induction:*** Earth's magnetic field and magnetic elements. Bar magnet - magnetic field lines. Magnetic field due to magnetic dipole along the axis and perpendicular to the axis; torque on a magnetic dipole in a uniform magnetic field; magnetic properties of materials–Intensity of magnetisation, magnetic susceptibility, magnetic induction and permeability Dia, Para and Ferromagnetic substances with examples; magnetic force and motion in a magnetic field, Biot-savart Law, Ampere's circuital law, solenoid, torque on current loop, magnetic flux, Faraday's law, Lenz's law, motional EMF, AC generator.
- ***Atomic and Nuclear Physics:*** Alpha particle scattering and Rutherford's nuclear model, atomic spectra, Bohr model of hydrogen atom, hydrogen atom spectra, composition of nucleus, size of the nucleus, nuclear binding energy, nuclear force, radioactivity, Nuclear Fission and Fusion.
- ***Electronics-Semiconductors:*** intrinsic and extrinsic, p-n junction, diodes, special purpose diodes, transistors, digital electronics -logic gates.

CHEMISTRY

- ***General and Physical Chemistry:*** Some basic concepts of chemistry-structure of atom-acids and bases-pH-buffers-buffer action-buffer capacity-hydrolysis of salts-solubility product-states of matter (gases and liquids)-solutions-thermodynamics-first and second law-electrochemistry-Nernst equation, electrochemical cell, cell representation and cell potential-chemical equilibrium- redox reactions-solid state-chemical kinetics-1st order rate expression, 2nd order rate expression, half life period and Arrhenius equation and surface chemistry- chemical adsorption and physical adsorption.
- ***Inorganic Chemistry:*** Periodic table-chemical bonding and molecular structure – hydrogen-general characteristics of s-block elements-p- block elements and d-block elements- coordination chemistry-EAN rule, nomenclature and valence bond theory- organometallics-importance of coordination compounds in qualitative inorganic analysis principles and processes of isolation of elements-nuclear chemistry-different types of decay.
- ***Organic and Applied Chemistry:*** Purification and Characterization of Organic Compounds; Some basic principles-Hydrocarbons-haloalkanes and haloarenes-organic compounds containing oxygen (alcohols, phenols, carbonyl compounds, carboxylic acids), Organic Compounds containing Nitrogen (aliphatic and aromatic amines – primary, secondary and tertiary amines) – diazonium salts-synthetic and natural polymers-biomolecules - chemistry in action-environmental chemistry.

COMPUTER SCIENCE

- Introduction to computers
- Hardware & software concepts
- Parts of computer
- Operating systems
- Language Processors
- Number conversion (binary, octal, decimal, hexadecimal)
- Logical reasoning

BOTANY

- ***Plant Kingdom:*** Five kingdom classification major groups and their salient features. Bacteria, Fungi, Bryophytes, Pteridophytes, Gymnosperm.
- ***Morphology:*** Structural organization of stem, leaf and root and their modifications (Stem-climber, Rhizome, tuber, bulb, corm); leaf - foliage, scale and bract; root - tap and adventitious roots in dicot and monocot plants.
- ***Anatomy:***
  Tissues - Parenchyma, collenchymas, sclerenchyma, xylem, phloem. Anatomy of root, stem and leaf of monocot and dicot plants.
- ***Embryology:***
  Structure and function of flower, Infloroscence, (Cymose, Racemose and special types) Androecium (Anther structure, microsporangium, microsporogenesis and male gametophyte), Entomophilies, Hydrophily, Zoophily, Fertilization, Fruits (Simple, aggregate and multiple fruits).
- ***Physiology:*** Basic account on water absorption, Ascent of sap, Transpiration (Exchange of gases, stomatal mechanism), Respiration (Glycolysis, Krebs cycle, electron transport system), Photosynthesis {Light and dark reaction - Calvin cycle), factors affecting photosynthesis - light, temperature and Carbon dioxide}, Growth (Plant hormones and growth regulation) and movements (Turgor and growth movements), Mineral nutrition (essential and non-essential elements) in plants.
- ***Applied Botany:*** Plant concept of Plant breeding - mutation, hybridization, polyploidy. Use of fertilizers and pesticides (advantages and hazards).
- ***Cell Biology:*** Introduction on Cell theory, Prokaryotic, Eukaryotic cell, Cell wall, cell membrane and cell organelles, Plastids, mitochondria, endoplasmic reticulam, golgi bodies, ribosome, lysosome, nucleus and chromosomes, Mitosis, Meiosis.
- ***Ecology:*** Concept of Organism and population, Ecological adaptation, Ecosystem: Components, types, energy flow, nutrient cycling.

ZOOLOGY

- ***Diversity of living organisms:*** Classification of animals, salient features of non-chordata up to phyla level, chordate to class level.
- ***Anatomy, histology and physiology (Earthworm, cockroach, Frog and Human):*** Integumentary system, digestive system, respiratory, circulatory, excretory, Muscular, nervous, endocrine and reproductive systems. Connective tissue, epithelial tissue, small intestine, Histology of stomach, bone, blood, lymph, liver, pancreas, lung, spleen, kidney, skin, testis and ovary.
- ***Developmental Biology:*** Basic features of vertebrate development, Gametogenesis, fertilization, cleavage, blastulation.
- ***Genetics:*** Mendel's laws of inheritance, Chromosome theory of inheritance, incomplete dominance, co-dominance, deviations from Mendelien ratios, multiple alleles, sex determination, linkage or crossing over, Mendelien disorder, chromosomal disorders, DNA and RNA replication, transcription genetic code, gene expression, regulation and human genome project, DNA finger print.
- ***Evolution of life:*** Morphological, embryological and paleontological evidences for evolution. Theories of evolution: Lamarck, Darwin and De Vries. Human evolution: Paleontological evidence, elementary knowledge on Dryopithecus, Australopithecus, Homo erectus, H.neanderthalensis, Cro-Magnon and Homo-sapiens.
- ***Applied Zoology:*** Major animal diseases caused by bacteria, viruses, protozoans and helminthus and their control. Domestication and introduction of animals: Liverstock, poultry, fisheries. Understanding human diseases: Body's defense mechanism (immunity).

ACCOUNTANCY

(Including Quantitative Aptitude)

- Basic Accounting theory
- Recording of transactions: Subsidiary books - Journal - Ledger
- Trial balance, rectification of errors
- Financial statements, trading and profit and loss account (with adjustments) and balance sheet
- Final accounts for non-trading concerns
- Bills of exchange
- Partnership accounting: Admission, retirement, death and dissolution
- Company accounts: Issue of shares, forfeiture, re-issue, issue and redemption of debentures, final accounts - classification of assets and liabilities of presenting balance sheet
- Depreciation Accounting: Straight line and Diminishing value methods; Provision for Depreciation
- Single entry: Statement of affairs and determination of profit.
- Quantitative Aptitude:
- Basic arithmetical operations - Basic properties of numbers - HCF & LCM Fractions - Decimals - Percentages - Ratio & proportions - Power & groups Simple Interest & Compound Interest - Mensuration - Problem solving in Algebra Elementary Geometry - Statistical tables & averages.

COMMERCE

- Business Organization and Principles of Management:
- Economic activities and business
- Formation of business units
- Corporate Organization – Types
- Stock exchange
- Transport and storage/warehousing
- Banking and financial institutions
- Evolution and growth of management
- Organization of modern business office
- Nature and purpose of business
- Structural aspects of business
- Business and sources of finance
- Trade: Internal and external
- Elements of insurance/types
- Nature and significance of management
- Planning, organizing, staffing, directing and controlling

ECONOMICS

- ***Basic concepts:*** What is an economic problem? - Meaning of economy Goods and Services - Economic systems (Capitalism, Socialism and Mixed Economy)- Economic Methods (deductive and inductive)- Micro and Macroeconomics.
- ***Consumption:*** Meaning of wants - Utility -Laws of demand - Elasticity of demand- Indifference Curve Analysis-Consumer equilibrium.
- ***Production:*** Supply- Law of variable proportions - Cost and Revenue concepts- Economies of scale (large scale and small-scale production)- Returns to Scale.
- ***Value and Exchange:*** Determination of price - Market price and normal price- Market structure-features - nature of demand curves- Perfect competition, Imperfect competition and Monopoly.
- ***Distribution:*** Factor Pricing-derived demand- The concepts of Rent, Wages, Interest and Profit.

- ***Macroeconomics:*** Aggregate demand– Aggregate supply- Effective demand- Equilibrium level of income - Propensity to consume- Propensity to save and invest - MEC – MEI- Multiplier-Accelerator (only concepts).
- ***Indian Economic Problems:*** Nature of Indian Economy- Basic structure - Poverty and unemployment in India - Problem of Population - Regional disparities - India's national Income-Inequality- Indian Planning – The effect of Economic Reforms.

STATISTICS

- ***Statistical data:*** Definition and scope of the Statistics - collection and organisation of data, frequency distributions - diagrams and graphical representation of data.
- ***Measures of Location:*** Arithmetic mean - Median, Quartiles, Deciles and Percentiles - Mode - Weighted arithmetic mean, Geometric mean and Harmonic mean - Simple problems.
- ***Measures of Dispersion:*** Range - Quartile deviation - Mean deviation - Variance and Standard - Coefficient of variation - simple problems.
- ***Correlation:*** Concept of bivariate distributions - Scatter diagram, Karl Pearson's co-efficient of correlation - Spearman's rank correlation (without ties) - Simple Problems.
- ***Data interpretation:*** Interpretation of quantitative variables from tables and from diagrams.
- ***Index Numbers:*** Meaning- types- Wholesale Price Index- Consumer Price Index- Inflation and Index Numbers- Uses of Index Numbers.

POLITICAL SCIENCE

- ***Political Science*** - meaning, nature and scope
- ***Citizen*** - State and Society; Citizenship - Rights and duties of citizens (a brief study of the fundamental rights and fundamental duties of Indian citizens).
- ***State and Government:*** Nature and definition of State; Elements of state; State and Society; State and Associations.
- ***Nation and Nationality:*** Meaning of the terms Nation and Nationality, Elements of Nationality; Nationalism - meaning, importance, merits and demerits.
- ***Sovereignty*** - meaning, characteristics and kinds of sovereignty, legal, political and popular sovereignty.
- ***Law, Liberty and equality:*** Meaning of the terms Law and Liberty, Law and morality. Liberty and Law, Sources of Law, Kinds of Law; Definition of the term Liberty, Kinds of liberty; Equality -
- Definition of the term, kinds - liberty and equality.
- ***Forms of Government:*** Unitary and Federal - meaning, merits and demerits, Parliamentary and Presidential - explanation - merits and demerits of both systems.
- ***Spheres of State activity:*** Individualism, Socialism, Communism, Capitalism and Dictatorship, Gandhiism and Sarvodaya.
- ***Constitution:*** Classification - Written and Unwritten; Rigid and Flexible - meaning - merits and demerits.
- ***Indian Constitution:*** Salient Features - Indian National Movement: Main events 1857, 1919, 1935, 1942 and 1945.
- ***Legislature:*** Organization, powers and functions of the legislature; A brief study of the organization, functions and working of Indian Parliament.
- ***Executive in India:*** President - election, powers and functions; Vice-President, Prime Minister and the Council of Ministers; Governor - appointment - powers and functions, Chief Minister and the Council of Ministers.
- ***Judiciary:*** Role and importance, Independence of Judiciary, Supreme Court and the High Courts in India.
- ***Civil Services:*** Nature - importance and functions of Civil Services; Bureaucracy, U.P.S.C., Organization and functions.
- ***Electorate:*** Types of franchise, Merits and Demerits, Direct Democratic Devices.
- ***Party system:*** Political parties, their role and functions, Role of opposition in democracy.
- ***Public Opinion:*** Meaning - Agencies of public opinion, role and importance of Public Opinion.
- ***Local Self Government:*** Panchayat Raj, Municipal Govt., planning - importance - socio economic development - rural and urban development; development of scheduled castes and tribes.
- ***Factors conditioning Indian Democracy:*** Inequality - social and economic; Regional imbalance, communalism and casteism, Regionalism and Linguism.
- ***Internationalism:*** Meaning and importance - United Nations - Aims - Objectives, Organs and functions.
- ***Advanced English:*** Tenses, phrasal verbs, idiomatic expressions, jumbled narratives, guided composition, literature-based comprehension passage with subjective sentence-long responses

HISTORY

ANCIENT INDIA

- ***Introduction:*** Pre-history – The Stone Age: Paleolithic and Neolithic cultures
- ***The Harappan Culture:*** Origin, extent and date, Important cities: Harappa; Mohenjodaro; Kalibangan; Lothal and Dholavira; Trade, commerce, seals and script; Religion
- ***The Vedic Period:*** Rigveda, its date and geographical knowledge; Socio, Economic, Religious and Political conditions; Later Vedas, their date and geographical knowledge; Epics: Ramayana and Mahabharata, their contents.
- ***Jainism and Buddhism:*** Jainism - Mahavira and his teachings; Buddhism - Buddha and his teachings.
- ***The Mauryan Age:*** Chandragupta Maurya and his achievements; Ashoka and his achievements; Asoka and Buddhism; Mauryan administration; Fall of the Mauryas.
- ***Satavahanas:*** Early history; Gautamiputra Satakarni; Later Satavahanas and their decline.
- ***Kushans:*** Kanishka and his achievements; Decline of Kushans.
- ***Age of the Guptas:*** Samudragupta; Chandragupta II; Science and technology; Art, architecture and painting; Golden age of the Guptas.
- ***Chalukyas of Badami:*** Early history; Pulakesi II.
- ***Rashtrakutas:*** Early history; Dhruva; Amoghavarsha Nrupatunga.
- **Pallavas:** Mahendravarman I; Narasimhavarman I; Contribution to literature, art and architecture.
- ***Cholas:*** Rajaraja Chola I; Rajendra Chola1; Chola art and architecture.

MEDIEVAL INDIA

- ***Harshavardhana and his times:*** Carrier and achievements of Harshavardhana; Religion with special reference to Buddhism.
- ***Arabs in India:*** Arab conquest of Sindh; Mohammed of Ghazni, and nature of his invasions; Mohammed of Ghor, his conflicts with Prithviraj Chauhan.
- ***The Vijayanagar Empire:*** Origin and founders of Vijayanagara kingdom; Sri Krishnadevaraya, and his patronage to art, literature, religion and philosophy; the battle of Tallikota.
- ***Sher Shah:*** Early life and his rise to power; Wars with Mughals; Administrative reforms.
- ***Mughals:*** Akbar's accession and political achievements; His religious policy and Din – e – Illahi; Aurangzeb and fall of the Mughal Empire; Mughal contribution to Art, Architecture and Literature.
- ***Rise of the Marathas:*** Shivaji's political achievements; Shivaji's administration;
- ***Peshwas:*** Balaji Viswanath; Baji Rao; Balaji Baji Rao.

