SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

SATHYABAMA
ALL INDIA ENTRANCE
EXAMINATION-2020
SAEEE-2020

SATHYABAMA
ALL INDIA ENTRANCE EXAMINATION-2020 **SAEEE-2020**

Last Date To Apply 4th April, 2020

Entrance Examination - 2020
For The Following Undergraduate Programmes

(B.E. / B.TECH. / B.ARCH. / B.DES.)

NIRF RANKING 2019
Ranked Among India's
top 50 universities for four consecutive years

NATIONAL INSTITUTIONAL RANKING FRAMEWORK

Government of India
Ministry of Human Resource Development

QS STARS
RATED FOR EXCELLENCE
2019

INFORMATION BROCHURE

CONTENTS

I. INTRODUCTION

Sathyabama Institute of Science and Technology aims to provide higher education with high quality teaching and research. The Institution has attained higher under the able guidance of Founder Chancellor **Col. Dr. JEPPIAAR, M.A., B.L., Ph.D.,** and dynamic leadership of chancellor **Dr. MARIAZEENA JOHNSON, B.E., M.B.A., M.Phil., Ph.D.,** well supported by president **Dr. MARIE JOHNSON, B.E., M.B.A., M.Phil., Ph.D.,** Vice Chancellor **Dr. S. SUNDAR MANOHARAN, Ph.D.** At present, institution offers 39 under Graduate Programmes, 23 Post Graduate Programmes and Ph.D., programme in Engineering, Technology, Arts, Science, Pharmacy, Nursing, Law and Management. We admit students into under Graduate Engineering, Technology, Architecture and B.Design Programmes based on the Sathyabama All India Entrance Examination conducted every year.

II. ELIGIBILITY CRITERIA FOR ADMISSION

Candidates can choose any of the following programmes (refer page no.2) based on the eligibility criteria. Candidates should have passed the qualifying examination with first class/grade either in March/April 2019 or should be appearing for the same in March/April 2020. The candidate's date of birth should be on or before 1st January 2000.

In addition to this, candidates should have passed the 10th class or Equivalent Examination in march/April 2018 or after, with minimum aggregate of 60% marks or "6.0" CGPA.

NOTE:

CANDIDATES PASSED IN COMPARTMENTAL CLASS/ GRADE (OR) PASSED WITH ARREARS/ EIGTHER IN 10TH CLASS IN 12H CLASS NOT ELIGIBLE FOR ADMISSSION.

NON PRESENDENT (NRI). DIPLOMA HOLDERS AND CANDIDATES OF FOREIGN ORGIN NEED APPEAR FOR THIS ENTRANCE EXAMINATION.

UG PROGRAMMES IN ENGINEERING, ARCHITECTURE, DEIGN AND ELIGBILITY CRITERIA

	PROGRAMME & SPECILATION	DURATION	ELIGIBILITY CRITERIA
❖	B.E- Aeronautical Engg.	**4 Years**	A pass in the 10th class or Equivalent Examination with a minimum aggregate of 60% marks or "6.0" CGPA. A Pass in the 10+2/HSC/ICSE or Equivalent Examination with Mathematics , Physics and Chemistry with an average of 45% marks in Mathematics , Physics and Chemistry.(40% in case of candidates belonging to Reserved Category)
❖	B.E- Automobile Engg.		
❖	B.E- Civil Engg.		
❖	B.E-Computer Science and Engg.		
❖	Electrical and Electronics Engg.		
❖	Electronics and Communication Engg.		
❖	Electronics and Instrumentation Engg.		
❖	Mechatronics		
❖	Mechanical Engg.		
❖	Chemical Engg.		
❖	Information Technology		
❖	Bio Medical		
❖	Biotechnology		
❖	B.Design – Interior Design		A pass in 10+2/HSC obtain atleast 45% marks(40% in case of candidates belonging to reserved category) in the qualifying Examination
❖	B.Arch- Bachelor of Architecture	**5 Years**	A Pass in the 10+2/HSC/ICSE or Equivalent Examination with Mathematics , Physics and Chemistry with a minimum average of 50% marks in Mathematics , Physics and Chemistry.(45% in case of candidates belonging to Reserved Category) and valid NATA marks (National Aptitude Test in Architecture) Note: For regular update about architecture refer Council of architecture website. Candidate opting for this programme should appear for Mathematics, Physics and Chemistry in the entrance examination.

III ENTRANCE EXAMINATION AND ADMISSION POCEDURE

1. PRIMARY INFORMATION TO ALL CANDIDATES APPLYING FOR ENTRANCE EXAMINATION -2020

- Candidates are required to ensure themselves that they possess the requisite eligibility criteria for admission in o a programme bore applying for entrance examination (refer eligibility criteria in page no.2)

- Based on 12th class syllabus (refer page no.10 for detailed syllabus). Entrance examination will be conducted in Mathematics, physics and Chemistry. All Candidates must appear for Mathematics, physics and Chemistry.

- Entrance Examination will be conducted only by computer based mode.

- Permitting a candidate to appear for the entrance Examination -2020 or counseling does not entitle the right for admission.

- Candidates who have been offered provisional admission after counseling should submit the relevant original documents such as 10th/HSC Mark sheet, Transfer Certificate, etc. at the time of admission. If not, admission will stand cancelled.

- After admission, at a later point of time if any discrepancy or malpractice is noticed in the submitted documents, the Candidate's admission will be cancelled by the institution without any further explanation.

2. ADMISSION PROCEDURE

The admission to **B.E /B.Tech. / B.Arch./ B. Des**. Programmes is done solely on the basics of the performance in the **All India B.E /B.Tech. / B.Arch./ B. Des. Entrance Examination 2020** conducted by Sathyabama Institute of Science and Technology. The candidates will be shortlisted and called for Counseling based on their performance in the entrance examination 2020. On the day of counseling the branch of study will be allotted depending on the availability of seat and provisional admission order will be issued on the same day after collecting a non- refundable counseling fee of Rs.50,000/-.

ALLOTMENT OF BRANCH ONCE MADE DURING THE COUNSELLING IS FINAL AND CANNOT BE CHANGED UNDER ANY CIRCUMSTANCES.

3. APPLICATION PROCEDURE B.E /B.Tech. / B.Arch./ B. Des. ENTRANCE EXAMINATION 2020

To apply entrance examination – 2020, the eligible candidate may choose any one of the following options:

a. APPLICATION FORM (PHYSICAL MODE)

Eligible candidate can get the application form on payment of Rs.650/- at our campus. Application forms may also be obtained through post by sending a request letter (candidates mailing address should be mentioned clearly in capital letters with pin code number, mobile number and e-mail ID) along with a demand draft for Rs.650/- drawn in favour of **Sathyabama Institute of Science and Technology**, payable at Chennai, This request letter should reach on or before 25th March 2020 to **The Coordinator, Entrance examnation-2020, Sathyabama Institute of Science and Technology, Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai-600 119.**

Filled in datasheet can be sent to The Coordinator, Entrance examnation-2020, Sathyabama Institute of Science and Technology, Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai-600 119.

Candidates are advised to ensure that the entrance examination application form (data sheet) submitted is complete in all aspects. We are not responsible for the in complete data given by the candidate in the datasheet.

CANDIDATES ARE REQUESTED TO RETAIN A PHOTO COPY OF THR FILLED IN DATASHEET AND NOTE THE APPLICATION NUMBER FOR FURTHER ENTRANCE REFERENCE. APPLICATION NUMBER IS REQUIRED TO TRACK YOUR APPLICATION AND TO BOOK THE SLOT FOR COMPUTER BASSED EXAMINATION.

b. APPLICATION FORM (ONLINE MODE)

Candidates can also use online submission of application, which is available at www. Sathyabama.ac.in. Candidate opting for online submission should fill the application, and verify that all the details are entered. After the verification of the details, online payment of Rs.650/- should be made either by using Net Banking Facility/Credit Card/Debit Card or offline payment (only by Indian bank challan mode) at any one of the INDIAN BANK branches.

