Advertisement Notice
Dated:17-07-2020

Online applications are invited for admission to M.Sc Programme in the Department of Physics and Chemistry for the unfilled seats, after the final round of CCMN – 2020 coordinated by MNIT Jaipur. The Institute level examination will be conducted to fill up the vacant seats after final round of CCMN-2020, as per the guidelines of the Institute. In case all the seats are filled through CCMN-2020, no candidate can be admitted for these courses.

Programme	Eligibility
M. Sc in Physics and Chemistry (2 Year Programme)	The eligibility criteria will be as per CCMN-2020. • **For M.Sc Physics:** All Candidates should have obtained a B.Sc Degree with Physics a compulsory subject. • **For M.Sc Chemistry:** All Candidates should have obtained a B.Sc Degree with Chemistry a compulsory subject. • In the qualifying degree, the aggregate marks or CGPA/CPI without rounding-off (taking into account all subjects, including languages and subsidiaries, all years combined) should be at least 55% or 5.5 out of 10 for General/OBC/EWS category candidates and 50% or 5.0 out of 10 for SC/ST and PWD category candidates. • For candidates with letter grades/CGPA (instead of percentage of marks), the equivalence of percentage of marks will be decided by rules followed by CCMN-2020. • It will entirely be the responsibility of the candidate to prove that he/she satisfies the Minimum Educational Qualifications (MEQs) and eligibility Requirements (ERs) for admission. • The Institute has the right to cancel, at any stage the admission of a candidate who is found to have been admitted to a course to which he/she is not entitled, being unqualified or ineligible in accordance with the rules and regulations in force. • CCMN-2020 can be reached at : www.ccmn.in

- Pattern of Examination: The question paper will consist of 60 MCQ type questions of maximum marks 60. Each correct answer will carry two marks and for wrong answer 0.25 marks will be deducted. Questions not attempted will result in zero mark. The duration of exam will be of 90 minutes.
- Syllabus for M. Sc Physics: Annexure I
- Syllabus for M. Sc Chemistry: Annexure II
- Fee Structure for M. Sc Physics : Annexure III
- Fee Structure for M. Sc Chemistry : Annexure IV

- **Important Date's for both M. Sc Physics and M. Sc Chemistry:**

S. No	Event	Tentative Date
1	Publication of advertisement in the News Papers/uploading of Advertisement on Institute website.	17-07-2020
2	Online application link activates	20-07-2020
3	Last date of submission of online application with payment of application fee	03-08-2020
4	Download of Admit card for written test (for screening test)	07-08-2020
5	Conduct of Entrance Examination	12-08-2020
6	Publication of final list recommended	16-09-2020
7	Reporting at Institute	17, 18, 21 & 22 (except Saturday & Sunday)
8	Class work	-

The candidates can apply online by logging on to the following URL: (www.admissionnitsri.ac.in) by or before 03-08-2020. The application fee of Rs. 1500/- for General/OBC and Rs.1000/- for SC/ST and EWS has to pay online while applying.

Application will be screened by concerned Departments and list of eligible candidates will be put on website www.nitsri.ac.in . All announcements related to admissions will be made through Institute website. All candidates are advised to remain in touch with the Institute website for any information related to the admission.

The selection will be provisional subject to the verification of the following documents in original and fulfillment of requirements as per the statutes and advertisement.

I. DOB Certificate.
II. Eligibility Degree Certificate.
III. Affidavit duly signed by 1st class magistrate for gap period (if any) and to the effect that the details including documents provided by the candidate to NIT Srinagar for M.Sc admission for the year in question are correct and genuine.
IV. 10+2 marks card and qualification.
V. B.Sc grade/marks card.
VI. B.Sc degree certificate/ Provisional degree certificate.
VII. Migration certificate.
VIII. Character certificate and transfer certificate.
IX. Candidates need to upload all the above cited certificates/ documents at the time of online filling of the application form.

For any update candidates are advised to remain in touch with the Institute website www.nitsri.ac.in

12.7.2020

(Prof. (Dr.) Kowsar Majid)
Dean Academic Affairs

No: DAA/NIT/2020/169
Dated: 17/07/2020

Copy for information & necessary action to:

1. All Deans.
2. All HODs.
3. Registrar, with a request to kindly arrange to publish the advertisement notice in National/Local Dailies in minimum possible space.
4. Associate Dean Academic Affairs.
5. Associate Dean Examination.
6. Chairperson CC, with a request to kindly upload the notice on Institute Website.
7. ERP with a request to kindly make the application form available on ERP Portal and make the link available on Institute website. Further online fee payment may also be ensured.
8. A R (Academic)
9. P.A to Director.
10. File.

M.Sc Chemistry Entrance Examination Syllabus for Session Autumn 2020

Chemistry (CY)

PHYSICAL CHEMISTRY

Basic Mathematical Concepts: Functions; maxima and minima; integrals; ordinary differential equations; vectors and matrices; determinants; elementary statistics and probability theory.

Atomic and Molecular Structure: Fundamental particles; Bohr's theory of hydrogen-like atom; wave-particle duality; uncertainty principle; Schrödinger's wave equation; quantum numbers; shapes of orbitals; Hund's rule and Pauli's exclusion principle; electronic configuration of simple homonuclear diatomic molecules.