MODERN INDIA

- ***Advent of Europeans in India:*** Portuguese in India; Dutch and their decline; English and the formation of the East India

Company; French settlements in India.
- ***The Revolt of 1857:*** Causes and nature of revolt; Course of the revolt and results; Causes for the failure.
- ***Rise of the British power in India:*** Battles of Plassey and Buxar; Three Carnatic wars and the success of the English.
- ***Nationalism Movement in India:*** Genesis of Indian National Congress; Moderates and Extremists; Surat Split; Rise of Extremism; Home Rule Movement; Revolutionary and Terrorist movement; Jallianwala Bagh Tragedy of 1919; Non-Cooperation Movement; Civil Disobedience Movement; Quit India Movement; Indian Independence.

B.B.A.

Numerical skills and Reasoning skills
- Basic arithmetical operations
- Basic properties of numbers
- HCF & LCM
- Fractions
- Decimals
- Percentages
- Ratio & proportions
- Power & groups
- Simple Interest & Compound Interest
- Mensuration - Problem solving in Algebra
- Elementary Geometry
- Statistical tables & averages and logical reasoning.

B.SC. (HONS.) IN COMPUTER SCIENCE

MATHEMATICS

Part A: Algebra, Vectors, Linear Programming
- Real Numbers, Complex Numbers
- Polynomials, Linear Equations in one and two variables, Quadratic Equations in one variable, Permutations and Combinations, Binomial Theorem, Arithmetic Progression, Geometric Progression, Standard Progressions and Series
- Types of Vectors, Vector addition, Scalar multiplication, Scalar and Vector products of 2, 3 and 4 vectors
- Linear Inequalities, Linear Programming – Graphical Method

Part B: Mensuration, Geometry, Analytical Geometry
- Areas, Surface Areas and Volumes of standard plane and solid regions
- Euclid's Axioms and Postulates, Lines, Angles, Triangles, Congruent Triangles, Quadrilaterals, Area, Circles, Similar Triangles
- Cartesian coordinate system for a plane, Distance formula, Section formula, Area of Triangle, Equations of a straight line, Equations of a plane, Conic Sections
- Cartesian coordinate system for space, Direction Cosines, Direction Ratios, Lines and Planes in Space

Part C: Trigonometry, Calculus and Differential Equations
- Trigonometric Ratios, Identities, Trigonometric Functions of sum and difference of Angles, Trigonometric Equations
- Sets, Relations, Functions, Simple problems on Limits, Continuity, Derivatives of First and Higher Order, Rules of Differentiation, Bernoulli Rule, Partial Derivatives of First order
- Indefinite Integral, Definite Integral, Rules
- of Integration, Applications of Integrals
- › Ordinary Differential Equations, General and Particular Solutions, First Order Differential Equations – Classification and Solution, Second Order Homogeneous Differential Equations

Part D: Statistics and Probability
- Introduction to Statistics, Data Collection & presentation, Mean, Median, & Mode, Cumulative Frequency Distribution, Measures of Dispersion, Range, Mean Deviation, Standard Deviation,
- Sets and Relations, Empirical Probability,
- Theoretical Approach Random Experiments, Events, Axiomatic Approach to Probability, Conditional Probability, Independent Events, Bayes's Theorem, Random Variable & its distribution, Bernoulli's trials, Binomial Distribution.

QUANTITATIVE APTITUDE
- This test is with a view to test the candidate's ability in comprehending and analyzing quantitative data) Basic arithmetical operations - Basic properties of numbers - HCF & LCM - Fractions - Decimals - Percentages - Ratio & proportions - Power & groups - Simple Interest & Compound Interest - Mensuration - Problem solving in Algebra - Elementary Geometry - Statistical tables & averages.

LOGICAL REASONING
- This test is with a view to ascertain the candidate's ability to apply logic, rationale and constraint-based deduction skills. This will be tested with questions which involve pictorial representations and hypothetical situations of real-life scenarios which call for application of logic and reason to find feasible solutions

BACHELOR OF PERFORMING ARTS (MUSIC)

- Candidates will be selected for admission on the basis of their performance in the Admissions Test in:

  General English (see Page 30) and Aptitude test in Music in the major/ elective subjects chosen for study

DIPLOMA IN MUSIC

- Candidates will be selected for admission on the basis of their performance in the Admissions Test in:

  General English (X Std. Level) and Aptitude test in Music in the main / ancillary subjects chosen for study

POSTGRADUATE PROGRAMMES

M.A. in English Language and Literature

Duration: ***2 Years*** | For ***Women*** Candidates only

The M.A. in English Language and Literature is designed to inspire students to appreciate first-hand, the varieties and shades of language and style and various kinds and trends of imaginative writing in Modern English Literature (1500 to the present day). Over the course of the programme, students will learn how to train their critical taste and judgment in such a way that they are able to respond sympathetically and imaginatively to diverse literary trends and movements. Concurrently, their ability to arrive at an impersonal and dispassionate evaluation of a given work of art and/or a given writer will be honed. They will gain the skills necessary to be aware of problems, limitations and strengths implicit in the appreciation of English language and literature, and learn how to write effectively and cogently while expressing themselves either in critical or in creative writing.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before the date of Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered
- Age: Preferably below 23 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

British Literature I: 1340-1660
British Literature II: 1660-1798
Indian Writing in English
Structure of Modern English: Grammar

Semester 2

British Literature III: 1798-1900
British Literature IV: 1900 to the Present
Literary Theory
Structure of Modern English: Linguistics

YEAR 2

Semester 3

American Literature
Eco-critical Studies
Dissertation: Research Methodology & Interim Review (***non-credit & optional)***

Electives

Popular Culture Studies
Life Writing Studies
Teaching of English as a Second Language
Writing for the Media

Semester 4

New Literatures
Women's Writing

ELECTIVES

Comparative Literature
Translation Studies
European Classics in Translation
Dissertation

M.A. in Economics

Duration: **2 Years** | For ***Men*** Candidates only

The programme is designed to equip students with potential to serve in positions of responsibility with the government, the corporate sector, universities and research institutions. The set of courses offered fall into core courses and electives. The core courses are intended to provide well-balanced training in economic theory, contemporary economic problems and quantitative methodology so as to build the essential tools for economic analysis of problems arising in a variety of contexts. The elective courses from the economics stream deal with application of economic theory and econometrics to address practical issues in a range of fields like demography, labour, industry, agriculture, development, education and health economics. The elective courses from financial economics deal with the allocation and deployment of economic resources, both spatially and across time, in an uncertain environment. In both streams, the electives enable the students to acquire more advanced training in branches of their choice.

- Students have an option to ***specialize in Applied Economics or Financial Economics***

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before the date of Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Age: Preferably below 23 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Microeconomic Theory, Macroeconomic Theory, Quantitative Methods for Economics, Agricultural and Industrial Economy of India, Financial Markets and Institutions, Computer Applications In Economic Analysis I (Practical)

Semester 2

Public Economics, Ethics, Economy and Society, Econometrics, Elective I, Elective II, Computer Applications in Economic Analysis II (Practical), Year End Viva voce

YEAR 2

Semester 3

Monetary Theory and Policy, Time Series Modelling, Economics of Growth and Development, Elective III, Elective IV, Computer Applications in Economic Analysis III (Practical), Dissertation Review

Semester 4

Indian Economy: Contemporary Issues and Policies, History of Modern Economic Analysis, Elective V, Elective VI, Computer Applications in Economic Analysis IV (Practical), Dissertation

ELECTIVES

Applied Economics (Series AE)
Advanced Macroeconomics, Agricultural Economics, Applied Econometrics, Behavioural Economics and Finance, Demography, Economic Institutions, Systems and Theories, Economics of Education and Health, Economics of Infrastructure, Economics of Insurance, Energy and Resource Economics, Environmental Economics, Forecasting Methods for Economics and Finance, Industrial Economics, International Economics and Finance, International Trade, Labour Economics, Open Economy Macroeconomics, Underwriting and Actuarial Applications

Financial Economics (Series FE)
Behavioural Economics and Finance, Computational Finance, Corporate Finance, Data Analytics, Developmental Finance, Economics of Insurance, Emerging Market Economies, Financial Derivatives, Financial Econometrics, Financial Economics, Financial Risk Management, Financial Services, Forecasting Methods for Economics and Finance, International Economics and Finance, International Finance, Rural Finance, Security Analysis and Portfolio Management, Underwriting and Actuarial Applications

M.Sc. in Mathematics

Duration: ***2 Years*** | For ***Women*** & ***Men*** Candidates

The M.Sc. in Mathematics Programme provides a broad-based knowledge of mathematics to students through core courses that cover the areas of Analysis, Algebra, Geometry, Differential Equations, Probability & Statistics, Operations Research, etc. The syllabus also provides one software laboratory course in each of the four semesters, which will enable hands-on experience with various programming languages, software packages and in working in different platforms. In order to develop a deep understanding and skill in chosen areas, the programme provides different streams of electives.

- Students have an option to ***specialize in Computer Science or Actuarial Science***

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Only candidates with a B.Sc. in Mathematics or other B.Sc. programmes (M/P/C or M/E/S or M/P/CS) with a major/ specialization in Mathematics are eligible to apply
- Familiarity with the following is mandatory for admissions:
  Mathematics: Calculus, Differential Equations, Probability Theory, Real Analysis, Group Theory, Ring Theory, Linear Algebra, Complex Analysis, Discrete Mathematics, and Numerical Analysis
  Computer Science: C Language Programming
- Age: Preferably below 23 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Advanced Real Analysis, Advanced Linear Algebra, Commutative Algebra, Number Theory

Semester 2

Functional Analysis, Probability & Statistics, Measure Theory, Theory of Ordinary Differential Equations

YEAR 2

Semester 3

Differential Geometry, Optimization Techniques, Theory of Partial Differential Equations

Semester 4

Mathematical Modeling, Elective II, Elective III, Elective IV, Dissertation, Comprehensive Viva voce

SPECIALIZATION

The Department offers specialization in ***Computer Science*** or ***Actuarial Science***.

Students who opt for this are required to take the ***four Stream Core subjects*** listed below for each specialization:

Computer Science

Stream Core 1: Computer Organization and Design
Stream Core 2: Computer Networks
Stream Core 3: Systems Programming
Stream Core 4: Database Systems

Actuarial Science

Stream Core 1: Actuarial Mathematics
Stream Core 2: Applied Statistical Methods
Stream Core 3: Actuarial Models
Stream Core 4: Financial Economics

LAB COURSES

C++ Programming, Advanced C++ Programming, Programming in Python, Numerical Methods and Simulation Lab, Introduction to SageMath Programming, Symbolic Computing in SageMath, Introduction to MATLAB Programming, Advanced MATLAB Programming, Introduction to OCTAVE Programming, Advanced OCTAVE Programming, Data Analysis and Visualization using Python Mathematical Methods in Data Mining using Python, SQL Programming, Core Java Programming, Operating Systems Lab, Actuarial Mathematics using R, Actuarial Mathematics using SAS

ELECTIVES

STREAM I: Algebra, Geometry & Number Theory
Algebraic Topology, Algebraic Geometry, Symplectic Geometry, Foundations on Algebraic Number Theory, Analytic Number Theory, Riemannian Manifolds, Differentiable Manifolds

STREAM II: Analysis and Applications
Sobolev Spaces and Sobolev Functions, Distribution Theory, Advanced Complex Analysis, Functional Analytic Methods for Partial Differential Equations, Spectral Theory of Linear Operators, Harmonic Analysis

STREAM III: Differential Equations and Dynamical Systems
Dynamical Systems, Time scale, Integral Equations, Control Theory, Numerical Solutions of Partial Differential Equations

STREAM IV: Applied Mathematics:
Calculus of Variations, Finite Element Methods, Wavelet Analysis, Mathematical Ecology, Mathematical Methods in Image Processing, Numerical Methods in Image Processing, Integral Transforms, Techniques in Applied Mathematics, Convex Optimization, Game Theory, Computational Statistics

STREAM V: Computer Science
Artificial Intelligence, Computer Graphics, Formal Languages and Automata, Pattern Recognition, Introduction to Cryptography, Neural Networks, Mathematical Methods for Data Mining, Design of Algorithm, Operating System

STREAM VI: Actuarial Science
General Insurance, Life and Health Contingencies, Actuarial Risk Management (Foundation), Actuarial Risk Management (Advanced), Enterprise Risk Management

M.Sc. in Physics

Duration: ***2 Years*** | For ***Men*** Candidates only

The Masters Programme in Physics is designed to equip the students with strong fundamentals of physics. Students get adequate exposure to theory and experimental methodology of Modern Physics along with requisite computational techniques. A project work is designed to cater to the research potential of the students wherein they are exposed to gain experience in handling sophisticated equipment and are exposed to advanced concepts in Physics.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Candidates with a ***B.Sc. (Hons.):*** Physics as a main subject along with Mathematics and either Chemistry, Statistics, Electronics or Computer Science as additional subjects are eligible to apply
- Candidates with a ***B.Sc. without Honours:*** 3-subject combination with Physics, Mathematics and either Chemistry,
- Statistics, Electronics or Computer Science are eligible to apply
- Age: Preferably below 23 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Classical Mechanics
Classical Electrodynamics
Quantum Mechanics I
Mathematical Physics
Experimental Methods in Physics I
Electronics and Microcontroller Lab
Semester End Viva voce
Solid State Physics I

Semester 2

Nuclear and Particle Physics
Modern Optics
Quantum Mechanics II
Statistical Mechanics
Experimental Methods in Physics II
Software Lab
Semester End Viva Voce
Solid State Physics II
Mathematical Physics II

YEAR 2

Semester 3

Advanced Spectroscopy
Statistical Mechanics
Elective I
Semiconductor Device Physics
Advanced Physics Lab
Project work
Semester End Viva Voce

Semester 4

Elective II, Elective III, Elective IV, Project Work

ELECTIVES

Principles of Laser Physics
Semiconductor Device Physics
Concepts in Materials Science
Nuclear Spectroscopy
Fiber Optics
Functional Ceramics and Devices
Nuclear Reactions
Photovoltaics for Energy Conversion
Ultrafast Nonlinear Optics
Accelerators, Reactors & Detectors
Biomaterials
Molecular Simulations
Microelectronics
Fundamentals of Nanoelectronics
Nanoscale Physics
Foundations of Quantum Optics
Quantum computing
Femtosecond Laser Material processing
Material Characterization Techniques
Materials for Photonics
Introduction to Microfluidics : Devices and Applications
Computational Material Science
Superconductivity
Graphene and 2-Dimensional Materials

M.Sc. in Chemistry

Duration: ***2 Years*** | For ***Men*** Candidates only

"The Masters Programme in Chemistry covers all aspects of the different branches of chemistry and lays emphasis on detailed understanding of the fundamental principles and on training in appropriate computational and experimental methods. This rigorous training in all the major branches of chemistry - theoretical, applied, instrumental, computational and experimental – sets the stage for electives in interdisciplinary areas as well as for an introduction to advanced emerging fields of research in the last two semesters. A project work is designed to cater to the research potential of the students wherein they are exposed to gain experience in handling sophisticated equipment (UV-Vis, Fluorescence, IC, HPLC, FTIR, GC-MS/LC-MS QQQ and QToF, MP AES, SEM, TEM) and advanced concepts in Chemistry. Seminars, colloquia and lab meetings require students to make presentations on their progress to the faculty members and research scholars of the department thereby honing their communication skills and building confidence."