The candidates who have submitted the application through online mode need not send any printed forms/account statement/ bank or institution challan copy etc., unless otherwise requested by authorities. But they should note the application number, login user name and password for future reference (application number must be required to track their application and to book the slot for computer based examination). Applications without the fee payment will not be considered.

4. RECEIPT OF ENTRANCE EXAMINATION 2020 APPLICATIONS

- Last date for receipt of filled in datasheet at the Institution office: 4th April, 2020.
- Applications received after the due date will not be processed and rejected.
- Institution will not be responsible for any postal delay, loss in portal transmit or any damage of the datasheet.

5. ENTRANCE EXAMINATION- 2020 INSTRUCTIONS

Entrance Examination 2020 will be conducted through COMPUTER BASED MODE only. COMPUTER BASED MODE Examination will be conducted in all designated centers as per the dates available in the Website.

a. TRACK YOUR ENTRANCE EXAMINATION 2020 APPLICATION

- After submission of application from either online mode or physical mode, candidates can track his/her application through our website www.sathyabama.ac.in/ online_entrane_home.php.

- A Candidate can track his/her application form by entering the application number.

- E-mail may be sent to entranceexam2020@sathyabama.ac.in for any assistance to track the application by mentioning the application number, candidate name & aadhar number (if available), father's name, mobile number and date of birth of the candidate.

b. ENTRANCE EXAMINATION DATE& TIME SLOR BOOKING:

SUBMISSION OF ENTRANCE EXAMINATION APPLICATION FORM ALONE IS NOT SUFFICENT TO APPEAR FOR THE EXAMINATION. THE CANDIDATE SHOULD BOOK THE DATE & TIME THROUGH ONLINE FOR APPERING THE ENTRANCE EXAMINATION.

The computer based examination will be conducted in different slots (9.00 A.M to 11.30 A.M Noon to 2.30 P.M and 3.00 P.M to 5.30 P.M) depending on the number of candidates applied in a particular centre (city). Through a candidate has opted the state and city to appear for the same. For slot booking a password will be sent to the registered mobile number. Availability of Examination dates and slots for each centre will be known only at the time of slot booking. Candidate can download the hall ticket from our website only after booking the slot. Without hall ticket, a candidate will not be allowed to appear for entrance examination.

- The date, time slot booking and downloading of hall ticket will commence form 2nd week of April 2020. All candidates are requested to visit website www.sathyabama.ac.in/ online_entrane_home.php for booking the slot and downloading the hall ticket.

- Examination date, time and slot booking will be on first come first serve basis.

- Availability dates and sessions for slot booking will be based on the number of applicants in a particular city

- After the last date, if a candidate does not book the slot and date, to appear for computer based entrance examination the slot will be booked for such candidate by the coordinator (Entrance Examination- 2020), as per the availability of the slots in that centre requested by the candidate. The date and time (slot) once booked by the candidate (Entrance Examination- 2020), shall not be changed under any circumstances.

- Computer based mode examination will be conducted in all centers as per the dates available in the website.

- The examination centers, date and session, either booked by the candidate or Entrance exam Coordinator (Entrance Examination- 2020), shall not be changed under any circumstances. Every effort shall be made to allot a centre to a candidate in the city opted by the candidate. Moreover, if it is not possible due to administrative reasons, Institution also reserves its right to allot a centre other than that of the candidate's choice.

- For ant assistance to book the slot and download the Hall Ticket e-mail may be sent entranceexam2020@sathyabama.ac.in by mentioning the application number, candidates name& aadhaar number, father's name, mobile number and date of birth of the candidate.

c. HALL TICKET

- After successfully booking the slot, the hall tickets should be downloaded from the website and printout has to be taken on A4 white paper. All candidates are requested to take 3 or 4 photo copies (Xerox) of this hall ticket. One copy of this hall ticket must be submitted to invigilator on the day of computer based examination, Remaining copies may be requires by the candidate at the time of counseling, admission, to apply education loan etc.

- The Hall Ticket will contain name of the candidate, photograph of the candidate, address of the test centre allotted, examination date and timings.

- The Hall Tickets is an important document. It should be preserved and produced at the time of counseling and admission.

- No candidate will be permitted to appear for the computer based examination without a valid Hall Ticket. Hall Ticket must be produced as a printout and not in electronic format(in mobile or laptop etc.,)

- Candidate must not tamper the Hall Ticket or alter its content in any manner.

- Impersonation of the candidate is a legally punishable offence.

- No candidate can appear for entrance examination more than one slot in any centers.

d. COMPUTER BASED EXAMINATION

- The computer based examination will be administered in an authorized examination centre only.

- The candidate should be present in the examination centers at least 30minutes before the commencement of examination.

- The candidate is not allowed to possess or carry any electronic devices inside the examination centre such as mobile phone, blue tooth device etc.

- The candidate is allowed to carry only pen/pencil, eraser inside the examination center.

- **Candidates should compulsorily bring the examination Hall Ticket issued by institution for verification.**

- **Candidates are advised to bring any original Photo Identify Proof such as Aadhaar Card/ Voter Identity Card/ Driving Licensee/Bank pass book/ School or College ID card/Passport.**

- A Computer will be assigned for each candidate after the verification of his/her identity to appear for the entrance examination.

- For making rough calculation, a rough sheet will be provided at the examination centre. Writing of copying of questions on the plain paper will be treated as malpractice. The rough sheet should be returned to the examination administrator after the completion of the examination.

- The examination administrator is empowered to send the candidate out of the examination centre or take any punitive action against the candidate, if the candidate is found to do any of the following:
  Creating disturbance, impersonation of the candidate, talking to other candidates, attempting to temper with the computer hardware or software, possession of any electronic items or text material, not producing Hall Ticket and identity proof.

6. INFORMATION TO CANDIDATES BY SMS & E-MAIL AT DIFFERENT STAGES OF ENTRANCE EXAMINATION AND ADMISSION PROCESS

Through mobile and e-mail: All candidates will be updated with all information regarding Entrance Examination-2020, slot booking, downloading and taking printout of Hall Ticket, Counseling Dates etc., to the mobile number (given in the datasheet) through

SMS and e- mail. Please ensure that all the correct mobile number and e-mail ID are provided in the datasheet.

7. RESULTS OF THE ENTRANCE EXAMINATION-2020

*   To Entrance Examination results will be published on ww.sathyabama.ac.in (Refer Page No.8)

*   Such the examination is computer based mode and evaluated with care, there is no provision for revaluation or re totaling. No correspondences in this regard will be entertained.

8. COUNSELLING PROCEDURE AND ADMISSION

*   The date/time for counseling will be published in our website ww.sathyabama.ac.in/online_entrance_home.php after the publication of results. Candidates can download and take a printout of their counseling call letter from our website and appear for the counseling as per the counseling schedule. Details regarding counseling venues, dates and fee will be mentioned in the counseling call letter.

*   Change of date/time of counseling is generally not permissible. If a candidate does not personally appear for counseling on the date and time specified, his/her seat shall to the succeeding candidate in the order of merit.