Theory of Gases: Equation of state for ideal and non-ideal (van der Waals) gases; Kinetic theory of gases; Maxwell-Boltzmann distribution law; equipartition of energy.

Solid State: Crystals and crystal systems; X-rays; NaCl and KCl structures; close packing; atomic and ionic radii; radius ratio rules; lattice energy; Born-Haber cycle; isomorphism; heat capacity of solids.

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; hydrolysis; solubility product; phase equilibria–phase rule and its application to one-component and two-component systems; colligative properties.

Electrochemistry: Conductance and its applications; transport number; galvanic cells; EMF and free energy; concentration cells with and without transport; polarography; concentration cells with and without transport; Debey-Huckel-Onsagar theory of strong electrolytes.

Chemical Kinetics: Reactions of various order; Arrhenius equation; collision theory; transition state theory; chain reactions – normal and branched; enzyme kinetics; photochemical processes; catalysis.

Adsorption: Gibbs adsorption equation; adsorption isotherm; types of adsorption; surface area of adsorbents; surface films on liquids.

Spectroscopy: Beer-Lambert law; fundamental concepts of rotational, vibrational, electronic and magnetic resonance spectroscopy.

ORGANIC CHEMISTRY

Basic Concepts in Organic Chemistry and Stereochemistry: Electronic effects (resonance, inductive, hyperconjugation) and steric effects and its applications (acid/base property); optical isomerism in compounds with and without any stereocenters (allenes, biphenyls); conformation of acyclic systems (substituted ethane/n-propane/n-butane) and cyclic systems (mono- and di-substituted cyclohexanes).

Organic Reaction Mechanism and Synthetic Applications: Chemistry of reactive intermediates (carbocations, carbanions, free radicals, carbenes, nitrenes, benzynes etc.); Hofmann-Curtius-Lossen rearrangement, Wolff rearrangement, Simmons-Smith reaction, Reimer-Tiemann reaction, Michael reaction, Darzens reaction, Wittig reaction and McMurry reaction; Pinacol-pinacolone, Favorskii, benzilic acid rearrangement, dienone-phenol rearrangement, Baeyer-Villeger reaction; oxidation and reduction reactions in organic chemistry; organometallic reagents in organic synthesis (Grignard, organolithium and organocopper); Diels-Alder, electrocyclic and sigmatropic reactions; functional group inter-conversions and structural problems using chemical reactions.

Qualitative Organic Analysis: Identification of functional groups by chemical tests; elementary UV, IR and 1H NMR spectroscopic techniques as tools for structural elucidation.

Natural Products Chemistry: Chemistry of alkaloids, steroids, terpenes, carbohydrates, amino acids, peptides and nucleic acids.

Aromatic and Heterocyclic Chemistry: Monocyclic, bicyclic and tricyclic aromatic hydrocarbons, and monocyclic compounds with one hetero atom: synthesis, reactivity and properties.

INORGANIC 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; VSEPR theory and shapes of molecules; hybridization; dipole moment; ionic solids; structure of NaCl, CsCl, diamond and graphite; lattice energy.

Main Group Elements (s and p blocks): General concepts on group relationships and gradation in properties; structure of electron deficient compounds involving main group elements.

Transition Metals (d block): Characteristics of 3d elements; oxide, hydroxide and salts of first row metals; coordination complexes: structure, isomerism, reaction mechanism and electronic spectra; VB, MO and Crystal Field theoretical approaches for structure, color and magnetic properties of metal complexes; organometallic compounds having ligands with back bonding capabilities such as metal carbonyls, carbenes, nitrosyls and metallocenes; homogenous catalysis.

Bioinorganic Chemistry: Essentials and trace elements of life; basic reactions in the biological systems and the role of metal ions, especially Fe2+, Fe3+, Cu2+ and Zn2+; structure and function of hemoglobin and myoglobin and carbonic anhydrase.

Instrumental Methods of Analysis: Basic principles; instrumentations and simple applications of conductometry, potentiometry and UV-vis spectrophotometry; analysis of water, air and soil samples.

Analytical Chemistry: Principles of qualitative and quantitative analysis; acid-base, oxidation-reduction and complexometric titrations using EDTA; precipitation reactions; use of indicators; use of organic reagents in inorganic analysis; radioactivity; nuclear reactions; applications of isotopes.

M.Sc Physics Entrance Examination Syllabus for Session Autumn 2020

Physics (PH)

Mathematical Methods: Calculus of single and multiple variables, partial derivatives, Jacobian, imperfect and perfect differentials, 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. Matrices and determinants, Algebra of complex numbers.

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, Center 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. Lissajous figures. 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 theorem, reflection and refraction at a dielectric interface, transmission and reflection coefficients (normal incidence only). Lorentz Force and motion of charged particles in electric and mag-netic 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.

Solid State Physics, Devices and Electronics: 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, Zener diode and its applications, BJT: characteristics in CB, CE, CC modes. Single stage amplifier, two stage R-C coupled amplifiers. Simple Oscillators: Barkhausen condition, sinusoidal oscillators. OPAMP and applications: Inverting and non-inverting amplifier. 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.