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Candidates with a B.Sc. (Hons.): Chemistry as a main subject along with Mathematics and either Physics, Biology, Bio-technology, Statistics, Electronics or Computer Science as additional subjects are eligible to apply.
  (or)
  Candidates with a B.Sc. without Honours: 3-subject combination with Chemistry, Mathematics and either Physics, Statistics, Biology, Bio-technology, Electronics or Computer Science are eligible to apply.
- Age: Preferably below 23 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Quantum Chemistry and Group Theory, Mathematics for Chemistry, Analytical Chemistry, Coordination Chemistry, Advanced aspects of Organic structure and Stereochemistry, Coordination Chemistry - Preparation & Analysis (Practical), Analytical Chemistry - Conductometry, Potentiometry, Voltammetry (Practical), Organic Qualitative Analysis - Mixture Analysis & Drug Analysis (Practical)

Semester 2

Structural Inorganic and Bio-Inorganic Chemistry, Chemical Kinetics and Surface Chemistry, Thermodynamics and

Electrochemistry, Physical and Mechanistic aspects of Organic Chemistry, Inorganic Chemistry (Practical), Chemical Kinetics and Electrochemistry (Practical), Organic Synthesis (multistep) and Spectral Analysis (Practical)

YEAR 2

Semester 3

Organometallic Chemistry, Polymer Chemistry , Elective I, Elective II (Interdepartmental Electives),

Computational applications in Chemistry I (Practical), Project work (Interim Review)

Semester 4

Solid State Chemistry and Nano Materials, Supramolecular Chemistry, Medicinal Chemistry, Elective III (Interdepartmental Electives), Elective IV (Interdepartmental Electives), Computational applications in Chemistry II (Practical), Project work

ELECTIVES

*Students choose **one paper** from each elective*

Semester 3

Elective I
Synthetic Organic Chemistry ***or*** ***Nanoscience and Nanotechnology***

Elective II (Interdepartmental)
Theory and Application of Physical Methods in Chemistry ***or*** Materials and their characterization or Biomaterials

Semester 4

Elective III (Interdepartmental)
Environmental Chemistry ***or*** Environmental Biotechnology ***or*** Advanced aspects of applications of group theory in Chemistry

Elective IV (Interdepartmental)
Biocatalysis for Industry and Environment ***or*** Organic chemistry of natural products ***or*** Graphene and 2-dimensional materials

M.Sc. in Biosciences

Duration: ***2 Years*** | For ***Women*** and **Men** Candidates

The curriculum of M.Sc. in Biosciences is designed to provide an in-depth understanding of the major sub-disciplines of life sciences such as Molecular biology, Molecular cell biology, Biochemistry, Developmental biology, Immunology, Instrumentation for biological applications and Genetic Engineering. Strengthening the foundations in these aspects sets the stage for elective courses offered in advanced topics in the domains of Biotechnology. Laboratories with state-of-the-art equipment provide students with hands-on training in Animal and Plant Cell Culture, Microbiology, Molecular biology, Biochemistry and Bioinformatics. A dissertation project spanning the final two semesters of the programme equips students with essential laboratory techniques and trains them to design and conduct in vitro and in silico studies in topics aligned to the thrust areas of the Department of Biosciences. Weekly colloquia and lab meetings require students to make presentations on their progress to the faculty members and research scholars of the department thereby honing their communication skills and building confidence.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Only candidates with a B.Sc. or B.Sc.(Hons) in Biosciences, Botany or Zoology are eligible to apply
- Age: Preferably below 23 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Molecular Cell Biology, Molecular Biology, Instrumentation for Biological Applications, Immunology, Practical 1, Practical 2, Practical 3, Practical 4

Semester 2

Molecular Developmental Biology, Genetic Engineering, Biochemistry of Macromolecules, Bioinformatics, Practical 5, Practical 6, Practical 7, Practical 8

YEAR 2

Semester 3

Intermediary Metabolism, Plant Systematics and Conservation, Two electives, Practical 9, *Project Work (Review)

Semester 4

Molecular Evolution and Human Genetics, Cytogenetics and Plant Breeding, Two electives, Practical 10, *Project Work (in lieu of the two Practicals)

**Project Work is in lieu of Practicals 9 and 10 and is spread over semesters 3 and 4.*

ELECTIVES

Mycology, Pathology and Fungal Biotechnology, Plant Biotechnology, Microbial Biotechnology, Environmental Biotechnology, Biotechnology of Secondary Metabolites, Biomolecular Structure and Function

M.Sc. in Food and Nutritional Sciences

Duration: ***2 Years*** | For ***Women*** Candidates only

The M.Sc. in Food and Nutritional Sciences programme covers the major disciplines of Food Sciences and Nutritional Sciences that will professionally equip students to practice in industry with high levels of skill in these areas. The comprehensive curriculum includes fundamental courses in Food and Nutrition, Biochemistry, Research Methodology and Food Microbiology.

Advanced and specialized courses in Food Sciences cover aspects of Food Product Development, Food Quality and Safety, Food Chemistry and Entrepreneurship. Specific courses in Nutritional Sciences focus on Dietetics, emerging area of Functional Foods, Molecular Nutrition, Ayurvedic Nutrition, Nutritional Counseling and Public Health Nutrition. These courses along with project work in two areas of specialization (Applied Nutrition and Food Technology) are designed to help the students to pursue research and career in various Health Care Institutions, Food Industries, National & International organisations and NGOs with particular emphasis on community service. Weekly department colloquium are held for updating subject knowledge and upgrading technical competency.

- Students have an option to ***specialize in Applied Nutrition or Food Technology***

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Only candidates with a B.Sc. in Home Science/ **Food and Nutritional Sciences/Food Technology/Nutrition and Dietetics and other similar degrees** or Biosciences, or Mathematics / Physics / Chemistry are eligible to apply
- Age: Preferably below 23 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Concepts in Food Science, Nutrition and Technology, Bio-macromolecules and Intermediary Metabolism, Research Methodology and Applied Statistics, Food Microbiology and Safety, Food Microbiology and Safety (Practical 1), Food Analysis (Practical 2), Computer Applications in Research (Practical 3)

Semester 2

Analytical Techniques, Chemistry of Food Components, Nutrition Through Life Cycle, Food Product Development and Evaluation, Chemistry of Food Components (Practical 4), Nutrition through Life Cycle & Food Product Development and Evaluation (Practical 5)

YEAR 2

Semester 3

Food Quality Control & Assurance, Advanced Human Nutrition, Postharvest Technology of Fruits and Vegetables, Therapeutic Nutrition and Dietetics, Advances in Food Processing and Packaging Technologies, One Elective, Advanced Human Nutrition (Practical 6), Postharvest Technology of Fruits and Vegetables (Practical 7), Dietetics and Clinical Nutrition (Practical 8), Advances in Food Processing and Packaging Technologies (Practical 9), Experimental Methods (Practical 10), Project Work (review)

Semester 4

Indian Traditional Foods and Ayurvedic Nutrition, Dairy Technology, Public Nutrition and Epidemiology, Food Grain and Oilseed Technology, One Elective, Public Nutrition and Epidemiology (Practical), Dairy Technology and Food Grain and Oilseed Technology (Practical), Special Research Techniques (Practical), Project Work, Comprehensive Viva voce

ELECTIVES

Elective A: Applied Nutrition

Functional Foods and Molecular Nutrition, Food Fortification and Fermentation, Nutritional Counselling and Support Systems, Pediatric and Geriatric Nutrition, Health Promotion Through Nutrition , Communication, Sports Nutrition, Advances in Women Nutrition

Elective B: Food Technology

Functional Foods and Molecular Nutrition, Food Fortification and Fermentation, Physical Properties of Foods, Unit Operations in Food Processing , Baking Technology, Technology for Plantation, Crops and Spices Entrepreneurship and Marketing

POSTGRADUATE TEST SYLLABUS

- There will be negative marking for all multiple-choice questions.
- The General English / Verbal Skills test is compulsory for all postgraduate programmes
- Model Test Papers are available on the website - sssihl.edu.in

GENERAL ENGLISH

- Objective-type questions on basic grammar (tenses, prepositions, vocabulary, error-identification etc.)
- Summary/ precis writing/ paraphrase
- Reporting an event/ Channel conversion

M.A. IN ENGLISH LANGUAGE & LITERATURE

WEIGHTAGE
- Written Test: 70%
- Interview: 30%

QUESTION PAPER FORMAT
- Five short notes (based on literary/ linguistic terms, genres, movements etc.) Long essay with choices
- Comprehension of prose and poetry passages from literature
- Objective-type questions (based on English language & literature)

PRESCRIBED TEXTS
- A short history of English Literature by Ifor Evans
- A background to the study of English Literature - for Indian students by B. Prasad, Macmillan.

M.A. IN ECONOMICS

WEIGHTAGE
- Written Test: 50%
- Technical Interview: 20% (subject to passing the written test)
- Final Interview: 30%

QUESTION PAPER FORMAT

The question paper is of two hours in duration / 75 marks. It is divided into three sections:

Section A: Objective type questions
Section B: Short answer questions
Section C: One essay type question

TOPICS

Economic Theory
- Consumer behaviour: preference ordering, utility, budget sets and demand functions; Theory of the firm; Costs, supply and factor demand; Market structure: pricing and production under perfect and imperfect competition, General equilibrium and welfare; Taxation; Elements of national income accounting; Level of economic activity under classical assumptions; Keysian theory of effective demand and employment; Monetary and fiscal policies; International trade.

Quantitative Methods
- Functions of one variable; Linear and quadratic equations; Derivatives and rules of differentiation; Measures of central tendency and dispersion; Correlation and regression with two variables; Index numbers; Elements of probability theory; Random variables and common distributions.

Indian Economy and Development
- Basic issues and indicators of economic development; Economic growth; Aspects of development policy: Population growth and employment; Strategies and theories of development; Human values and economic development; Structure of the Indian economy; Human resource development; Persistence of poverty and inequality; New economic policy regime; Indian ethos and policies for all round development; Aspects of the International Economy

M.SC. IN MATHEMATICS

WEIGHTAGE
- Written Test: 50%
- Technical Interview: 20% (subject to passing the written test)
- Final Interview: 30%

QUESTION PAPER FORMAT

The question paper is of two hours in duration / 75 marks. It is divided into three sections:

Section A: 40 multiple choice questions (40 marks)
Section B: Problem-solving type questions - 5 marks each - internal choice (25 marks)
Section C: Short C-Programming Test (10 marks)

Viva voce: Those who pass the English and Written Tests will undergo a technical Viva voce (25 marks) followed by an interview.

TOPICS

MATHEMATICS
- Calculus, Differential Equations, Probability Theory, Real Analysis, Group Theory, Ring Theory, Linear Algebra, Complex Analysis, Discrete Mathematics, and Numerical Analysis. The detailed syllabus is as follows:

- Calculus: Higher Order Partial Derivatives, Differentiability, Gradient, the Chain Rule, Directional Derivative, Total Differential and Approximation, Constrained Extrema and Lagrange Multipliers, Double and Triple Integration.

Differential Equations
- Classification of Ordinary and Partial Differential Equations, Types of Solutions, Existence and Uniqueness of Solution for an Initial Value Problem, Bernoulli Equation, Exact Differential Equations and Integrating Factors, Cauchy-Euler Equation, Method of Variation of Parameters, Method of Undetermined Coefficients, Wronskian, Method of Separation of Variables for solving Boundary Value Problems

Probability Theory
- Conditional Probability-Bayes's Formula, Independent Events, Discrete and Continuous Random variables, Expected Value, Variance, Covariance, Variance of sums and Correlations, Moment generating functions.

Real Analysis
- Logic, Sets and Relations, Functions, Cardinality, Natural Number and Induction, Ordered Field, Completeness Axiom, Topology of the Reals and Compactness, Convergence, Sequences and Series, Convergence Tests, ε-δ definition, Limit theorems, Continuous Function and Uniform continuity, Intermediate Value Theorem, Mean Value Theorem, L'Hospital's rule, Point-wise and Uniform Convergence, Taylor's Theorem, Riemann Integration, Radius and Interval of Convergence for Power Series.

Group Theory
- Groups, Subgroups, Cyclic Groups, Normal and Quotient Subgroups, Permutation Groups, Homomorphism, Automorphism, Cayle's and Sylow's Theorem.

Ring Theory
- Rings, Integral Domain, Division Rings, Ideals, Quotient Rings, Euclidean Rings, Polynomial Rings, Field of Quotients, Polynomials over Rational Fields.

Linear Algebra:
- Vector Spaces,Linear Independence and Dependence,Bases and Dimension, Linear Transformations, Systems of Linear Equations, Eigenvalue and Eigenvector Theory.

Complex Analysis
- Algebra of Complex Numbers, Analyticity - Harmonic Functions, Elementary Functions, Cauchy Integral Formula, Convergence of Sequence and Series, Taylor Series - Laurent Series, Types of Isolated Singularities, Residue Theorems.

Discrete Mathematics
- Logic, Counting, Graphs and Trees.

Numerical Analysis
- Bisection Method, Newton Method, Secant Method, Polynomial Interpolation, Simpson Rule, Trapezoidal Rule, LU Factorization, Residual Correction Method, Method of Least Squares, Power Method, Taylor's Method, Euler's Method, Runge-Kutta Method.

COMPUTER SCIENCE

C Language Programming
- A minimal exposure to programming is expected from the students. Nevertheless, those qualified for the M.Sc. (Mathematics) programme and desirous of opting for computer science specialization will be tested in fundamentals of Computer Science and Programming once they are enrolled for the course.

M.SC. IN PHYSICS

WEIGHTAGE
- Written Test: 50%
- Technical Interview: 20% (subject to passing the written test)
- Final Interview: 30%

QUESTION PAPER FORMAT

The question paper consists of 75 multiple choice questions and is of two hours duration / 75 marks

Section A: Mathematics, Electronics, Chemistry & Computer Science (25 marks)
Section B: Physics (50 marks)

SECTION A

Mathematics
- Calculus of single and multiple variables, partial derivatives, Matrices and determinants, Algebra of complex numbers; Taylor expansion, Fourier series; Vector algebra, Vector Calculus, Multiple integrals, Divergence theorem, Green's theorem, Stokes' theorem. First order equations and linear second order differential equations with constant coefficients.