9. REQUIRED DOCUMENTS IN ORGINAL TO BE SUBMITTED DURING COUNSELLING & ADMISSION

*   The candidate should produce the following documents in original along with one set of photocopies while reporting for counseling candidates will not be allowed to participate in the counseling process without these documents

    o   Counseling call letter
    o   Sathyabama Entrance Examination-2020 Hall Ticket
    o   NATA score card (for B.Arch only)
    o   Secondary school (Class X) mark sheet
    o   HSC Mark sheet (Class XII) or Intermediate college Mark Sheet
    o   If a candidates fails to produce any of these documents, he/she will not be considered for counseling
    o   Five colour passport size photographs of the candidate and parents

*   The branch of study will be allotted as per the marks secured in the Entrance Examination and availability of seats on that particular date at the counseling. After the allotment of branch of study, provisional admission letter will be issued to the candidate. Last date for the submission of retaining fee, submission of original certificates and other admission procedure will be mentioned in the admission offer letter.

*   Allotment of branch once made is final and cannot be changed under any circumstances.

*   A candidate should make a decision before the payment of the fee, whether he/she should join the programme based on the branch allotted to him/her at the time counseling.

*   The candidates called counseling will have to pay the prescribed non- refundable counseling fee of Rs. 50,000/- (after the selection of the programmer/ branch that is available at the time of counseling)by means of Demand Draft drawn in favour of "Sathyabama Institute of science and Technology", payable at Chennai.

- A candidate can also attend the counseling through online to Select the preferred branch of Course and make the online payment of counseling fees.

- A candidates admission will be confirmed only after the payment of remaining tuition and other fee, such as Hostel Fee (if applicable) etc.

- On the day of counseling if the opted branch is not available, the candidate need not pay the counseling fee. Counseling fee paid once will not be refunded under any circumstances.

IV. SCHOLARSHIPS

We offer Dr. JEPPIAAR REMIBAI SCHOLARSHIP to students who secure the top three positions in the semester examinations. A Student if consistently maintains top rank in eight consecutive semesters is eligible for a **MAXMUM SCHOLARSHIP.**

For more Details regarding Scholarship offered for meritorious students, please visit our Webpage: admission/ Scholarship files Sathyabama.ac.in/news/scholarship.pdf.

V. IMPORTANT DATES TO REMEMBER

Issue of application forms	**18th October, 2019**
Last date for submitting the filled in application forms by any mode	**4th April, 2020**
Commencement of slot booking/ downloading of Hall Tickets	**2nd Week of April, 2020**
Computer based Examination (in all cities- Refer page no.23)	**14th to 19th April, 2020**
Declaration of Results and commencement of downloading of counseling call letter	**30th April, 2020**
Counseling for Admission (Online and Physical)	**1st Week of May, 2020**

*Refer page no.5 for more details

VI. QUESTION PAPER PATTERN AND MAXIMUM MARKS

The Question paper is divided into three parts.

- 30 Questions from Physics

- 30 Questions from Chemistry

- 60 Questions from Mathematics

- Sample questions are available at www.sathyabama.ac.in/ online_entrane_home.php.

EACH QUESTION CARRIES ONE MARK AND

NO NEGATIVE MARKS FOR WRONG ANSWERS

IMPORTANT INFORMATION

➢ We do not have any agent or middle men or broker for our admissions

➢ We have only one campus at Jeppiar Nagar, Chennai.

➢ Our official website is www.sathyabama.ac.in

➢ Entrance Examination application fee (Rs.650/-) will not be refunded under any circumstances

➢ Candidates are requested to enter and shade the correct mobile number properly in datasheet

➢ Candidates are requested to write their contact e-mail ID in capital letters nearly and legibly in datasheet

➢ Hall tickets/Results/Counseling call letter should be only downloaded from our website and not be sent by post under any circumstances

➢ Candidates are advised to check the SMS, e-mail frequently for any regular updates

➢ Candidates are advised to visit www.sathyabama.ac.in/ online_entrane_home.php. for regular updates regarding Entrance Examination -2020

➢ All the candidates must appear for Physics, Chemistry and mathematics in the Entrance Examination

➢ For any assistance, candidate can send an e-mail to entranceexam2020@sathyabama.ac.inby clearly mentioning their application number (if applied), name of the candidate, father's/guardian's name, mobile number, date of birth and aadhaar number (if available).

➢ Contact 044-24502436/24500600 (between 8.15 A.M and 4.00P.M except public holidays) and Toll Free No. 18004231770 for any enquiry regarding entrance examination

➢ All candidates who have submitted application for our entrance examination are requested to note their application number (either online or physical mode of submission). Application number is requested to track their application and to book the slot for computer based examination

➢ A candidate should submit only one application either physical mode (datasheet) or online mode

VII. SYLLABUS

PHYSICS

UNIT 1: PHYSICS AND MEASUREMENT

Physics, technology and society, SI units, Fundamental and derived units. Least count, accuracy and precision of measuring instruments, Errors in measurement, Significant figures. Dimensions of Physical quantities, dimensional analysis and its applications.

UNIT 2: KINEMATICS

Frame of reference. Motion in a straight line: Position time graph, speed and velocity. Uniform and non-uniform motion, average speed and instantaneous velocity uniformly accelerated motion, velocity-time, position-time graphs, and relations for uniformly accelerated motion. Scalars and Vectors, Vector addition and Subtraction, Zero Vector, Scalar and Vector products, Unit Vector, Resolution of a Vector. Relative Velocity, Motion in a plane, Projectile Motion, Uniform Circular Motion.

UNIT 3: LAWS OF MOTION

Force and Inertia, Newton's First Law of motion; Momentum, Newton's Second Law of motion; Impulse; Newton's Third Law of motion. Law of conservation of linear momentum and its applications, Equilibrium of concurrent forces. Static and Kinetic friction, laws of friction, rolling friction. Dynamics of uniform circular motion: Centripetal force and its applications.

UNIT 4: WORK, ENERGY AND POWER

Work done by a constant force and a variable force; kinetic and potential energies, work energy theorem, power. Potential energy of a spring, conservation of mechanical energy, conservative and neoconservative forces; Elastic and inelastic collisions in one and two dimensions.

UNIT 5: ROTATIONAL MOTION

Centre of mass of a two-particle system, Centre of mass of a rigid body; Basic concepts of rotational motion; Moment of a force, torque, angular momentum, conservation of angular momentum and its applications; moment of inertia, radius of gyration. Values of moments of inertia for simple geometrical objects, parallel and perpendicular axes theorems and their applications. Rigid body rotation, equations of rotational motion.

UNIT 6: GRAVITATION

The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Kepler's laws of planetary motion. Gravitational potential energy; gravitational potential. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites.

UNIT 7: PROPERTIES OF SOLIDS AND LIQUIDS

Elastic behavior, Stress-strain relationship, Hooke's Law, Young's modulus, bulk modulus, modulus of rigidity. Pressure due to a fluid column; Pascal's law and its applications. Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, Reynolds number. Bernoulli's principle and its applications. Surface energy and surface tension, angle of contact, application of surface tension - drops, bubbles and capillary rise. Heat, temperature, thermal expansion; specific heat capacity, calorimetry; change of state, latent heat. Heat transfer-conduction, convection and radiation, Newton's law of cooling.

UNIT 8: THERMODYNAMICS

Thermal equilibrium, zeroth law of thermodynamics, concept of temperature. Heat, work and internal energy. First law of thermodynamics. Second law of thermodynamics: reversible and irreversible processes. Carnot engine and its efficiency.

UNIT 9: KINETIC THEORY OF GASES

Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases - assumptions, concept of pressure. Kinetic energy and temperature: rms speed of gas molecules; Degrees of freedom, Law of equip-partition of energy, applications to specific heat capacities of gases; Mean free path, Avogadro's number.