Integral Calculus
- Integration as the inverse process of differentiation, definite integrals and their properties, Fundamental theorem of integral calculus. Double and triple integrals, change of order of integration. Calculating surface areas and volumes using double integrals and applications. Calculating volumes using triple integrals and applications. Vector Calculus: Scalar and vector fields, gradient, divergence, curl and Laplacian. Scalar line integrals and vector line integrals, scalar surface integrals and vector surface integrals, Green's, Stokes and Gauss theorems and their applications.

Linear Algebra
- Vector spaces, Linear dependence of vectors, basis, dimension, linear transformations, matrix representation with respect to an ordered basis, Range space and null space, rank- nullity theorem; Rank and inverse of a matrix, determinant, solutions of systems of linear equations, consistency conditions. Eigenvalues and eigenvectors. Cayley-Hamilton theorem. Symmetric, skewsymmetric, hermitian, skew-hermitian, orthogonal and unitary matrices.

Probability
- Basic concepts of probability theory. Binomial, Poisson & Normal distributions.

Numerical Analysis
- Solution of non-linear equations using iterative methods. Interpolation Lagrange's formula and Newton's formula for equidistant points). Numerical differentiation and integration Trapezoidal and Simpson's rules.

Electronics
- Boolean algebra: Binary number systems; conversion from one system to another system; binary addition and subtraction. Logic Gates AND, OR, NOT, NAND, NOR exclusive OR; Truth tables; combination of gates; de Morgan's theorem; Zener diode and its applications, BJT: characteristics in CB, CE, CC modes. Single stage amplifier, two stage R-C coupled amplifiers. Simple Oscillators: OP AMP and applications: Inverting and non-inverting amplifier. 8085 or 8086 Microprocessor architecture and knowledge of assembly language programming.

Chemistry
- Periodic Table: Periodic classification of elements and periodicity in properties; general methods of isolation and purification of elements. Chemical Bonding and Shapes of Compounds: Types of bonding-Ionic and covalent bonding, M.O. and V.B. approaches for diatomic molecules, VSEPR theory and shape of molecules, hybridisation; Chemical Thermodynamics: Reversible and irreversible processes; First law and its application to ideal and nonideal gases; Thermochemistry; Second law; Entropy and free energy, Criteria for spontaneity. Chemical and Phase Equilibria: Law of mass action; Kp, Kc, Kx and Kn; Effect of temperature on K; Ionic equilibria in solutions; pH and buffer solutions; Chemical Kinetics- Reactions of various order; Basis of Organic Reactions Mechanism: Elementary treatment of SN1, SN2, E1 and E2 reactions; Acids and Bases: Arrhenius, Lowry -Bronsted concepts of acids and bases - Strengths of acids and bases.

Computer Science
- Basic knowledge of computer systems, software and programming; Number systems. Basic electronic gates. Algorithmic approach to solve problems. Fundamentals of C language.

SECTION B (PHYSICS)

Mechanics and General Properties of Matter
- Newton's laws of motion and applications, Velocity and acceleration in Cartesian, polar and cylindrical coordinate systems, uniformly rotating frame, centrifugal and Coriolis forces, Motion under a central force, Kepler's laws, Gravitational Law and field, Conservative and non-conservative forces. System of particles, Centre of mass, equation of motion of the CM, conservation of linear and angular momentum, conservation of energy, variable mass systems. Elastic and inelastic collisions. Rigid body motion, fixed axis rotations, rotation and translation, moments of Inertia and products of Inertia, parallel and perpendicular axes theorem. Principal moments and axes. Kinematics of moving fluids, equation of continuity, Euler's equation, Bernoulli's theorem.

Oscillations, Waves and Optics
- Differential equation for simple harmonic oscillator and its general solution. Superposition of two or more simple harmonic oscillators. Damped and forced oscillators, resonance. Wave equation, traveling and standing waves in one dimension. Energy density and energy transmission in waves. Group velocity and phase velocity. Sound waves in media. Doppler Effect. Fermat's Principle. General theory of image formation. Thick lens, thin lens and lens combinations. Interference of light, optical path retardation. Fraunhofer diffraction. Rayleigh criterion and resolving power. Diffraction gratings. Polarization: linear,

circular and elliptic polarization. Double refraction and optical rotation.

Electricity and Magnetism

- Coulomb's law, Gauss's law. Electric field and potential. Electrostatic boundary conditions, Solution of Laplace's equation for simple cases. Conductors, capacitors, dielectrics, dielectric polarization, volume and surface charges, electrostatic energy. Biot- Savart law, Ampere's law, Faraday's law of electromagnetic induction, Self and mutual inductance. Alternating currents. Simple DC and AC circuits with R, L and C components. Displacement current, Maxwell's equations and plane electromagnetic waves, Poynting's vector, Lorentz Force and motion of charged particles in electric and magnetic fields.

Kinetic theory, Thermodynamics

- Elements of Kinetic theory of gases. Velocity distribution and Equipartition of energy. Specific heat of Mono-, di- and tri- atomic gases. Ideal gas, van-der-Waals gas and equation of state. Mean free path. Laws of thermodynamics. Zeroth law and concept of thermal equilibrium. First law and its consequences. Isothermal and adiabatic processes. Reversible, irreversible and quasi-static processes. Second law and entropy. Carnot cycle. Maxwell's thermodynamic relations and simple applications. Thermodynamic potentials and their applications. Phase transitions and Clausius-Clapeyron equation. Ideas of ensembles, Maxwell- Boltzmann, Fermi- Dirac and Bose- Einstein distributions.

Modern Physics

- Inertial frames and Galilean invariance. Postulates of special relativity. Lorentz transformations. Length contraction, time dilation. Relativistic velocity addition theorem, mass energy equivalence. Blackbody radiation, photoelectric effect, Compton effect, Bohr's atomic model, X-rays. Wave-particle duality, Uncertainty principle, the superposition principle, calculation of expectation values, Schrödinger equation and its solution for one, two- and three-dimensional boxes. Solution of Schrödinger equation for the one-dimensional harmonic oscillator. Reflection and transmission at a step potential, Pauli exclusion principle. Structure of atomic nucleus, mass and binding energy. Radioactivity and its applications. Laws of radioactive decay. Nuclear reactions, Nuclear model- liquid drop model.

Solid State Physics and Devices

- Crystal structure, Bravais lattices and basis. Miller indices. X-ray diffraction and Bragg's law; Intrinsic and extrinsic semiconductors, variation of resistivity with temperature. Fermi level. p-n junction diode, I-V characteristics.

Atomic and Molecular Spectroscopy

- Atomic Spectra: Spin and orbital angular momenta and related quantum numbers, Elements of Molecular Spectroscopy: quantization of energy; representation of spectra; elements of practical spectroscopy.

Lasers

- Quantum theory of radiation; Einstein A and B coefficients, Essential elements of a laser; laser operation; characteristics of laser light.

M.SC. IN CHEMISTRY

WEIGHTAGE

- Written Test: 50%
- Technical Interview: 20% (subject to passing the written test)
- Final Interview: 30%

QUESTION PAPER FORMAT

The question paper is of two hours in duration / 75 marks.

Section A: Objective type – 25 questions (25 marks)
Section B: Short answer type. 6 out of 8 questions- Global choice (6x5=30 marks)
Section C: Essay type – long answer type- One out of two questions (20 marks)

GENERAL CHEMISTRY

- Electronic structure of atoms: Atomic spectra - H-spectrum.
- Wave Mechanics: De Broglie matter waves- Heisenberg uncertainty principle, Schrödinger's wave equation. Hydrogen atom- Theories of chemical bonding: Valence bond theory -various types of hybridization and shapes of simple inorganic and organic molecules/ ions- dsp2, sp3d, sp3d2, d2sp3 and sp3d3; VSEPR theory – applications to NH3, H3O+, SF4, ClF3, ICl2-, H2O, SnCl2, XeF2, XeF4,IF5; MO theory- homonuclear and heteronuclear diatomic molecules;– dipole moment- electronegativity- Fajan's rules – Resonance - Delocalized bonding - 1, 3 butadiene and benzene; Electronic displacements: inductive, resonance and hyper conjugative effects. Bonding in metals; Intermolecular forces: Molecular crystals, hydrogen bond; vander Waals forces, Debye, Keesom & London forces.

ANALYTICAL CHEMISTRY

- Solvents: Non-aqueous solvents
- Solubility of substances: activity, activity coefficients, ionic strength of electrolytes, electrolytic dissociation - acids & bases.
- Aqueous equilibria: Weak electrolytes -
- Oswald's law, common ion effect - Neutralization reactions - Sparingly soluble salts - solubility product. Complex ions. Salt hydrolysis & Buffers.
- Quantitative analysis: Titrimetry - Basic principle, types of reactions - Theoretical principles involved in titrimetric analysis using neutralization and redox reactions - Potentiometric titration curves; Theory of pH indicators; Theory of redox indicators.

INORGANIC CHEMISTRY

- Group I: General characteristics - Alkali metals in liquid ammonia- alkali metal complexes, crown ethers and cryptands;
- Group II A: General characteristics - Diagonal relationships - complexes of Be & Ca;
- Noble gases: Uses, general characteristics - Fluorides of Xenon- Clathrates;
- Group III A: General properties - Oxidation states and types of bonds- oxygen compounds of boron - Diborane and Boron - Nitrogen compounds;
- Group IV A: Physical properties, inert pair effect, multiple bonding, graphite compounds Carbides. Classification of silicates: Silicones - preparation and application - hydrides of silicon Carbon allotropes;
- Group V A: Electronic structure and oxidation states - Oxoacids of nitrogen - Oxoacids of phosphorous;
- Group VI A: Electronic structure and oxidation states - oxoacids of sulphur;
- Group VII A: Electronic structure, oxidation states and general characteristics - Oxoacids of halogens - Interhalogen compounds, Polyhalogen compounds - pseudo halogens and pseudo halides.
- Chemistry of transition elements: General characteristics - periodic trends; Magnetic properties; Metallic nature- oxidation states, catalytic properties, complexes.
- Coordination chemistry: Werner's theory - Nomenclature of coordination compounds -Isomerism – EAN (effective atomic number) rule - Crystal field theory - Applications of crystal field theory.
- Periodicity: Basic trends - First and second row anomalies.
- Nuclear chemistry: Composition of the nucleus - radioactive decay modes - law of radioactivity, natural and artificial disintegration series - Nuclear reactions, Applications of radioisotopes as tracers; Counting statistics - Counting techniques.

ORGANIC CHEMISTRY

- Aliphatic hydrocarbons: Nomenclature; chain and conformational isomerism; General methods of preparations, reactions of alkanes/alekenes/alkynes; Geometric isomerism in alkenes- sequence rules.
- Cycloalkanes: Nomenclature - General methods of preparation - Geometrical Isomerism - conformational analysis.
- Aromatic Hydrocarbons: Chemical criteria for aromaticity - Aromatic sextet– Substitution reactions of Aromatic

compounds - Substituent effects- Reactions of Polycyclic benzenoid aromatic hydrocarbons: Naphthalene, Anthracene & Phenanthrene:

- Stereochemistry: Absolute configuration – assignment of R&S - Optical activity - concept of dissymmetry (chirality) - optical isomers of tartaric acid.
- Halogen derivatives: Methods of preparation and reactions of alkyl and aryl halides. SN2, SN1 reactions, rearrangements - E1& E2 reactions.
- Organometallic compounds: Organomagnesium compounds - Grignard reagents.
- Alcohols: Nomenclature, physical properties - preparation, and reactions.
- Phenols: Acidity and structure -Synthesis and Reactions.
- Ethers: Nomenclature, synthesis and reactions.
- Carbonyl compounds: Nomenclature - preparation of aldehydes and ketones. General mechanism of nucleophilic addition reactions.
- Carboxylic acids and their derivatives: General methods of preparation - Mechanism of ester hydrolysis (acid catalyzed and base catalyzed AAC2, BAC2) - Reactions of Carboxylic acids. Dicarboxylic acids: Hydroxy acids (lactic acid and salicylic acid).
- Reactive methylene compounds: Diethylmalonate and ethylacetoacetate.
- Organic compounds of nitrogen, Amines: Effect of structure on basicity, preparation and reactions of amines - synthetic applications of azo compounds.

PHYSICAL CHEMISTRY

- Chemical kinetics: The rate of reactions - rate laws - rate constants - reaction order - Methods of determining reaction orders and rate laws - Radioactive decay - Half life.
- Complex reactions: Parallel, consecutive and reversible reactions.
- Theory of chemical kinetics: Arrhenius equation - Collision theory, Transition state theory. Surface Chemistry: Adsorption, physisorption & chemisorptions - adsorption isotherms. Catalysis - heterogeneous catalysis.
- Chemical thermodynamics: Thermodynamics of closed systems - 1st law of thermodynamics. Heat and enthalpy: Relation between ΔH and ΔU - Kirchoff's law - Joule-Thomson effect. Work of adiabatic expansion: adiabatic - reversible expansion of a perfect gas - Applications of 1st law concepts: Joule-Thomson expansion - characteristics. 2nd law of thermodynamics: Carnot cycle - Clausius inequality - Spontaneous, nonspontaneous changes - Combined equations of I & II laws of thermodynamics - Maxwell relations - Helmholtz and Gibbs energy - Phase transition processes. 3rd law of thermodynamics: Nernst theorem - Internal pressure - Gibbs - Helmholtz Equation.
- Electrochemistry- Electrochemical cells: Galvanic and electrolytic cells. Electrode types. Chemical cells: Liquid junction potential-Nernst equation - Application of standard reduction potentials - electrochemical series - potentiometric titrations - Fuel cells.
- Ionics: Electric properties of ionic solutions, Equivalent conductance - molar conductivity. Strong electrolytes - Kohlrausch's law - applications.
- Weak electrolytes: Ostwald's dilution law- hydrodynamics, conductivity of H+ and OH- ions. Phase rule and phase diagram: Basic concepts - Derivation of Gibbs phase rule - phase diagram of one component system - H2O and sulphur.

BIOCHEMISTRY

- Carbohydrates: Introduction, classification, nomenclature, monosaccharides-structure and réactions, disaccharides, oligosaccharides, polysaccharides ; Aminoacids and Proteins.

SPECTROSCOPY

- UV-Vis spectroscopy: Theory-instrumentation – Woodward-Fieser rules for calculation of λmax of dienes, Fieser- Kuhn rules for determining λmax of polyenes;
- Infrared spectroscopy: Theory instrumentation - Sampling techniques; Analysis of IR spectral data- identification of functional groups.

INDUSTRIAL CHEMISTRY:

- Surface coatings: Paints and varnishes - Pigments: classification and applications.
- Petroleum Refining: Occurrence - composition - processing - applications; Fuels from petroleum - raw materials (chemicals) from petroleum for industrial applications.
- Polymers: Importance of polymers - basic concepts - Types of polymers - Structure and properties. Polymer processing, classification based on methods of preparation.
- Dyes: Definition - classification based on method of application, color and structure - Classification based on chemical constitution - Methods of application.
- Fertilizers: Classification - organic fertilizers, inorganic/commercial fertilizers.

M.SC. IN BIOSCIENCES

WEIGHTAGE

- Written Test: 50%
- Technical Interview: 20% (subject to passing the written test)
- Final Interview: 30%

QUESTION PAPER FORMAT

The question paper is of two hours in duration / 75 marks.

Section A: Objective type – 25 questions (25 marks)
Section B: Short answer type. 6 out of 8 questions- Global choice (6x5=30 marks)
Section C: Essay type – long answer type- One out of two questions (20 marks)

BOTANY

- ***Thallophytes, Cryptogams and Phanerogams:*** Important features (habit, morphology and reproduction); General classification of Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms; Evolutionary trends among them. Binomial nomenclature and modern trends in taxonomy; Economic importance of Annonaceae, Brassicaceae, Meliaceae, Fabaceae (Leguminosae), Solanaceae and Poaceae.
- ***Plant Anotomy:***Types of meristamatic and other tissue systems in Plants; Anatomy of root, stem and leaf in Dicots; Micro and Macro Sporogenesis; Endosperm: Formation and Types; Polyembryony: Embryogenesis in Morocots and Dicots: Types and examples.

Plant Physiology:

- Osmosis - Principle, Mechanism and factors affecting osmosis; Active Transport - Principle and mechanism; Physiology of Photosynthesis - Introduction, PSI & PSII systems, Mechanism of Photosynthesis - Light and Dark reaction; Respiration - Kinds of respiration, aerobic and anaerobic respiration, mechanism of aerobic respiration: Glycolysis, Krebs cycle; Transpiration: Kinds of transpiration, guttation and exudation; Translocation: Mechanism of ascent of sap, path of translocation, structure of xylem and phloem; Flowering Photoperiodism, classifcation of plants according to flowering, vernalization; Growth: growth regulators/hormones; Dormancy: Kinds, factors causing dormancy, mechanism; Mineral nutrition in plants: essential and non-essential elements, major and minor elements and their role.

ZOOLOGY

- ***Non-Chordates & Chordates:*** Classification of Non-Chordates, Prochordates and non-Chordates; Locomotion and reproduction in Protozoa, Protozoan and Helminthes Parasites of Man; Comparative anatomy of Chordates, flight adaptations and migration in Birds; Poisonous and Non-Poisonous snakes of India; Dentition in Mammals; Apiculture, Sericulture, Pearl, Prawn and Fish culture techniques.

- ***Animal Histology & Physiology:*** Epithe1ia1, Connective, Muscular and Nervous tissues; Physiology of Digestion, Osmoregulation, Respiration, Circulation,

Excretion and Reproduction in mammals, Muscle contraction Impu1se conduction; Blood composition, Blood groups, Endocrine glands and Hormonal action; Th.ennoregulation in Animals.

CELL BIOLOGY, GENETICS & EVOLUTION

- Structure of cell -- Cell organelles, Types of Chromosomes Mitosis and Meiosis, Gametogenesis, mechanism of fertilization, cleavage patterns, Gastrulation; Placentation and Menstruation in Mammals, Extra foeta membranes; Mendel's laws of inheritance, Multiple a1ludes, linkage - Sutton's and Morgon's views, kinds of linkage; Crossing over -- somatic and germinal crossing over, mechanism of meiotic crossing over; Sex determination -- Sex chromosome mechanisms, types of sex chromosomal mechanism of sex determination; Mutation -- kinds of mutation, classification of mutation based on various types; Operon concept -- basic concept and types; Eugenics - basics, pedigree analysis, positive and negative eugenics; Genetic code -- basics of cryptoanalysis, methods of cryptoanalysis of genetic code; Principles of plant and animal breeding; Evidences of evolution -- Darwin's and Lamarkian Theories; Darwin's and Lamarkian theories of evolution origin and evolution of man, isolation and speculation.

ENVIRONMENTAL BIOLOGY

- Biotic and Abiotic factors of environment; Biogeochemical cycles -- types, general process, climax concept; examples of succession; trends of succession; Ecological Succession -- types, general process, climax, concept, examples of succession, trends of succession; Ecosystem, Population ecology; Arboreal, Volany1, Deepsea, Xerophytic, Hydrophilic and epiphytic adaptations; Environmental pollutions -- origin, types, kinds and sources, remedial measures;

MICROBIOLOGY

- Classification and characteristics of microorganisms - Bacteria, Fungi and Viruses; General classification of common Viral, fungal and Bacterial diseases in Plants, Animals and Man; Economic importance of Bacteria. Physiology and Cultivation of microbes. Microbes in water, soil, air food and secuage; Air, Water, Soil, food and Vector borne diseases; Prophylactic measures, Antigen and Antibody reactions; Principles of Immunization.

BIOCHEMISTRY & BIOTECHNOLOGY

- Classification of enzymes, coenzymes and vitamins, structure and function of carbohydrates, proteins and lipids and their energy metabolism.

- Plant and Anima1 tissue culture techniques, Micro-Propagation, Monoclonal Antibodies, Protoplast cu1ture, DNA sequencing, Recombinant DNA, Applied aspects of Biotechnology in Agriculture, Animal Husbandry, Medicine, disease, diagnosis and Therapy.

M.SC. IN FOOD & NUTRITIONAL SCIENCES

WEIGHTAGE

- Written Test: 70%
- Interview: 30%

QUESTION PAPER FORMAT

The two-part question paper is of two hours in duration / 75 marks.

- ***Part I*** (30 min): Subject based test for all the streams Objective type (25x1=25 Marks) Twenty-five out of thirty questions with global choice

- ***Part II*** (90 min): Subject based test for all the streams Descriptive type (10x5 = 50 Marks). Ten out of fifteen questions with global choice.
  The question paper will contain questions on the following topics carrying equal marks. There will be balanced distribution of questions from each of the topics listed below to enable the students from various streams get an opportunity to score in the test.

Food Science and Nutrition

- Food as a source of nutrients, composition, properties, characteristics, and nutritive value of different foods (cereal grains, millets, pulses, nuts and oil seeds, fruits and vegetables, milk and milk products, meat, egg, poultry, fish, spices and condiments).
- Energy requirement: Basal metabolism, Energy requirement for different age groups.
- Study of Nutrients: (a) Carbohydrates, proteins and fats – chemistry and nutritional aspects such as digestion, absorption, metabolism, functions, sources, deficiency and requirements
  (b) Vitamins and minerals - functions, sources, requirements, and deficiencies
  (c) Water balance.

Dietetics and Public Health Nutrition

- Principles involved in adoption of normal diet for formulating therapeutic diet - use of food exchange groups.
- Diet during pregnancy, lactation, infancy, school age, adolescent, adulthood and old age.
- Nutritional deficiency diseases.
- Dietary management in diseases (metabolic disorders, febrile conditions, surgical & other stress conditions) - causes, symptoms, physiological changes and diet.
- National and international agencies and intervention programmes in the betterment of nutritional status.
- Methods of assessing the nutritional status.

Microbiology, Food safety and Quality control

- Historical development and scope of microbiology; General characteristics, morphology, growth and reproduction of bacteria, fungi and algae. Pure culture techniques; Stains and staining techniques.
- Causes of food spoilage; Principles of food safety and preservation; Methods of food preservation.
- Food contamination and adulteration: Types and detection methods of adulterants.
- Food safety evaluation and quality control assurance systems.
- Food laws and standards; Subjective and objective methods of evaluating food acceptability.

Biochemistry and Physiology

- Chemistry and metabolism of carbohydrates, lipids, proteins and nucleic acids.
- Enzymes, coenzymes and cofactors; Hormones.
- Structure and functions of the following - Cell, Skeletal system, Blood and Circulatory system, Gastro-intestinal system, Excretory system, Respiratory system, Endocrine system, Reproductive system, Immune system and Sense organs.

Chemistry and Physics

- Chemistry: The gas laws, properties of gases, electrolytes, thermo-chemistry, chemical equilibrium, chemical kinetics, concept of pH and buffer, molecular orbital theory, chemical bonds and the forces involved therein; periodic table; Aliphatic and aromatic hydrocarbons. Organic substitution reactions, electrophilic and neucleophilic reactions; Isomerism; structural and optical isomers. Solubility and concentration (molar, normal and molal) of solutions.
- Food Chemistry: Water activity in foods; Carbohydrates: Mono, di-saccharides (reducing and non-reducing sugars) and polysaccharides (starch, cellulose, pectins) - sources and properties; Proteins: Primary, secondary and tertiary structure of proteins- Protein denaturation, peptide bonds, amino acids; Fats and oils: Properties and modification of fats; Colloids and emulsions; Plant acids and pigments.
- Physics: Elements of mechanics, colligative properties, Laws of Thermodynamics: Mode of heat transfer; Electrostatics, magnetism and electrodynamics; Outlines in optics and sound; Electro-magnetic radiation; Radioactivity and elements in quantum physics; Physico – chemical properties: Vapour pressure, boiling point, freezing point, viscosity, interfacial and surface tension and specific gravity.

PROFESSIONAL PROGRAMMES

Bachelor of Education (B.Ed.)

Duration: ***2 Years*** | For ***Women*** Candidates only

The B.Ed. programme prepares teachers for Upper Primary or Middle Level (Class VI- VIII), Secondary Level (Class IX-X) and Senior Secondary Level (Class XI-XII). Since the programme is two years, it allows the time for student-teachers to become reflective practitioners. The course structure offers a comprehensive coverage of themes and rigorous field engagement with the child, school and community. It also includes special courses for enhancing professional capacities of the student-teachers. The unique aspect of this programme is that it stresses on the importance of imparting values-based education to students, resulting in their wholesome and balanced development.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed or appeared for Final exams at Bachelor's degree level before the date of Admissions Test
- Bachelor's degree (BA/BA (Hons.)/B.Sc./B.Sc. (Hons.)/B.Com. (Hons.)/BBA/BE/B.Tech.) If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Age: Preferably below 28 years as of 31st May in the year of admission

Note: All applicants of the B.Ed. programme must ***choose one of the four pedagogy subjects*** (Mathematics, Physical Sciences, Biological Sciences or Social Studies) for the entrance test and indicate the same on the application form.

COURSES TAUGHT

YEAR 1

Semester 1

Childhood and Growing Up, Basics in Education, Technology of Teaching and Learning, Pedagogy of Teaching – Group I: Pedagogy of English or Pedagogy of Physical Science, Pedagogy of Teaching – Group II: Pedagogy of Mathematics or Pedagogy of Biological Science or Pedagogy of Social Science, Psychological Testing, Internship Phase I (3 weeks)

Semester 2

Learning and Teaching, Contemporary India and Education, Assessment for Learning, Pedagogy of Teaching – Group I: Pedagogy of English or Pedagogy of Physical Science, Pedagogy of Teaching – Group II: Pedagogy of Mathematics or Pedagogy of Biological Science or Pedagogy of Social Science, Internship Phase II (8 weeks)

YEAR 2

Semester 3

School Organization, Supervision and Administration, Education in Human Values: Peace Education, Language across Curriculam, Drama and Art in Education, Yoga Education, Critical understanding of ICT, Internship Phase III (4 weeks)

Semester 4

Knowledge and Curriculum, Creating an Inclusive School, Gender, School and Society, Optional Course: Guidance and Counseling or Environmental Education or Health and Physical Education, Community Work, Internship Phase IV (5 weeks) - Final Practice Teaching: Practical in Two Pedagogies

M.B.A.

Duration: ***2 Years*** | For ***Women*** and ***Men*** Candidates

The Management Programme has been structured in a balanced manner providing equal importance to the development of managerial skills and capabilities and the inculcation of healthy attitudes and values, thus enabling the student to grow into a proficient manager and a responsible member of society. It has four components. The Foundation Courses have special focus on universal human values and cover subjects such as: Self-Development, Values-based Management, Values - Centered Leadership, National Perspectives and Rural Development. The Core and Functional Courses cover concepts and techniques connected with functional management in Marketing, Operations, Finance, and Human Resources.
The Integrative Courses cover subjects that span across the different functions and disciplines such as: Management Information Systems, Total Quality Management, and Management Strategies among others. Electives are offered in streams such as Marketing, Finance, Operations, Systems, Human Resources and International Business.