UNIT 10: OSCILLATIONS AND WAVES

Periodic motion - period, frequency, displacement as a function of time. Periodic functions. Simple Harmonic Motion (S.H.M.) and its equation; phase; oscillations of a spring -restoring force and force constant; energy in S.H.M. - kinetic and potential energies; Simple pendulum - derivation of expression for its time period; Free, forced and damped oscillations, resonance. Wave motion. Longitudinal and transverse waves, speed of a wave. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, Standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler Effect in sound

UNIT 11: ELECTROSTATICS

Electric charges: Conservation of charge, Coulomb's law-forces between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field: Electric field due to a point charge, Electric field lines, Electric dipole, Electric field due to a dipole, Torque on a dipole in a uniform electric field. Electric flux, Gauss's law and its applications to find field due to infinitely long uniformly charged straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell. Electric potential and its calculation for a point charge, electric dipole and system of charges; Equipotential surfaces, Electrical potential energy of a system of two point charges in an electrostatic field. Conductors and insulators, Dielectrics and electric polarization, capacitor, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, Energy stored in a capacitor.

UNIT 12: CURRRENT ELECTRICITY

Electric current, Drift velocity, Ohm's law, Electrical resistance, Resistances of different materials, V-I characteristics of Ohmic and non ohmic conductors, Electrical energy and power, Electrical resistivity, Colour code for resistors; Series and parallel combinations of resistors; Temperature dependence of resistance. Electric Cell and its internal resistance, potential difference and emf of a cell, combination of cells in series and in parallel. Kirchhoff's laws and their applications. Wheatstone bridge, Metre Bridge. Potentiometer - principle and its applications.

UNIT 13: MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

Biot - Savart law and its application to current carrying circular loop. Ampere's law and its applications to infinitely long current carrying straight wire and solenoid. Force on a moving charge in uniform magnetic and electric fields. Cyclotron. Force on a current-carrying conductor in a uniform magnetic field. Force between two parallel current carrying conductors-definition of ampere. Torque experienced by a current loop in uniform magnetic field; Moving coil galvanometer, its current sensitivity and conversion to ammeter and voltmeter. Current loop as a magnetic dipole and its magnetic dipole moment. Bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements. Para-, dia- and ferro- magnetic substances. Magnetic susceptibility and permeability, Hysteresis, Electromagnets and permanent magnets.

UNIT 14: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS

Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance. Alternating currents, peak and rms value of alternating current/ voltage; reactance and impedance; LCR series circuit, resonance; Quality factor, power in AC circuits, AC generator and transformer.

UNIT 15: ELECTROMAGNETIC WAVES

Electromagnetic waves and their characteristics. Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, Xrays, gamma rays). Applications of EM waves.

UNIT 16: OPTICS

Reflection and refraction of light at plane and spherical surfaces, mirror formula, Total internal reflection and its applications, Deviation and Dispersion of light by a prism, Lens Formula, Magnification, Power of a Lens, Combination of thin lenses in contact, Microscope and Astronomical Telescope (reflecting and refracting) and their magnifying powers. Wave optics: wave front and Huygens' Principle, Laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes, Polarization, plane polarized light; Brewster's law, uses of plane polarized light and Polaroids.

UNIT 17: DUAL NATURE OF MATTER ANDRADIATION

Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation; particle nature of light. Matter waves-wave nature of particle, de Broglie relation. Davisson- Germer experiment.

UNIT 18: ATOMS AND NUCLEI

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivityalpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number, nuclear fission and fusion.

UNIT 19: ELECTRONIC DEVICES

Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

UNIT 20: COMMUNICATION SYSTEMS

Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation, Need for modulation, Amplitude and Frequency Modulation, Bandwidth of signals, Bandwidth of Transmission medium, Basic Elements of a Communication System (Block Diagram only).

CHEMISTRY

UNIT 1: SOME BASIC CONCEPTS IN CHEMISTRY

Matter and its nature, Dalton's atomic theory; Concept of atom, molecule, element and compound; Physical quantities and their measurements in Chemistry, precision and accuracy, significant figures, S.I. Units, dimensional analysis; Laws of chemical combination; Atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae; Chemical equations and stoichiometry.

UNIT 2: STATES OF MATTER

Classification of matter into solid, liquid and gaseous states.

Gaseous State:
Measurable properties of gases; Gas laws - Boyle's law, Charle's law, Graham's law of diffusion,

Avogadro's law, Dalton's law of partial pressure; Concept of Absolute scale of temperature; Ideal gas equation; Kinetic theory of gases (only postulates); Concept of average, root mean square and most probable velocities; Real gases, deviation from Ideal behavior, compressibility factor, van der Waals equation, liquefaction of gases, critical constants.

Liquid State:
Properties of liquids - vapour pressure, viscosity and surface tension and effect of temperature on them (qualitative treatment only).

Solid State:
Classification of solids: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea); Bragg's Law and its applications; Unit cell and lattices, packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, imperfection in solids; Electrical, magnetic and dielectric properties.

UNIT 3: ATOMIC STRUCTURE

Discovery of sub-atomic particles (electron, proton and neutron); Thomson and Rutherford atomic models and their limitations; Nature of electromagnetic radiation, photoelectric effect; Spectrum of hydrogen atom, Bohr model of hydrogen atom - its postulates, derivation of the relations for energy of the electron and radii of the different orbits, limitations of Bohr's model; Dual nature of matter, de-Broglie's relationship, Heisenberg uncertainty principle. Elementary ideas of quantum mechanics, quantum mechanical model of atom, its important features, and concept of atomic orbitals as one electron wave functions; Variation of and with r for 1s and 2s orbitals; various quantum numbers (principal, angular momentum and magnetic quantum numbers) and their significance; shapes of s, p and d - orbitals, electron spin and spin quantum number; Rules for filling electrons in orbitals aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of half-filled and completely filled orbitals.

UNIT 4: CHEMICAL BONDING AND MOLECULAR STRUCURE

Kossel - Lewis approach to chemical bond formation, concept of ionic and covalent onds.

Ionic Bonding: Formation of ionic bonds, factors affecting the formation of ionic bonds; calculation of lattice enthalpy.

Covalent Bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules.

Quantum mechanical approach to covalent bonding:
Valence bond theory - Its important features, concept of hybridization involving s, p and d orbitals; Resonance.

Molecular Orbital Theory - Its important features, LCAOs, types of molecular orbitals (bonding, antibonding), sigma and pi-bonds, molecular orbital electronic configurations of homonuclear diatomic molecules, concept of bond order, bond length and bond energy. Elementary idea of metallic bonding. Hydrogen bonding and its applications.

UNIT 5: CHEMICAL THERMODYNAMICS

Fundamentals of thermodynamics: System and surroundings, extensive and intensive properties, state functions, types of processes.

First law of thermodynamics - Concept of work, heat internal energy and enthalpy, heat capacity, molar heat capacity; Hess's law of constant heat summation; Enthalpies of bond dissociation, combustion, formation, atomization, sublimation, phase transition, hydration, ionization and solution.

Second law of thermodynamics; Spontaneity of processes; DS of the universe and G of the system as criteria for spontaneity, Dgo (Standard Gibbs energy change) and equilibrium constant.

UNIT 6: SOLUTIONS

Different methods for expressing concentration of solution - molality, molarity, mole fraction, percentage (by volume and mass both), vapour pressure of solutions and Raoult's Law Ideal and non-ideal solutions, vapour pressure - composition, plots for ideal and non-ideal solutions; Colligative properties of dilute solutions - relative lowering of vapour pressure, depression of freezing point, elevation of boiling point and osmotic pressure; Determination of molecular mass using colligative properties; Abnormal value of molar mass, van't Hoff factor and its significance.

UNIT 7: EQUILIBRIUM
Meaning of equilibrium, concept of dynamic equilibrium.

Equilibria involving physical processes: Solid -liquid, liquid - gas and solid gas equilibria, Henry's law, general characters of equilibrium involving physical processes.