ELIGIBILITY REQUIREMENTS

- 10+2 years of schooling and 3 years of university (total 15 years) as recognized by SSSIHL
- Either passed OR appeared for Final exams at Bachelor's degree level OR Master's degree level before Admissions Test. If not appeared for Bachelor's degree final exams, aggregate marks in all the preceding Years/Semesters put together will be considered.
- Age: Preferably below 28 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Economics for Managers, Values Based Management, Marketing Management, Self-Development, Financial Accounting for Managers, Financial Management, Computer Applications – Financial Management, Statistics for Business Management, Business and Managerial Communication, Analytical and Presentation Skills - Part 1

Semester 2

Entrepreneurship & Innovation, Human Resources Management, Fundamentals of Research Methods, Business Law, Rural Management (Seminar), Management Accounting, Service Operations Management, Management Science, Analytical and Presentation Skills – Part 2, Year End Viva voce

YEAR 2

Semester 3

Strategic Management, Group Dynamics, Management of Quality, Management of Quality – Applications, Business and Managerial Communication 2, Elective I, Elective II, Elective III, Computer Applications – Business Analytics, Analytical and Presentation Skills – Part 3, Project work Review

Semester 4

Values Centered Leadership, Fundamentals of Project Management, Business Excellence, Managing in the Information Age, Elective IV, Elective V, Elective VI, Computer Applications – Enterprise Applications, Analytical and Presentation Skills – Part 4, Project Work, Experiential Leadership Development, E-business, Comprehensive Viva voce

ELECTIVES

Marketing

Marketing Strategy, Brand Management, Consumer Behaviour, Rural Marketing, Service Marketing, Relationship Marketing, Digital Marketing

Finance

Financial Derivatives, Advanced Financial Derivatives, Computational Finance, Forecasting Methods for Business & Economics, Modelling Financial Markets, Risk Management in Financial Institutions, International Financial Management, Mathematics of Finance Direct and Indirect Taxes, Financial Institutions and Markets, Management of Banks, Mergers and Acquisitions, Corporate Financial Strategy, Corporate Banking, Equity Research, International Economics and Finance, Personal Financial Planning, Infrastructure Finance, Investment Analysis and Portfolio Management, Financial Reporting and Analysis, Fixed Income Securities, Corporate Governance, Value Investing

Human Resource Management

Talent Management, Employee Empowerment, Participative Management, Industrial / Employee Relations, Compensation Management, HR Related Negotiation Skills, Performance Management, Personnel Counseling, Quality of Working Life, Talent Acquisition and Retention, Management of Training and Development, Labour Legislations, Organisation Development and Transformation

Organisational Behaviour

Cross-Cultural Management, Leadership, Influence and Power, Managerial Competencies and Career Development, Transactional Analysis, The Psychology of Leadership

Systems

Digital Strategy for Managers, Business Analysis, Customer Relationship Management, IT Project Management, Knowledge Management, Geospatial Information Systems

Data Science

Data Science with Python, Data Science With R, Machine Learning, Big Data Analytics for Business

Operations

Project Management, Supply Chain Management, Advanced Operations Research Applications, Production Planning & Control, Statistical Quality Control, Reengineering

Healthcare Management

Introduction to Healthcare Management, Healthcare Quality & Accreditation, Healthcare Informatics, Managing Health Services, Organization & Systems, Ethics and Human Values in Healthcare Management, Public Health Management & Healthcare Statistics, Innovation and Healthcare Delivery, Strategy in Healthcare Management, Health Technology Assessment

M.Tech. in Computer Science

Duration: ***2 Years*** | For ***Men*** Candidates only

A master's programme for students with a background in science and engineering alike that teaches students the theoretical foundations of Computer Science as well as the practical knowledge regarding computer systems. This is achieved primarily through core theoretical courses. In order to impart working knowledge and programming for solving problems the program is designed to have a software lab associated with each of the courses. A well-structured list of electives from various areas like Computer Vision, Machine Learning, Data Analytics, High Performance Computing, Software Systems, etc. enable students to specialize in frontier areas of computer science. A comprehensive Viva voce and project work in the second year prepares graduating students with the necessary knowledge and skills for the next stage of their careers upon graduation.

ELIGIBILITY REQUIREMENTS

- The candidate must have either passed or appeared for final exams of one of the following: a) M.Sc. in Mathematics or M.Sc. in Physics or M.Sc. in Computer Science or M.C.A., or b) B.E. in Computer Science / B.Tech. in Computer Science
- Candidates with a Bachelor's degree (B.E. / B.Tech.) in Computer Science, Computer Science and Engineering, Electronics & Communications Engineering (with Computer Science background*) and Information Technology (with Mathematics background) are eligible to apply. If not appeared B.E./B.Tech./M.Sc. final exams, aggregate marks in all the preceding Years/ Semesters will be considered
- Familiarity with the following is mandatory for admissions:
  - **Mathematics**: Calculus of one and several variable, Sequence and Series, Linear Algebra and Matrix Theory, Differential equations and Laplace Transforms, Mathematical logic.
  - **Computer Science:** Data Structures and Simple Algorithms, Computer Organization and Architecture, Data communications and Networks, Data base Systems, Languages Translators
- Age: Preferably below 28 years as of 31st May in the year of admission

** Implies an adequate, formal training and qualification from a recognized institution or relevant Computer/IT industry/academic experience for a minimum period of 5 years*

COURSES TAUGHT

YEAR 1

Semester 1

Design and Analysis of Algorithms, Design and Analysis of Algorithms (Practical), Advanced Computer Architecture, Advanced Computer Architecture (Practical), Parallel Processing, Parallel Processing (Practical), Elective I, Seminar I, Seminar II, Semester End Viva voce

Semester 2

Theory of Computation, Distributed Systems, Distributed Systems (Practical), Topics in Database Management Systems, Topics in Database Management Systems (Practical), Elective II, Elective III, Seminar III, Seminar IV, Semester End Viva voce

YEAR 2

Semester 3

Elective IV, Project Work Review

Semester 4

Project Work, Comprehensive Viva voce

ELECTIVES

Stream I: Intelligent Systems and Knowledge Engineering

Artificial Intelligence, Genetic Algorithms, Natural Language Processing, Neural Networks, Data Mining and Data Warehousing, Pattern Recognition, Machine Learning, Mining of Big Data Sets, Deep Learning

Stream II: Advanced Computer Networks

Telecom Networking, Network Security, Wireless and Mobile Networks, Advanced Computer Networks

Stream III: Human Computer Interaction

Digital Image Processing, Medical Image Processing, Computer vision, Advanced Topics in Image Processing, Video Processing

Stream IV: Theoretical Computer Science

Advanced Algorithms, Cryptography

Stream V: Computer Systems

Compiler Design, Advanced Programming in the Unix Environment, Programming for Performance, Operating Systems, Embedded Computing

Stream VI: Multi-Core and Parallel Computing

High Performance Computing with Accelerators, Cloud Computing, Parallel Numerical Linear Algebra, Multi Core Computing, High performance Embedded Computing, Multi Processor Programming

Stream VII: Software Engineering

Object Oriented System Design, Web Technology

Stream VIII: Mathematical Methods in Computer Science

Mathematical Methods in Image Processing, Numerical Methods in Image Processing, Mathematical Methods for Data Mining

M.Tech. in Optoelectronics & Communications

Duration: ***2 Years*** | For ***Men*** Candidates only

Optoelectronics and Communication have been deemed as the 21st century revolutionary technologies that will create as enormous an impact as electronics did in the 20th century. This interdisciplinary M.Tech programme aims to generate trained professionals in the broad areas of optoelectronics and communications with an emphasis on networking, signal processing and VLSI technologies. One half of the courses are core papers and the other half are electives. This enables students to pursue areas in their areas of academic interest. The core courses give a strong background of science and engineering. These are supplemented with laboratory courses, enabling the students to take up project work in the second year. Students of this program undergo core training in optoelectronics, VLSI, Signal Processing and related communication technologies that have made them highly compatible and ubiquitous in leading industries and R&D organizations across the world.

The Project work taken up by the students in the fourth semester are done in collaboration with mentors from leading industries of the communication sector, provides as an ultimate training to apply the technologies learnt, serving as a heads up to face the industry requirements. Indeed, the industry related dissertation work is considered to be the highlight of this M. Tech. program.

ELIGIBILITY REQUIREMENTS

- The candidate must have either passed or appeared for final exams of one of the following:
    a. M.Sc. Physics, or
    b. B.E. / B.Tech. with background in Electronics, Electrical, Communication, Instrumentation and Computer Science
- Candidates with a Bachelor's degree in B.E. or B.Tech. (with background in Optics and Electromagnetic Theory) or a Master's Degree in Physics are eligible to apply
- Age: Preferably below 28 years as of 31st May in the year of admission

COURSES TAUGHT

YEAR 1

Semester 1

Optoelectronics and Optoelectronic Sensors, Digital Communication Systems, Broadband Communication Networks, Elective I, Fiber Optic Components (Practical), Optoelectronics Lab (Practical), Algorithm Development Lab (Practical), Semester End Viva Voce

Semester 2

Optical Communication Systems, Optical Networks, Elective II, Elective III, Network Lab (Practical), Network Programming with Python (Practical), Entrepreneurship and Innovation, Semester End Viva Voce

YEAR 2

Semester 3

Elective IV, Elective V, Network Automation with Python (Practical), Basics of Managing a Business, Project Interim Review

Semester 4

Project

ELECTIVES

Stream I: Optoelectronics
Principles of Photonics
Optical Instrumentation
Integrated Optics
Biomedical Optics and Biophotonics

Stream II: Networking and Communications
IoT and Sensor Networks
Network Security
Embedded Signal Processing
Adaptive Signal Processing

Stream III: Very Large Scale Integration (VLSI) Technology
Principles of VLSI
VLSI Design & Test
FPGA Based Design
Embedded Systems and RTOS
ASIC Design
Digital Logic Design

OPEN ELECTIVES

Introduction to Virtualization Technologies
Software Engineering
Microfluidics: Devices and Applications
Biomedical Signal Processing

PROFESSIONAL TEST SYLLABUS

- There will be negative marking for all multiple-choice questions.
- Model Test Papers are available on the website - sssihl.edu.in

B.ED.

Admission to B.Ed. programme of the Institute will be based on the performance in admission test and interview.

QUESTION PAPER FORMAT:

PART A
General English: 50 Marks / 50 Mins

- Objective- type questions on basic grammar (tenses, prepositions, vocabulary, error-identification etc.)
- Summary/ precis writing/ paraphrase
- Reporting an event/ Channel conversion.

Situational Analysis: 25 Marks / 25 Mins
The purpose of this sub test is to assess the candidate's ability to analyze a given situation with all its implications and, her capacity to respond to different problems and values issues raised.

PART B
Subject Test: 100 Marks / 100 Mins
Candidates to take a test in either one of the following subjects:

- Mathematics
- Physical Sciences
- Biological Sciences
- Social Studies

Part B: MATHEMATICS

- Sets-relations-binary operations-semi groups-groups-subgroups-normal subgroups-homomorphism-Functions permutations permutation groups-cyclic groups-quotient group- automorphism.
- Rings-Integral domains-fields-characteristic-homomorphism-Ideals-Prime Ideals-maximal ideals-Rings of permutations-polynomials-polynomial rings.
- Vector spaces-linearly independent vectors-Basis-dimension-linear transformation--Null space--Range--Rank of a linear transformation.
- Elementary matrix operations-Elementary matrices–Determinants-properties-rank of matrix-inverse of a matrix- Eigen vectors- Eigen values-systems of linear equations.
- Three-dimensional geometry--Coordinates--distance formula-direction cosines-plane- angle between two planes–perpendicular distance from a point-Equation of a line-skewlines–shortest distance-The sphere tangent plane power of a point-polar plane and pole-radical plane-coaxial system of spheres-The circle-radius-centre.
- Real numbers-properties-functions-range-sequences-series-limits-continuity; Differentiability-differentiation-mean value theorems--L'Hospital rules--Integration definite integrals- Reimann integral.
- Differential equations-first order and first degree-different forms–Exact differential equations-change of variables-equation of first order but not of first degree-higher order linear differential equations-system of linear differential equations.
- Elements of Number theory-Divisibility-primes- congruences-solutions of congruences- congruences of degree 1; The Euler function O.-Quadratic equations-quadratic expressions-change of sign–roots maximum-minimum values.

PART B: PHYSICAL SCIENCES

PHYSICS (50 Marks)

- Vector Analysis: Scalar and Vector fields, Gradient of a scalar field. Divergence and curl of a vector field
- Mechanics of particles: Laws of motion, Motion of variable mass system. Conservation of energy and momentum
- Central forces: Central forces - definition and examples, Conservative nature of central forces. Equation of motion under a central force, Gravitational field, motion under inverse square law, derivation of Kepler's laws
- Kinetic theory of gases: Deduction of Max Well's law of distribution of molecular speeds - Transport phenomena - Viscosity, thermal conduction and diffusion of gases.
- Diode theory: Intrinsic and extrinsic semiconductors; pn junction diode; approximations of a diode; biasing and its effects; V-I characteristics, specifications of a diode Rectifiers: Half wave rectifier, full wave rectifier, bridge rectifier, power supply LC and RC filters and regulators; Types of diodes and their applications: power, signal, Zener, Schotkky, LED.
- 7-segment displays and photodiodes Clippers; negative and positive clampers; voltage multipliers Zener diode as a constant voltage source & as a regulator Use of LED as a display, high frequency application of Schotkky, photodiode
- Polarization and double effraction: Polarized light - Brewsters law -Malus Law - phenomenon of double refraction is calcite - Refraction of plane wave incident on a negative crystal-like calcite - Nichol prism. Analysis of polarized light by quarter wave plate - Babinet compensator.
- Newton's Laws, Equations of motion and their Solutions for a Single Particle: Newton's laws of motion and frame of reference, relative velocity; Applications of Newton's laws to the motion of a single particle – Concepts of kinetic energy and potential energy, conservative force and Work-Energy theorem; Equations of Motion and their solutions for motion under - constant force
- Oscillations: Simple harmonic oscillator-simple pendulum, physical pendulum, spring mass system; damped harmonic oscillator; forced oscillations; coupled oscillations
- Waves: Vibrating Strings; equation of motion in a string- solution; Normal modes of vibration
- Electrostatics-I: The electric field: Coulombs law; continuous charge distribution ,Divergence and curl of electrostatic fields: field lines, flux and Gauss law ,Divergence of E; Application of Gauss's law: spherical, cylindrical and plane symmetries; curl of E, Work and energy in Electrostatics: work done to move a charge; energy of a point charge distribution; energy of a continuous charge distribution Conductors: basic properties; induced charges; surface charge and force on a conductor; Capacitors
- Nuclear Physics: Radioactivity: The radioactive decay law; half-life and mean life; Statistical nature of radioactivity; statistical errors in nuclear physics, Radioactive growth and decay; transient and secular equilibrium, Natural radioactivity and radioactive series Artificial radioactivity; Determination of

age of the Earth, Carbon dating; Units for measuring radiation; Nuclear Reactions: Introduction; nomenclature; Types of nuclear reactions ,Balance of mass and energy in nuclear reactions

- Constituents of a nucleus; Discovery of neutron, Nuclear radius; distribution of nuclear charge; Measurement of nuclear radius, Nuclear mass and abundance of nuclides; Mass spectrometer, Nuclear binding energy; Nuclear angular momentum and parity; statistics, Nuclear Magnetic moment; Nuclear electric quadrupole moment; Nuclear excited states; failure of proton-electron hypothesis
- Electromagnetic induction: Faraday's law- Lenz's law-expression for induced emf –electromotive force-time varying magnetic fields - Betatran - Ballistic galvanometer-theory-damping correction-self and mutual inductance, coefficient of coupling, calculation self-inductance of along solenoid-toroid-energy stored in magnet in field principles of transformer.
- Varying and alternating currents: CR circuits, LR circuits, growth and decay of currents, LCR circuit, critical damping-alternating current, relation between current and voltage in pure RC and L-vector diagrams LCR circuit power factor, series and parallel resonant circuit-Q-factor.
- Maxwell's equations and electromagnetic wave: A review of basic laws of electricity and magnetism- displacement current -Maxwell's equations in differential form Maxwell's wave equation. Plane electromagnetic waves transverse nature of electromagnetic waves Poynting theorem, production of electromagnetic waves (Hertz experiment)

CHEMISTRY (50 Marks)

- Atomic Structure and Elementary Quantum Mechanics
- Black Body radiation, Plack's Radiation law, Photoelectric effect, heat capacity of solids, Comption effect. De Broglie's hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schordinger's wave equation and its importance, physical interpretation of the wave function.
- Chemical Bonding: Lonic solids - lattice and salvation energy, solubility of ionic solids rule, power and polarisability of ions, covalent nature of ionic bond covalent bond –Stereochemistry of inorganic molecules - common hybridization and shapes of molecules Molecular orbital theory - Shapes and sign convention of atomic orbital, modes of overlapping, concepts of sigma and pi bonds, criteria for forming molecular orbital from atomic orbital, LCAO - concept, types of molecular orbital - bonding, antibonding and non-bobding, electron density distribution diagram for H2 +, MOED of homonuclear - H2, He2+, B2, C2, N2, O2, F2 and their ions (unhybridised diagrams only) and heteronuclear diatomic molecules CO, CN-, NO,NO- and HF. Bond order and magnetic properties.
- Periodic properties
- Review of trends in atomic and ionic radii - covalent radii - single, double and triple bond covalent radii, van der Waal radii, radii of cations, anions isoelectronic ions, ionization energy, Electropositivity, basic nature, reducing behavior, electron affinity and electro negativity - Methods of determination and evaluation - Pauling's and Mulliken's approach, application in predicting and explaining chemical behavior - nature of bond, bond length and bond angles, diagonal relationship.
- Chemistry of elements of Second and Third Transition series- comparative treatment with their 3d analogues with respect to oxidation state, magnetic behavior, spectral properties.Study of Ti, Cr and Cu triads-Titanium triad - electronic configuration, reactivity of +III and +IV states -oxides, halides. Chromium triad - reactivity of +III and +VI states. Copper triad - reactivity of +I, +II, and +III states.
- Metals: Theories of bonding in metals - Free electron theory - thermal and electrical; conductivity of metals, drawbacks. Valence bond theory - explanation of metallic properties and its limitations. Band theory - explanation of metallic properties, conductors, semiconductors and insulators. General methods involved in extraction of metals - minerals and ores, ore concentration – electromagnetic separation, gravity separation - wilfley table, hydraulic classifier, leaching, froth flotation, Calcination and roasting. Acid and alkali digestion. Reduction of oxides, carbonates, halides, sulphides, sulphates - smelting, flux, auro reduction, alumino - thermic reduction, hydrometallurgy, electrolytic reduction.
- Gaseous state: Deviation of real gases from ideal behavior, Vanderwaal's equation of state. Critical Prenomena: PV - isotherms of real gases, continuity of state, Andhrew's isolthems of carbon dioxide. The vander waals equation and the critical state, Derivation of relationship between critical constants and Vander waal's constants. Experimental determination critical constants.
- Liquid state: Intermolecular forces, structure of liquids (qualitative description). Structural different between solids, liquids and gases. Liquid crystals, the mesomorphic state: classification of liquid crystals into Semectic and Nematic, differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices,lubricants and in digestion/assimilation of food.
- Solutions: Liquid - liquid mixtures - ideal liquid mixtures, Raoult's and Henry's law. Fractional distillation. Partially miscible liquids - phenol-water, trimethyl amine-water, nicotine-water systems, Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation.
- Chemical Kinetics: Rate of a reaction, factors influencing the rate of a reaction - concentration, temperature, pressure, solvent, light and catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions - Zero order, first order, second order, pseudo first order, half-life and mean life. Determination of order of a reaction - differential method, method of integration, half-life method and isolation method. Radioactive decay as first order phenomenon. Arrhenius equation, and concept of activation energy. Theories of chemical kinetics: effect of temperature on rate of a reaction Simple collision theory based on hard sphere model.
- Thermodynamics: Definition of thermodynamic terms: System, surroundings, types of systems, and intensive and extensive properties. State and path functions and their differentials.
- Thermodynamic process. Concept of heat and work.
- First law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law - Joule. Thomson coefficient and inversion temperature.

- Thermodynamic scale of temperature.
- Concept of entropy, entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical processes. Gibbs and Helmholtz functions: Gibbs function (G)
- Acids and Bases: Arrhenius, Lowry-Bronsted concepts of acids and bases-Strengths of acids and bases-Dissociation of poly-protic acids, Lewis theory of acids and bases: HSAB(Hard and soft acid and base) Concept-Pearson's classification as hard and soft acids and bases, acid-base strength and hardness and softness.
- Carbohydrates: Introduction: Classification and nomenclature-classification into mono, oligo and polysacchrides into pentoses, hexoses etc. into aldoeses and ketoses. Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Number of optically active, isomers possible for the structure, configuration of glucose based on D-glyceraldehydes as primary standard (No proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehyde tests and mutarotation).
- Amino acids and proteins: Introduction: Definition of Amino Acids, classification of Amino acids into alpha, beta and gama amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples Zwitter ion structure-salt like character, solubility, melting points, amphoteric character, definition of isoelectric point. Chemical properties: General reactions - Reactions due to amino and carboxyl groups- Lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins, peptide synthesis.

Part B: BIOLOGICAL SCIENCES

BOTANY (50 Marks)

- Evolution of Life and Diversity of Microbes. Origin and evolution of Life -an outline.
  Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control.
  Bacteria: Structure, nutrition, reproduction and economic importance, an outline of Plant diseases of important crop plants caused by bacteria and their control. Brief account of Archaebacteria, Chlamydia, Actinomycetes and Mycoplasma, cyanobacteria
- Algae and Fungi: General account, thallus organisation, structure, reproduction, classification and economic importance - Oedogonium, Ectocarpus and Polysiphonia.
  Fungi: Structure, reproduction and life history of Cercospora, Penicillium, Puccinia, Alternaria, General account of plant diseases caused by Fungi and their control.
  Lichens: Structure and reproduction; ecological and economic importance.
- Bryophytaand Pteridophyta Bryophytes: General characters, classification and alternation of generations. Structure, reproduction, life history and systematic position of Marchantia, Anthoceros and Funaria, Polytrichum.Evolution of Sporophyte in Bryophytes. Pteridophytes: General characters, classification, alternation of generations and evolution of sporophtyte. Structure, reproduction, life history and systematic position of Rhynia, Lycopodium, Equisetum Evolution of stele, heterospory and seed habit in Pteridophytes.
- Gymnosperms and paleobatany General characters, structure, reproduction and classification.
  Morphology of vegetative and reproductive parts, systemic position, life history of Pinus and Gnetum.
  Distribution and economic importance; endangered Gymnosperms.
  Palaeobotany: Introduction, Fossils and fossilization; Geological time scale; Importance of fossils.
  Bennettitales: General account
- Anatomy:
  Meristems, Leaf, Stem and root.
  Anamalous secondary growth-General account. Stem-Boerhavia, Bignonia, Dracaena; Wood structure: General account. Study of local timbers–Teak, Rosewood, Red sanders, Nallamaddi Yegisa, and Neem
- Embryology:
  History and importance of Embryology, Anther structure, Microsporogenesis and development of male gametophyte. Ovule structure and types; Megasporogenesis; types and development of female gametophyte. Pollination-Types; Pollen-pistil interaction. Fertilization. Endosperm-Development and types. Embryo-development and types; Polyembryony and Apomixis- an outline.
  Palynology: Principles and applications.
- Taxonomy:
  Plant systematics, Systematics vs Taxonomy, Types of classification: Artificial, Natural and Phylogenetic. Systems of classification: Bentham & Hooker, Engler & Prantle. Current concepts in Angiosperm Taxonomy: Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy. Nomenclature and Taxonomic resources, Herbarium
- Medicinal Botany:
  Ethnomedicine, Outlines of Ayurveda, Sidda, Unani and Homeopathic systems of traditional medicine. Plants in primary health care, Traditional medicine vs Modern medicine. Pharmacognosy, Plant crude drugs
- Cell Biology: Plant cell envelops, Nucleus, Chromosome and its types, Karyotype. Cell division: Cell cycle and its regulation;
- Genetics: Mendelism, Genetic interactions, Linkage and crossing over. Mutations: Chromosomal aberrations, Gene Expressions, Extra nuclear genome: Mitochondrial and plastid DNA, plasmids.
- Ecology:
  Concept and components of Ecosystem. Energy flow, food chains, food webs, ecological pyramids,
  Plants and environment: Ecological factors-Climatic (light and temperature), edaphic. Ecological adaptations of plants, Population ecology, Community ecology, Production ecology
- Biodiversity and Conservation:
  Biodiversity: Concepts, Convention on Biodiversity - Earth Summit. Types of biodiversity.
  Levels, threats and value of Biodiversity. Hot spots of India, Agro-biodiversity, Principles of conservation, Role of organisations in the conservation of Biodiversity.
- Plant Physiology:
  Water Relations, Mineral Nutrition, Enzymes, Photosynthesis, Translocation of organic substances
- Physiology: Respiration, Nitrogen Metabolism, Lipid Metabolism,growth and Development,Stress Physiology
- Tissue Culture and Biotechnology:
  Tissue culture, Callus culture, cell and protoplast culture, Somatic hybrids and cybrids. Applications of tissue culture. Biotechnology: Introduction, history and scope. rDNA technology: Vectors and gene cloning and transgenic plants.
- Seed Technology and Horticulture:
  Seed: Seed dormancy; causes and

methods of breaking dormancy, Seed storage, Seed production technology, seed testing and certification, Horticulture techniques, Floriculture, Micro irrigation systems, Vegetative Propagation of plants, Layering and bud grafting, Role of plant growth regulators in horticulture.

ZOOLOGY (50 Marks)

- Biology of Invertebrates and cell biology: General characters and classification of Major Invertebrate phyla with examples up to orders, Ultra structure of Animal Cell: Cell Division, Mitosis and Meiosis. Structure and function of the following cell organelles: (i) Plasma Membrane: Membrane, Transport of small molecules, Cell Junctions, Cell adhesion, (ii) Cytoskeleton,(iii) Golgi Complex, (iv) Lysosomes, (v) Role of mitochondria in cellular energy, transactions, (vi) Chromosomes-Structure and type, Salivary gland chromosomes.
- Animal Physiology, Behaviour and Ecology:
  Nutrition: Types, vitamins and minerals. Digestion, Respiration, Circulation, Excretion, Nervous transmission, Muscle contraction in mammals. Endocrine glands, Hormonal control of reproduction in mammals. Concept of Homeostasis. Animal Behaviour, Animal Ecology, Animal associations, Environments and adaptive features of animals Environmental pollution, Wild life, wild life sanctuaries and national parks of India.
- Biology of Chordates, Genetics, Evolution and Zoogeography: Protochordata, Cyclostomata, Parental care in Amphibia, Dentition in Mammals, Developmental Biology Genetics: Gene interaction with 3 examples, Sex determination, Sex linked inheritance, Blood group inheritance, Fine structure of gene, Operon/ concept, Cloning, Lethal genes, Chromosomal Aberration and human diseases. Evolution and Zoogeography, Modern synthetic theory of Evolution, Mutations, Genetic basis of Evolution, Genetic Drift (Hardy Weinberg's Law), Isolation and speciation, Characteristics of the following Zoogeographic regions and their fauna

Part B: SOCIAL STUDIES

POLITICAL SCIENCE

POLITICAL SCIENCE CONCEPTS, THEORIES AND INSTITUTIONS

- Introduction, definition of Political Science
- State–nation and Civil Society
- Sovereignty: Monism and Pluralism
- Theories of Origin of the State: Social Contract and Evolutionary (Historical)
- Concepts: Law, Liberty and Equality–Their Relationship theories and kinds of Rights
- Forms of Government
- Theory of Separation of Powers
- Organs of Government

GOVERNMENT AND POLITICS

- Salient Features of Indian Constitution
- Evolution of Indian Constitution-nationalist Movement and Philosophical Foundations
- Indian Federation–Centre-State relations
- President–election, Powers and Functions–Prime Minister and Council of Ministers
- Parliament–Composition, Powers and Functions
- Judiciary–Supreme Court, Composition, Powers, Functions and Judicial review–Judicial Activism.
- Party System: national and regional parties, Coalitional Politics.
- Election Commission–Electoral reforms and voting behavior
- State Government– Governor, Chief Minister and Council of Ministers–powers and Functions

POLITICAL THOUGHT

- Ancient Indian Political Thought: Sources of Ancient Indian Political Thought, Manu: Varnadharma and Dandaneeti, Kautilya: State and Society, Gouthama Buddha: Dhamma and Sangha
- Modern Indian Political Thought: Gandhi: Ahimsa and Satyagraha, Nehru : democratic Socialism, Ambedkar: Annihilation of Caste, M.N.Roy: Radical Humanism
- Western Political Thought: Plato, Aristotle, Machiavelli, Thomas Hobbes, John Locke, J.J.Rousseau, Jermy
- Benthom, J.S.Mill, Hegel, Marx

ECONOMICS

- Micro- Macro, Static-Dynamic, Normative and Positive Economics.
- Cardinal and Ordinal approaches, and law of diminishing marginal utility.
- Law of variable proportions, and returns to scale.
- Different concepts of costs and their Inter-reaction.
- Concepts of National Income.
- Meaning of Economic Development and Measure of Economic Development-GNP, PQLI, and HDL
- Sources of Public revenue.
- Canons and Effects of Public Expenditure.
- Functions and classification of Money.
- Budgets and Money supply-concept of Inflation.
- Functions of commercial banks and functions of Reserve Bank of India.
- Methods of Credit control.
- Importance of Agriculture in the Indian Economy,
- Population growth in India-causes-problems of over population.
- Regional disparities- causes of inequalities in Income and Wealth.
- Meaning of a mixed Economy, characteristic features.
- The concept of poverty-causes of poverty in India.
- Types of unemployment-Disguised, Seasonal, Frictional, And Structural.
- Objectives of Planning in India-Important achievements and failures of planning India.

GEOGRAPHY

- Unit-I: Principles of Physical Geography:
- Unit-II: Submarine relief - Distribution of temperature and salinity - Movements of Ocean water: Waves, Tides and Currents - Currents of the Pacific, the Atlantic and the Indian Ocean - Ocean deposits.
- Unit-III: Regional Geography of India: Locational aspects, Major Physiographic regions, climate, drainage, soil types and natural vegetation-pattern and growth trends of population, urbanization -Agriculture: Rice, Wheat, Cotton, Jute, Sugarcane, Tea and Coffee - irrigation and power development in India-Minerals: Iron, coal and petroleum-Composition and pattern of trade.
- Unit-IV: Regional Geography of Asia: Scope and content of Regional Geography-location, Relief, Drainage, Climate, Natural Vegetation, Agriculture. Types mineral wealth (iron, tin, coal and oil); Industrial development, industries (shipbuilding, petrochemicals, automobiles); Population distribution; Broad outlines of the following as regions: South East Asia: Thailand, Malaysia, Indonesia - South West Asia: Iran, Iraq, Afghanistan.