Equilibria involving chemical processes: Law of chemical equilibrium, equilibrium constants (Kp and Kc) and their significance, significance of DG and DGo in chemical equilibria, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst; Le Chatelier's principle.

Ionic equilibrium: Weak and strong electrolytes, ionization of electrolytes, various concepts of acids and bases (Arrhenius, Br instead - Lowry and Lewis) and their ionization, acid - base equilibria (including multistage ionization) and ionization constants, ionization of water, pH scale, common ion effect, hydrolysis of salts and pH of their solutions, solubility of sparingly soluble salts and solubility products, buffer solutions.

UNIT 8: REDOX REACTIONS AND ELECTROCHEMISTRY

Electronic concepts of oxidation and reduction, redox reactions, oxidation number, rules for assigning oxidation number, balancing of redox reactions. Electrolytic and metallic conduction, conductance in electrolytic solutions, specific and molar conductivities and their variation with concentration: Kohlrausch's law and its applications. Electrochemical cells - Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half - cell and cell reactions, emf of a Galvanic cell and its measurement; Nernst equation and its applications; Relationship between cell potential and Gibbs' energy change; Dry cell and lead accumulator; Fuel cells; Corrosion and its prevention.

UNIT 9: CHEMICAL KINETICS

Rate of a chemical reaction, factors affecting the rate of reactions: concentration, temperature, pressure and catalyst; elementary and complex reactions, order and molecularity of reactions, rate law, rate constant and its units, differential and integral forms of zero and first order reactions, their characteristics and half - lives, effect of temperature on rate of reactions Arrhenius theory, activation energy and its calculation, collision theory of bimolecular gaseous reactions (no derivation).

UNIT-10 : SURFACE CHEMISTRY

Adsorption- Physisorption and chemisorption and their characteristics, factors affecting adsorption of gases on solids - Freundlich and Langmuir adsorption isotherms, desorption from solutions.

Catalysis - Homogeneous and heterogeneous, activity and selectivity of solid catalysts, enzyme catalysis and its mechanism.

Colloidal state - distinction among true solutions, colloids and suspensions, classification of colloids - lyophilic, lyophobic; multi molecular, macromolecular and associated colloids (micelles), preparation and properties of colloids - Tyndall effect, Brownian movement, electrophoresis, dialysis, coagulation and flocculation; Emulsions and their characteristics.

INORGANIC CHEMISTRY

UNIT 11: CLASSIFICATON OF ELEMENTS AND PERIODICITY IN PROPERTIES

Modem periodic law and present form of the periodic table, s, p, d and f block elements, periodic trends in properties of elements atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity.

UNIT 12: GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF METALS

Modes of occurrence of elements in nature, minerals, ores; Steps involved in the extraction of metals - concentration, reduction (chemical and electrolytic methods) and refining with special reference to the extraction of Al, Cu, Zn and Fe; Thermodynamic and electrochemical principles involved in the extraction of metals.

UNIT 13: HYDROGEN

Position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen; Physical and chemical properties of water and heavy water; Structure, preparation, reactions and uses of hydrogen peroxide; Classification of hydrides - ionic,
Covalent and interstitial; Hydrogen as a fuel.

UNIT 14: S - BLOCK ELEMENTS (ALKALI ANDALKALINE EARTH METALS)

Group - 1 and 2 Elements General introduction, electronic configuration and general trends in physical and chemical properties of elements, anomalous properties of the first element of each group, diagonal relationships. Preparation and properties of some important compounds - sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate; Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca.

UNIT 15: P - BLOCK ELEMENTS - Group - 13 to Group 18 Elements

General Introduction: Electronic configuration and general trends in physical and chemical properties of elements across the periods and down the groups; unique behavior of the first element in each group.

Group wise study of the p block elements Group 13
Preparation, properties and uses of boron and aluminum; Structure, properties and uses of borax, boric acid, diborane, boron trifluoride, aluminum chloride and alums.

Group 14
Tendency for catenation; Structure, properties and uses of allotropes and oxides of carbon, silicon tetrachloride, silicates, zeolites and silicones.

Group 15
Properties and uses of nitrogen and phosphorus; Allotrophic forms of phosphorus; Preparation, properties, structure and uses of ammonia, nitric acid, phosphine and phosphorus halides, (PCl_3, PCl_5);
Structures of oxides and oxoacids of nitrogen and phosphorus.

Group 16
Preparation, properties, structures and uses of dioxygen and ozone; Allotropic forms of sulphur; Preparation, properties, structures and uses of sulphur dioxide, sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur.

Group 17
Preparation, properties and uses of chlorine and hydrochloric acid; Trends in the acidic nature of hydrogen halides; Structures of Interhalogen compounds and oxides and oxoacids of halogens.

Group 18
Occurrence and uses of noble gases; Structures of fluorides and oxides of xenon.

UNIT 16: d– and f –BLOCK ELEMENTS

Transition Elements
General introduction, electronic configuration, occurrence and characteristics, general trends in properties of the first row transition elements – physical properties, ionization enthalpy, oxidation states, atomic radii, colour, catalytic behavior, magnetic properties,
complex formation, interstitial compounds, alloy formation; Preparation, properties and uses of $K_2Cr_2O_7$ and $KMnO_4$.

Inner Transition Elements
Lanthanoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction.
Actinoids - Electronic configuration and oxidation states.

UNIT 17: CO-ORDINATION COMPOUNDS

Introduction to co-ordination compounds, Werner's theory; ligands, co-ordination number, denticity, chelation; IUPAC nomenclature of mononuclear coordination compounds, isomerism; Bonding-Valence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of coordination compounds (in qualitative analysis, extraction of metals and in biological systems).

UNIT 18: ENVIRONMENTAL CHEMISTRY

Environmental pollution - Atmospheric, water and soil.
Atmospheric pollution - Tropospheric and Stratospheric
Tropospheric pollutants Gaseous pollutants: Oxides of carbon, nitrogen and sulphur, hydrocarbons; their sources, harmful effects and prevention; Greenhouse effect and Global warming; Acid rain;
Particulate pollutants: Smoke, dust, smog, fumes, mist; their sources, harmful effects and prevention.
Stratospheric pollution- Formation and breakdown of ozone, depletion of ozone layer - its mechanism and effects.
Water Pollution - Major pollutants such as, pathogens, organic wastes and chemical pollutants; their harmful effects and prevention.
Soil pollution - Major pollutants such as: Pesticides (insecticides, herbicides and fungicides), their harmful effects and prevention. Strategies to control environmental pollution.

ORGANIC CHEMISTRY

UNIT 19: PURIFICATION AND CHARACTERISATION OF ORGANIC COMPOUNDS

Purification - Crystallization, sublimation, distillation, differential extraction and chromatography - principles and their applications.

Qualitative analysis - Detection of nitrogen, sulphur, phosphorus and halogens.

Quantitative analysis (basic principles only) - Estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus. Calculations of empirical formulae and molecular formulae; Numerical problems in organic quantitative analysis.

UNIT 20: SOME BASIC PRINCIPLES OF ORGANIC CHEMISTRY

Tetravalency of carbon; Shapes of simple molecules - hybridization (s and p); Classification of organic compounds based on functional groups: - C = C - , - C h C – and those containing halogens, oxygen, nitrogen and sulphur; Homologous series; Isomerism - structural and stereoisomerism.

Nomenclature (Trivial and IUPAC)
Covalent bond fission - Homolytic and heterolytic: free radicals, carbocations and carbanions; stability of carbocations and free radicals, electrophiles and nucleophiles.

Electronic displacement in a covalent bond- Inductive effect, electromeric effect, resonance and hyperconjugation.