HISTORY

- Unit–I: Indus valley civilization – Vedic culture -–Rise of new religious Movements–Jainism and Buddhism in 6th Century B.C Impact on society and culture.
- Unit–II: A brief survey of political conditions in ancient India –Magadha - Alexander's Invasion and mouryas Ashoka's Dharma. Its nature and propogation–Mouran Administration – Economy – Art and Architecture.
- Unit–III: Post -Mouryan period in North India– A brief political survey of Kushans, Guptas, Puswabuthi and Rajputs Polity and Administration – Social condition Caste system – position of Women Economy – Indian Feudalism –Art – Architecture – Education, Literature, Philosophy, Science and Technology.
- Unit –IV: A brief political survey of South India – Sangham Age – Satavahanas Pallavas - Cholas – Calukyas and Rastrakutas - Kakatiya and Vijayanagara Polity and Administration, Society Economy – Art and – Architecture.
- Unit –V: Social reform and Literary Movements
- Unit –VI: Invasions of Arabs, Ghaznavids and Ghoris and Delhi Sultanate
- Unit –VII: Impact of Islam on Indian Society and Culture - Bhakthi and Sufi Movements Emergence of Composite culture.
- Unit –VIII: Survey of Sources- Establishment of Mughal Empire– Sur Interrugnam
- Unit- IX: Advent of European powers – Portuguese, Dutch, English and French Expansion and consolidation of British Empire
- Unit –X: Anti - Colonial Upsurge – Peasant and Tribal revolts – 1857 revolt – Causes – results and nature.
- Unit –XI: Factors for social change
- Unit –XII: Indian National Movement –
- Unit –XIII: Emergence of Communal trends – partition of India – Integration of Princely States into Indian Union.
- Unit –XIV: Characteristic features of Renaissance
- Unit –XV: Emergence of nation States in Europe – Nature of Feudalism in Europe and Asia Unit- Age of revolutions – Glorious revolution (1688) – American Revolution (1776) – French Revolution (1789)
- Unit –XVI: World between 1914–1945- Rivalry among colonial powers Imperialist. Hegemony

M.B.A.

QUESTION PAPER FORMAT:
There will be three written tests of three hours total duration. They would be of a pattern similar to CAT, GMAT and MAT. The details of various tests are as follows:

English:
60 Questions (1 Hour)

- This test is designed to test the candidate's command over English and Grammar, his vocabulary, and his ability to use words and phrases effectively. This test is also designed to test the ability of the candidate to read and rapidly digest literature, his ability to extract qualitative and quantitative information, and his ability to communicate precisely.

Quantitative Analysis & Logical Reasoning:
30 Questions (45 mins)

- This test is intended to assess the candidate's ability to handle quantitative information with speed and accuracy. This test is also designed to determine the candidate's ability to draw valid inferences from available information, using logical reasoning and simple mathematical formulae.

Management Aptitude:
30 Questions (30 mins)

- The purpose of this test is to assess the candidate's aptitude for Management profession and his ability to comprehend facts, and analyze given situation. The purpose of this test is also to assess the awareness of the candidate pertaining to national and international issues.

Written English:
(15 mins)

- A short essay on a specific theme

REFERENCE BOOKS

- Standard books used for CAT/MAT/GMAT Entrance Examinations.

M.TECH. IN COMPUTER SCIENCE

QUESTION PAPER FORMAT
For the written test, the question paper is divided into two parts:

Written Test: 120 Marks- 2 hours- Computer Science (67%) and Mathematics (33%)- two parts:

Part A: 80 Objective type items - 80 Marks (80 min.). This consists of 60 multiple choice questions of Computer Science- 20 multiple choice questions of Mathematics

Part B: Short Answer type Questions - 40 Marks (40 min.). This consists of 8 x 5 =40 marks- 4 short answer type questions of Computer Science- 4 short answer type questions of Mathematics.
In addition, there is a General English Aptitude Test: 20 marks- ½ hour- essay type questions- to test English language and communication skills

Practical Programming Skills Test (subject to qualification in written test)- 80 Marks- 2 ½ hours-to test the proficiency in designing, coding and debugging abilities in C language- the coding language will be in Linux platform

Technical Viva voce (subject to qualification in first two components): 30 Marks- to test the comprehension of basics and analytical abilities

Final Interview: An Interview will be conducted for candidates who qualify in the Practical and Viva- voce for final selection.

TOPICS

COMPUTER SCIENCE
The subjects to be covered under this area are: Data Structures & Algorithms, Computer Organization and Architecture, Data Communication and Networks, Database Systems, Operating system and System programming, and C, C++, & Java programming concepts.

Data Structures and Algorithms:

- Asymptotic Relations, Sorting Algorithms, Searching Algorithms, Basic Data Structures like Linked List, Doubly Linked List, Circular Linked List and Binary Tree. Abstract Data Types like Stacks, Queues and Graphs.

Computer Organization and Architecture:

- Computer Arithmetic, Instruction Set Architecture Characteristics, Instruction Cycle, CISC, RISC, Super Scalars Architectures, Instruction Formats, Addressing Modes, Pipelining and Instruction Level Parallelism, Speed-up of a Processor, Control Hazards, Basics of Cache, Cache Coherence, Basics of I/O, Interrupts.

Data Communication and Networks:

- Packet/circuit switching, loss, delay, throughput in a network, protocol layers, OSI & TCP/IP, HTTP,FTP, Electronic mail, DNS, Client server vs P2P architecture, Transport-layer Multiplexing and demultiplexing, sliding window protocols, TCP & UDP protocols, Principles of reliable data transfer, congestion control, Virtual circuit and datagram networks, IPv4, IPv6, Routing algorithms, Multiple access protocols, Error correction- detection, Wireless and Mobile Networks, GSM,CDMA, 802.11 standard, handling mobility in cellular networks, basics of physical layer

Data Base Systems:

- Database languages, View of Data, Relational Model, SQL: set operations, Aggregate functions, Nested Sub queries, Joined relations; ER Model: Constraints, Weak Entity sets, Generalization, Specialization, Reduction to Relational Schemas; Normalization: Different Normal Forms, Functional Dependency, Multi-valued Dependency; Transaction: Transaction concept, ACID properties, Serializability, Recoverability, Testing for serializability.

Operating Systems and System Programming:

- The concept of a process, operations on processes, process states, concurrent processes, process control block, process context, Job and processor scheduling, scheduling algorithms, Problems of concurrent processes, critical sections, mutual exclusion, synchronization, deadlock, Memory organization and management, storage allocation. Virtual memory concepts, paging and segmentation, File organization: blocking and buffering, file descriptor, directory structure, Basics of assemblers, Macro preprocessors and compilers.

Object Oriented Programming Concepts:

- Principles of Object-Oriented Programming, Classes, objects, constructors and destructors, Operator overloading, Type conversions, Type of constructors, Function over loading, Inheritance, Polymorphism, File stream – File operators.

Calculus of One and Several Variables:

- Limit, continuity, differentiation and integration of functions of one and more variables. Directional derivative and gradient of a function.

MATHEMATICS

- The subjects to be covered are: ODE, Discrete Mathematics, Linear Algebra, Probability and Statistics and Basic Calculus

Linear Algebra:

- Vector spaces, subspaces, basis, linear transformation, matrix of linear transformations, system of linear equations and their solutions using Gaussian elimination method, Eigen values and Eigen vectors, diagonalization of a linear transformation.

Discrete Mathematics:

- Set theory, Mathematical logic, Relations and functions, Trees and Graphs.

Probability and Statistics:

- Random variables, discrete and continuous distributions including Bernoulli, binomial, uniform, Poisson, exponential, hyper-geometric distributions, expectation, moments, central limit theorem, law of large numbers, random sample, sample mean, sample variance, mean, median and mode.

REFERENCE BOOKS

COMPUTER SCIENCE

- Data structures and algorithms in C by Mark Allen Weiss
- Computer Organization and design by David A. Patterson and John L. Hennessy , Elsevier Pub.
- Computer Networking: A Top-Down Approach, 4/E James F. Kurose, Keith W. Ross, Pearson Pub.
- Data Base System Concepts by Silberchatz, Korth and Studarshan, Tata McGraw Hill Pub.
- Systems programming by Lelend Beck, 3rd edition, Pearson India.
- C++ How to Program, 4/e by Paul Deitel

MATHEMATICS

- Calculus by Stanley I. Gossman, Academic Press Pub.
- Linear algebra by Larry smith, 3rd edition, Springer Verlag.
- Discrete Mathematical Structures by Kolman, Busby and Ross, 4th Ed., Pearson Pub.
- Advanced Engineering Mathematics by Kreyszig, 8th ed., Wiley Eastern, 1999.
- Differential Equations by Shapley L. Ross John Wiley and Sons Pub.

M.TECH. IN OPTOELECTRONICS & COMMUNICATIONS

General English Aptitude Test- 20 marks- ½ hour - essay type question- to test English language written communication skills

Written Test- 100 Marks- 3 hours- short answer , multiple choice and problem-solving type questions

Technical Viva voce

Final Interview

COMMON FOR B.E. / B.TECH. / M.SC. IN PHYSICS

General English Aptitude Test:
This will consist of an essay type question to test English language written communication skills. The test will be for half an hour with allocation of 20 marks. Linear Algebra: Determinates, System of linear equations, Eigenvalues and eigenvectors, Diagonalization of matrices. Calculus: Limit, continuity and differentiability: 'Hospital rule, Maxima and minima, Taylor's series, Evaluation integrals, Lagrange multipliers, Power series, Fourier series.

Complex variable:

- Analytic functions, Taylor's and Laurent' series, Residue theorem, Cauchy's theorem.
- Vector Calculus: Gradient, Divergence and Curl, Line, surface and volume integrals, Stokes, Gauss and Green's theorems.

Ordinary and Partial Differential Equations:

- ODEs with constant coefficients, variation of parameters, Initial and boundary value problems (BVPs), Power Series solutions, Legendre, Hermite and Bessel's functions, Variables separable method, Solutions heat, wave and Laplace equations.

Programming & Numerical Methods:

- Data Types & Declarations, Program Organization, Arithmetic Statements, Flow of Control-Iterative Statement, Conditional statement, Unconditional branching, arrays, functions and procedures, pointers, classes, file handling.
- Errors, Interpolation, curve fitting, root finding, solutions of algebraic system,

Eigen values – Power method, Numerical integration, Numerical Differentiation, Solution of ODEs and BVPs – RK Methods, Shooting & Crank-Nicholson methods.

FOR B. E. / B. TECH APPLICANTS ONLY

Networks:
- Network graphs: matrices of graphs; Solution methods, Nodal and mesh analysis, Network theorems, Thevenin's and Norton's, Wye-Delta transformation. Steady state analysis, Time and Frequency domain analysis, Solution using Laplace transform, 2port network parameters: transfer functions and state equations.

Electronic Devices:
- Energy bands, Carrier transport, diffusion, drift, mobility, resistivity, Diodes: p-n junction, Zener, BJTs, FETs, JFETs, MOSFETs, PIN and Avalanche; LEDs, LASERs,

Analog Circuits:
- Equivalent circuits of diodes, BJTs, JFETs, and MOSFETs. Simple diode circuits, Single-and multi-stage, differential, operational, feedback and power amplifiers, Frequency response of amplifiers; Op-amp circuits, Filters, Oscillators.

Digital circuits:
- Boolean algebra, logic gates, Digital IC families (DTL, TTL, ECL, MOS, CMOS), Combinational circuits, arithmetic circuits, code converters, multiplexers and decoders. Latches and flip-flops, counters and shift-registers. Sample and hold circuits, ADCs, DACs, Memories, Microprocessor (8085): architecture, programming, memory and I/O interfacing.

Signals and Systems:
- Laplace transform, continuous-time and discrete-time Fourier series and transforms, Z-transform. Sampling theorems. L TI Systems: analysis and signal transmission, Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density.

Control Systems:
- Feedback; transfer function; steady-state errors; Stability criteria; Bode plots; Elementary state variable formulation; Transition matrix and response for L TI systems. On-off, cascade, P, PI, PID and feed-forward controls. Controller tuning and general frequency response.

Communications:
- Analog systems: modulation and demodulation systems, spectral analysis, superheterodyne receivers; hardware, realizations of analog communication systems; signal-to-noise ratio (SNR) AM, FM. Digital systems: PCM, DPCM, DM; ASK, PSK, FSK; matched filter receivers, bandwidth consideration and probability of error calculations for these schemes.

Electromagnetics:
- Maxwell's equations, Wave equation, Pointing vector. Plane waves: propagation, reflection and refraction; phase and group velocity; skin depth; Transmission lines: characteristic impedance; impedance transformation; Smith chart; Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Antennas: Dipole antennas; antenna arrays; radiation pattern; reciprocity theorem, antenna gain.

FOR M.SC. IN PHYSICS APPLICANTS ONLY

Classical Mechanics:
- Lagrange's and Hamilton's formalisms; Equation of motion, Poisson bracket; small oscillations, normal modes; wave equation; Special theory of relativity – Lorentz transformations, relativistic kinematics, mass-energy equivalence.

Electromagnetic Theory:
- Laplace and Poisson equations; conductors and dielectrics; boundary value problems; Ampere's and Biot-Savart's laws; Faraday's law; Maxwell's equations; boundary conditions; electromagnetic waves; radiation from moving charges.

Quantum Mechanics:
- Schrodinger equation; Bound state problems, hydrogen atom; angular momentum and spin; addition of angular momentum; matrix formulation, time independent perturbation theory; elementary scattering theory.

Atomic and Molecular Physics:
- Spectra of one-and many-electron atoms; LS and jj coupling; Zeeman and Stark effects; X-ray spectra; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Franck-Condon principle; Raman effect; NMR and ESR;

Thermodynamics and Statistical Physics:
- Laws of thermodynamics; calculation of thermodynamic quantities; microstates, macrostates, phase space; partition function, free energy, classical and quantum statistics; Fermi gas; Black body radiation; Bose-Einstein condensation; first and second order phase transitions, critical point.

Solid State Physics:
- Elements of X-crystallography; structure determination; bonding, elastic properties, defects, lattice vibrations and thermal properties, free electron theory; band theory of solids; metals, semiconductors and insulators; transport properties; optical, dielectric and magnetic properties of solids; elements of superconductivity.

Nuclear and Particle Physics:
- Rutherford scattering; basic properties of nuclei; radioactive decay; nuclear forces; two nucleon problem; nuclear reactions; conservation laws; fission and fusion; nuclear models; particle accelerators, detectors; elementary particles; photons, baryons, mesons and leptons; Quark model.

Electronics:
- Network analysis; semiconductor devices; bipolar transistors; FETs; power supplies, amplifier, oscillators; operational amplifiers; elements of digital electronics; logic circuits.

SRI SATHYA SAI INSTITUTE OF HIGHER LEARNING

PRASANTHI NILAYAM

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The end of education is character.
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