Common types of organic reactions - Substitution, addition, elimination and arrangement.

UNIT 21: HYDROCARBONS

Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties and reactions.

Alkanes - Conformations: Sawhorse and Newman projections (of ethane); Mechanism of halogenations of alkanes.
Alkenes - Geometrical isomerism; Mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen halides (Markownikoff's and peroxide effect); Ozonolysis, oxidation, and polymerization.
Alkynes - Acidic character; Addition of hydrogen, halogens, water and hydrogen halides; Polymerization.
Aromatic hydrocarbons - Nomenclature, benzene - structure and aromaticity; Mechanism of electrophilic substitution: halogenation, nitration, Friedel Craft's
alkylation and acylation, directive influence of functional group in mono-substituted benzene.

UNIT 22: ORGANIC COMPOUNDS CONTAINING HALOGENS

General methods of preparation, properties and reactions; Nature of C-X bond; Mechanisms of substitution reactions. Uses; Environmental effects of chloroform, iodoform, freons and DDT.

UNIT 23: ORGANIC COMPOUNDS CONTAINING OXYGEN

General methods of preparation, properties, reactions and uses.

ALCOHOLS, PHENOLS AND ETHERS
Alcohols: Identification of primary, secondary and tertiary alcohols; mechanism of dehydration.
Phenols: Acidic nature, electrophilic substitution reactions: halogenation, nitration and sulphonation, Reimer - Tiemann reaction.
Ethers: Structure.
Aldehyde and Ketones: Nature of carbonyl group; Nucleophilic addition to >C=O group, relative reactivities of aldehydes and ketones; Important reactions such as Nucleophilic addition reactions (addition of HCN, NH3 and its derivatives), Grignard reagent; oxidation; reduction (Wolff Kishner and Clemmensen); acidity of _ - hydrogen, aldol condensation, Cannizzaro reaction, Haloform reaction; Chemical tests to distinguish between aldehydes and Ketones.
CARBOXYLIC ACIDS
Acidic strength and factors affecting it.

UNIT 24: ORGANIC COMPOUNDS CONTAINING NITROGEN

General methods of preparation, properties, reactions and uses.
Amines: Nomenclature, classification, structure, basic character and identification of primary, secondary and tertiary amines and their basic character.
Diazonium Salts: Importance in synthetic organic chemistry.

UNIT 25: POLYMERS

General introduction and classification of polymers, general methods of polymerization-addition and condensation, copolymerization; Natural and synthetic rubber and vulcanization; some important polymers with emphasis on their monomers and uses - polythene, nylon, polyester and bakelite.

UNIT 26: BIOMOLECULES

General introduction and importance of biomolecules.

CARBOHYDRATES - Classification: aldoses and ketoses; monosaccharides (glucose and fructose), constituent monosaccharides of oligosaccharides (sucrose, lactose, maltose) and polysaccharides (starch, cellulose, glycogen).

PROTEINS - Elementary Idea of _ - amino acids, peptide bond, polypeptides; Proteins: primary, secondary, tertiary and quaternary structure (qualitative idea only), denaturation of proteins, enzymes.

VITAMINS - Classification and functions.

NUCLEIC ACIDS - Chemical constitution of DNA and RNA. Biological functions of nucleic acids.

UNIT 27: CHEMISTRY IN EVERYDAY LIFE

Chemicals in medicines - Analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamins – their meaning and common examples.

Chemicals in food - Preservatives, artificial sweetening agents - common examples.

Cleansing agents - Soaps and detergents, cleansing action.

UNIT 28: PRINCIPLES RELATED TO PRACTICAL CHEMISTRY

• Detection of extra elements (N,S, halogens) in organic compounds; Detection of the following functional groups: hydroxyl (alcoholic and phenolic), carbonyl (aldehyde and ketone), carboxyl and amino groups in organic compounds.

• Chemistry involved in the preparation of the following: Inorganic compounds: Mohr's salt, potash alum. Organic compounds: Acetanilide, pnitroacetanilide, aniline yellow, iodoform.

• Chemistry involved in the titrimetric exercises - Acids bases and the use of indicators, oxalic-acid vs $KMnO_4$, Mohr's salt vs $KMnO_4$.

• Chemical principles involved in the qualitative salt
analysis:

• Cations - Pb^{2+}, Cu^{2+}, AI^{3+}, Fe^{3+}, Zn^{2+}, Ni^{2+}, Ca^{2+}, Ba^{2+}, Mg^{2+}, NH_4^+. Anions- CO_3^{2-}, S^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, CI^-, Br, I.

• (Insoluble salts excluded).

• Chemical principles involved in the following experiments:

1. Enthalpy of solution of $CuSO_4$
2. Enthalpy of neutralization of strong acid and strong base.
3. Preparation of lyophilic and lyophobic sols.
4. Kinetic study of reaction of iodide ion with hydrogen peroxide at room temperature.

MATHEMATICS

UNIT 1: SETS, RELATIONS AND FUNCTIONS

Sets and their representation; Union, Intersection and Complement of sets and their algebraic properties; Power set; Relation, Types of relations, Equivalence relations, functions; one-one, into and onto functions, composition of functions.

UNIT 2: COMPLEX NUMBERS AND QUADRATIC EQUATIONS

Complex numbers as ordered pairs of reals, Representation of complex numbers in the form a+ib and their representation in a plane, Argand diagram, Algebra of complex numbers, Modulus and Argument (or Amplitude) of a complex number, square root of a complex number, triangle inequality, Quadratic equations in real and complex number system and their solutions. Relation between roots and co-efficient, nature of roots, formation of quadratic equations with given roots.

UNIT 3: MATRICES AND DETERMINANTS

Matrices, Algebra of matrices, Types of matrices, Determinants and matrices of order two and three. Properties of determinants, Evaluation of determinants, Area of triangles using determinants. Adjoint and evaluation of inverse of a square matrix using determinants and elementary transformations, Test of consistency and solution of simultaneous linear equations in two or three variables using determinants and

matrices.

UNIT 4: PERMUTATIONS AND COMBINATIONS

Fundamental principle of counting, permutation as an arrangement and combination as selection, Meaning of P (n, r) and C (n, r), simple applications.

UNIT 5: MATHEMATICAL INDUCTION

Principle of Mathematical Induction and its simple applications.

UNIT 6: BINOMIAL THEOREM AND ITS SIMPLE APPLICATIONS

Binomial theorem for a positive integral index, general term and middle term, properties of Binomial coefficients and simple applications.

UNIT 7: SEQUENCES AND SERIES

Arithmetic and Geometric progressions, insertion of arithmetic, geometric means between two given numbers. Relation between A.M. and G.M. Sum upto n terms of special series: Sn, Sn2, Sn3, Sn3. Arithmetic Geometric regression.

UNIT 8: LIMIT, CONTINUITY AND DIFFERENTIABILITY

Real - valued functions, algebra of functions, polynomials, rational, trigonometric, logarithmic and exponential functions, inverse functions. Graphs of simple functions. Limits, continuity and differentiability. Differentiation of the sum, difference, product and quotient of two functions. Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order upto two. Rolle's and Lagrange's Mean Value Theorems. Applications of derivatives: Rate of change of quantities, monotonic – increasing and decreasing functions, Maxima and Minima of functions of one variable, Tangents and Normals.

UNIT 9: INTEGRAL CALCULUS

Integral as an anti - derivative. Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities.

Evaluation of simple integrals of the type

$$\int \frac{dx}{x^2 \pm a^2} \, , \, \int \frac{dx}{\sqrt{x^2 \pm a^2}} \, , \, \int \frac{dx}{a^2 - x^2} \, , \, \int \frac{dx}{\sqrt{a^2 - x^2}} \, , \, \int \frac{dx}{ax^2 + bx + c} \, ,$$

$$\int \frac{dx}{\sqrt{ax^2 + bx + c}} \, , \, \int \frac{(px+q)dx}{ax^2 + bx + c} \, , \, \int \frac{(px+q)dx}{\sqrt{ax^2 + bx + c}}$$

$$\int \sqrt{a^2 \pm x^2} \, dx \quad \int \sqrt{x^2 - a^2} \, dx$$

Integral as limit of a sum. Fundamental Theorem of Calculus. Properties of definite integrals. Evaluation of definite integrals, determining areas of the regions bounded by simple curves in standard form.

UNIT 10: DIFFERENTIAL EQUATIONS

Ordinary differential equations, their order and degree. Formation of differential equations. Solution of differential equations by the method of separation of variables, solution of homogeneous and linear differential equations of the type:

$$\frac{dy}{dx} + p(x)y = q(x)$$

UNIT 11: CO-ORDINATE GEOMETRY

Cartesian system of rectangular co-ordinates in a plane, distance formula, section formula, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes.

Straight lines

Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, distance of a point from a line, equations of internal and external bisectors of angles between two lines, coordinates of centroid, orthocentre and circumcentre of a triangle, equation of family of lines passing through the point of intersection of two lines.

Circles, conic sections

Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to a circle, equation of the tangent. Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard forms, condition for $y = mx + c$ to be a tangent and point (s) of tangency.

UNIT 12: THREE DIMENSIONAL GEOMETRY

Coordinates of a point in space, distance between two points, section formula, direction ratios and direction cosines, angle between two intersecting lines. Skew lines, the shortest distance between them and its equation. Equations of a line and a plane in different forms, intersection of a line and a plane, coplanar lines.

UNIT 13: VECTOR ALGEBRA

Vectors and scalars, addition of vectors, components of a vector in two dimensions and three dimensional space, scalar and vector products, scalar and vector triple product.

UNIT 14: STATISTICS AND PROBABILITY

Measures of Dispersion: Calculation of mean, median, mode of grouped and ungrouped data. Calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.
Probability: Probability of an event, addition and multiplication theorems of probability, Baye's theorem, probability distribution of a random variate, Bernoulli trials and Binomial distribution.

UNIT 15: TRIGONOMETRY

Trigonometrical identities and equations. Trigonometrical functions. Inverse trigonometrical functions and their properties. Heights and Distances.

UNIT 16: MATHEMATICAL REASONING:

Statements, logical operations AND, OR, IMPLIES, IMPLIED BY, IF AND ONLY IF. Understanding of Tautology, Contradiction, Converse and Contrapositive

VIII. INSTRUCTION TOFILL THE ENTRANCE EXAMINATION APPLICATION (DATASHEET)

1. **NAME OF THE CANDIDATE:** Write name in CAPTIAL LETERS as given Secondary (X Std.) or Higher Secondary (XII Std.)School c box. Write only one letter in a box. Do not leave any blank box between the letters in a word. One box should be left blank between consecutive words of name. KEEP THE INITIALS OF THE NAME AT THE END. If name has several initials, leave one blank after each of them. Darken the corresponding alphabet underneath each letter of the name with Mr., Ms., etc. Do not uses box for fu stop between the initials, instead you can leave an empty box.

2. **GENDER:** Write the appropriate serial number in the boxes provided and then darken the appropriate oval to correspond with the code.

3. **COMMUNITY:** Write the appropriate serial number in the boxes provided and then darken the appropriate oval to correspond with the code.

4. **NATIONALITY:** Write the appropriate serial number in the boxes provided and then darken the appropriate oval to correspond with the code.

5. **RELGION:** Write the appropriate serial number in the boxes provided and then darken the appropriate oval to correspond with the code.

6. **DATE OF BIRTH:** Write the date, month and year of birth as per the English calendar and as recorded in High school/ Higher secondary school Examination Certificate, Use numerals 01 to 31 for DATE, numerals 01 to 12 for MONTH, and all four digits for the year of Birth. Darken the corresponding numerals for date, month and year in each column.

7. **NATIE STATE:** Write appropriate serial number (by looking into the following table) in the boxes provided and darken the appropriate oval to correspond with the code.

STATE	CODE	STATE	CODE
ANDHRA PRADESH	01	MANIPUR	15
ARUNACHAL PRADESH	02	MEGHALAYA	16
ASSAM	03	MIZORAM	17
BIHAR	04	NAGALAND	18
CHATTISGARH	05	ODISHA	19
GOA	06	PUNJAB	20
GUJARAT	07	RAJASTHAN	21
HARYANA	08	SIKKIM	22
HIMACHAL PRADESH	09	TAMIL NADU	23
JHARKHAND	10	TELANGANA	24
KARNATAKA	11	TRIPURA	25
KEERALA	12	UTTARAHAND	26
MADHYA PRADESH	13	UTTAR PRADESH	27
MAHARASSHTRA	14	WEST BENGAL	28

UNION TERRITORY	CODE	UNION TERRITORY	CODE
ANDAMAN & NICOBAR ISLANDS	29	JAMMU AND KASHMIR	33
CHANDIGARH	30	LADHAK	34
DADRA &NAGAR HAVELI	31	LAKSHADWEEP	35
DAMAN &DIU	32	PUDUCHERRY	36
		NEW DELHI	37

8. CONTACT MOBILE NUMBER: Write the MOBILE NUMMBER in the boxes provided and then darken the appropriate oval o correspond with the code. Candidate are requested to this entry and shading many times. Because this number will be used for sending the SMS at various stages of the Entrance Examination.

9. **EXAMINATION CENTRE CODE:** Select the appropriate entrance examination centre's (city) and shade it accordingly. Candidates are requested to refer the entrance examination 2020 information brochure, Page No. 22 to know the cities and dates of Examination. CHANGE OF EXAMINATION CENTRES WILL NOT BE ENTERTAINED UNDER ANR CIRCUMSTANCES.

10. PHOTOGRAPHY: Affix recent (taken not earlier than a month) good quality colour passport size photography with light colour background in the space provided for this purpose. Spectacles if being used regularly are allowed. The photograph should be firmly affixed on the application form. It should not be pinned or stabled. Photograph should not be larger than the space provided in the box for pasting it.

11. SIGNATURE: Candidates signature establishes identity. Use black ball point pen to sign in the box provided.

12. AADHAAR NUBER: Write the candidate Aadhaar number if available.

13. DETAILS OF THE QUALIFYING EXAMINATION: Whether the candidate has passed or appearing please provided the details of board, name and complete address of school, month and year of passing the examination of eligibility.

14. NAME OF TE FATHER/GUARDIAN: Write name in CAPTIAL LETERS. Write only one letter in box. Do not leave any blank between the letters in a word. One box should be left blank between consecutive words of name. . If name has several initials, leave one blank after each of them. Darken the corresponding alphabet underneath after each letter of the name with do not prefix the name with Mr.., Ms., etc.

15. YEAR OF PASSING STANDARD 'X' OR EQUIVALENT EXAMINATION: Mention the year of passing Standard 'X' Or Equivalent Examination.

16. YEAR OF PASSING STANDARD 'XII': Mention the year of passing Standard 'XII' Examination. If the candidate is appearing for final year examination in March/ April, 2020, please enter as 2020

17. PERCENTAGE OF MARKS IN Std. X: Write the % of marks or CGPA neatly and legibly in the box provided.

18. Write the register number (including alphabets if any) as given in Higher secondary (XII Std.) School mark sheet in the boxes provided.

19. Write the appropriate alphabets in the boxes provided and then darken the appropriate oval to correspond with the a
lphabet.

20. PROGRAMME APPLYING FOR: Write the appropriate serial number in the boxes provided and then darken the appropriate oval to correspond with the code.

STATE	EXANINATION CENTRES	EXAM CENTRES CODE	DATE OF COMPUTER BASED EXAMINATION
ANDAMAN	PORT BLAIR	011	14th to 19th April, 2020
ANDHRA PRADESH	ANANTHAPURAMU	012	14th to 19th April, 2020
ANDHRA PRADESH	CUDAPAH	013	14th to 19th April, 2020
ANDHRA PRADESH	GUNTUR	014	14th to 19th April, 2020
ANDHRA PRADESH	KURNOOL	015	14th to 19th April, 2020
ANDHRA PRADESH	NELLORE	016	14th to 19th April, 2020
ANDHRA PRADESH	ONGILE	017	14th to 19th April, 2020
ANDHRA PRADESH	RAJAHMUNDRY	018	14th to 19th April, 2020
ANDHRA PRADESH	TIRUPATI	019	14th to 19th April, 2020
ANDHRA PRADESH	VELIVENNU	020	14th to 19th April, 2020
ANDHRA PRADESH	VIJAYAWADA	021	14th to 19th April, 2020
ANDHRA PRADESH	VISAKHAPATNAM	022	14th to 19th April, 2020
ASSAM	GUWAHATI	023	14th to 19th April, 2020
BIHAR	PATNA	024	14th to 19th April, 2020
CHHATTIZGARH	BILASPUR	025	14th to 19th April, 2020
UJARAT	AHMEDABAD	026	14th to 19th April, 2020
MAHARASHTRA	MUMBAI	027	14th to 19th April, 2020
JHARKHAND	RANCHI	028	14th to 19th April, 2020
KARNATAKA	BENGALURU	029	14th to 19th April, 2020
KERELA	ERNAKULAM	030	14th to 19th April, 2020
KERELA	THIRUVANTHAPURAM	031	14th to 19th April, 2020
MADHYA PRADESH	BHOPAL	032	14th to 19th April, 2020
NEW DELHI	NEW DELHI	033	14th to 19th April, 2020
ODISHA	BHUBANESHWAR	034	14th to 19th April, 2020
PUDUCHERRY	PUDUCHERRY	035	14th to 19th April, 2020
RAJASTHAN	KOTA	036	14th to 19th April, 2020
TAMIL NADU	CHENNAI	037	14th to 19th April, 2020
TAMIL NADU	COIMBATORE	038	14th to 19th April, 2020
TAMIL NADU	MADURAI	039	14th to 19th April, 2020
TAMIL NADU	NAGERCOIL	040	14th to 19th April, 2020
TAMIL NADU	SALEM	041	14th to 19th April, 2020
TAMIL NADU	TANJORE	042	14th to 19th April, 2020
TAMIL NADU	TRICHY	043	14th to 19th April, 2020
TAMIL NADU	THIRUNELVELI	044	14th to 19th April, 2020
TELANGANA	HYDERABAD	046	14th to 19th April, 2020
TELANGANA	KARIMNAGAR	047	14th to 19th April, 2020
TELANGANA	WARANGAL	048	14th to 19th April, 2020
TRIPURA	AGARTALA	049	14th to 19th April, 2020
UTTAR PRADESH	LUCKNOW	050	14th to 19th April, 2020
WESTBENGAL	KOLKATA	051	14th to 19th April, 2020

22. CHOICE OF BRANCH/ SPECIALIZATION (for B.E. / B. Tech. only):

(a) CHOICE OF BRANCH OPTION-1: Write the appropriate serial number (by looking at the following table) in the boxes provided and then darken the appropriate oval to correspond with the code.

(b) CHOICE OF BRANCH OPTION-2: Write the appropriate serial number (by looking at the following table) in the boxes provided and then darken the appropriate oval to correspond with the code.

(c) CHOICE OF BRANCH OPTION-3: Write the appropriate serial number (by looking at the following table) in the boxes provided and then darken the appropriate oval to correspond with the code.

BRANCH/ SPECIALIZATION	CODE
AERONAUTICAL ENGINEERING	11
AUTOMOBILE ENGINEERING	12
BIOTECHNOLOGY	13
BIOMEDICAL ENGINEERING	15
CHEMICAL ENGINEERING	16
CIVIL ENGINEERING	17
COMPUTER SCIENCE AND ENGINEERING	18
ELECTRICAL AND ELECTRONICS ENGINEERING	19
ELECTRONICS AND COMMUNICATION ENGINEERING	20
ELECTRONICS AND INSTRUMENTATION ENGINEERING	21
ELECTRONICS AND TELECOMMUNICATION ENGINEERING	22
INFORMATION TECHNOLOGY	23
MECHANICAL ENGINEERING	24
NECHATRONICS	25

23. BLOOD GROUP: Write the candidates blood group in the box provided and then darken the appropriate oval to correspond with the code.

24. COMPOTER POSTAL ADDRESS, STARTING WITH PARTENS NAME: Write the complete postal address in capital letters to which all communication will be sent. The address must include name of the parent, and all other details including the correct pin code for letters to reach the candidate. Indicate e- mail ID, Phone No. With the correct STD code. Candidates are requested to take much care to write this e- mail ID, since all information regarding entrance examination will be sent to this e-mail ID. Note that this block will be scanned by machine; hence the details should be written within the rectangular box provided.

25. DECLARATION: Read the declaration and sign in the box provided. Signature of applicant and parent is compulsory and should be done with black ball point pen only.

IMPORTANT DATES

Issue of application forms	**18th October, 2019**
Last date for submitting the filled in application forms by any mode	**4th April, 2020**
Commencement of slot booking/ downloading of Hall Tickets	**2nd Week of April, 2020**
Computer based Examination (in all cities- Refer page no.23)	**14th to 19th April, 2020**
Declaration of Results and commencement of downloading of counseling call letter	**30th April, 2020**
Counseling for Admission (Online and Physical)	**1st Week of May, 2020**

Contact Us,

The Registrar,

SATAHYABAM INSTITUTE OF SCIENCE AND TECHNOLOGY

Jeppiaar Nagar, Rajiv Gandhi salai, Chennai-600 119, Tamilnadu, India

Phone: Administration Office: 044-2450 3150/51/52/53/54/55

Entrance Exam Office: 044-2450 2436, 044-2450 0600, 99400 58263, 99400 69538

Fax: 044-2450 2344

Email: entrancexam2020@sathyabam.ac.in

Website: www.sathyabama.ac.in

www.facebook.co/Sathyabamaofficial

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SATHYABA INFORMATION CENTERS

VIJAYAWADA ADMISSION OFFICE	**HYDERABAD ADMISSION OFFICE**	**VISHAKAPATNAM ADMISSION OFFICE**
Sathyabama Information Center Door No. 76-3-12, Ashram Road, (Near Swathi Theatre) Bhavanipuram, Vijayawada -520 012 Contact: 9384666885	Sathyabama Information Center 12-5-124/1, S.S.K. Kandare's, Complex Moosapet, Hyderabad – 500 018 Contact: 9384666883	Sathyabama Information Center Door No. 39-26-39, Rajeev Nagar, Opposite to Punjab Hotel, Marripalam Post, Near NAD Junction, Vishakapatnam -530 018 Contact: 9384666886

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

www.sathyabama.ac.in

Jeppiaar Nagar, Rajiv Gandhi Salai,
Chennai - 600 119, Tamilnadu, India

Administrative Office:

044-2450 3150 | 51 | 52 | 54 | 55 | Fax: 044-2450 2344

Entrance Exam Office : 044-2450 2436

Email : entranceexam2020@sathyabama.ac.in

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