Estd. :1988 Our Motto: **Learn and Teach**

F E I

Govt. Recognised Senior Secondary School; Affiliated to the J&K BOSE

[A Unit of "FAYAZ CHARITABLE TRUST"]

Faiz-Abad, Nowgam – 190 015, Srinagar, Kashmir

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Syllabii & Courses of Study

- **Study material** of topics covered is made available on FEI School website **www.feinowgam.com**
- To access study material, click on "**Student Login**".
  - **User I.D. : student**
  - **Password : student@fei**
- Study material of **different classes** is available in **different tabs** on the drop down menu.
- As per new Education Policy, all subjects carry 20% marks as Internal Assessment which shall be awarded by concerned subject teachers.

EXAMINATION SCHEDULE OF THE INSTITUTE

Sr. No.	PARTICULARS / DESCRIPTION			
	Name of the Test	**Tentative Exam. Date**	**Syllabus Coverage**	**Max. Marks**
02.	Unit Test 1 (UT_1)	March (2nd week)	1/4 (25%)	50
03.	Term Test 1 (TT_1)	May (3rd Week)	1/2 (50%)	50
04.	Unit Test 2 (UT_2)	July (3rd week)	3/4 (75%)	50
06.	Pre-Board	October (1st week)	Full (100%)	50

Note: *If for any unavoidable circumstances an Examination is not conducted as per schedule, then that portion of the syllabus shall be clubbed with the next Examination.*

SCHEME OF STUDIES / COMBINATION OF SUBJECTS

The students who seek admission in Higher Secondary Part-II (Class 12th) shall follow the given below scheme.

Group-I	Group-II	Group-III	Group-IV	Group-V	Group-VI
General English (Compulsory)	Physics (Compulsory)	Chemistry (Compulsory)	Mathematics (Optional)	Biology (Optional)	Environmental Science (Optional)

Note: A student shall have to opt any two subjects from IV to VI.

SCHEME OF ASSESSMENT / EXAMINATION

The Higher Secondary Examination Part-II (Class 12th) conducted by the Board at the end of Academic Session on the basis of syllabi prescribed for Class 12th is open to eligible candidates and shall be conducted according to the following scheme of examination.

Sr. No.	✓ Marks ✓ Examinations ✓ Subjects	Marks distribution in different Components			
		Theory	Practical		Total: Internal & External
		External	Internal	External	(Theory + Practical)
1.	General English	80	20	x	100
2.	Physics	70	10	20	100
3.	Chemistry	70	10	20	100
4.	Biology	70	10	20	100
5.	Mathematics			x	100
6.	Environmental Science	70	10	20 (Ext./P.W)	100

IMPORTANT NOTES:

- Performance in each subject shall be assessed through a single paper of 70 marks for Science subjects and 100 marks for marks for Mathematics of 3 hours duration;
- Marks reserved for Internal Assessment (which is 10 in case of each subject) shall be awarded by the school themselves, as part of internal assessment, on the basis of performance of students in two tests (each test of 04 marks) and quality of reportage, i.e., Practical Notebook (carrying 02 marks) maintained by student.
- In case of Biology 10 marks are reserved for Internal Assessment. 05 marks are for Botany and 05 for Zoology.
- External practical examination of Botany Practicals shall be of 10 marks of 2 hours duration. External practical examination in case of Zoology shall be of 10 marks of two hours duration.

Dear Students: Now that you have completed one year of Higher Secondary Department and have stepped into the most crucial year of your Academic Career *i.e.*, Higher Secondary Part II (Class 12th), which forms the turning point of students. Any lapse on the part of anybody (Students, Teachers or Parents) could lead to an irreparable loss in future. So let us put our heads and hearts together to achieve the best from whatever strengths have been provided to us and let us work hard to address our weaknesses at the earliest so that we prepare ourselves for the tough competitions ahead of us. At this juncture, we pray to Almighty Allah (the Most Gracious, the Most Merciful) to provide all of us (Teachers, Students & Parents) Audacity and Enthusiasm to move towards our goal with Passion and Keenness. May He bestow upon us His choicest blessings and provide us the will power to get to our target which we have set for the years to come. May we come upto the expectations of our society and work earnestly, truthfully, honestly and sincerely with all the strengths (**'Mental'**, **'Physical'** & **'Economic'**) which have been provided to us by Almighty Allah, as all of us are answerable to Him on the day of Judgement for all our Deeds in this life, as deeds are better than words.

[May Almighty Allah crown our efforts with Success in the practical field "Aameen"]

Dear Students, there are no two opinions that we are passing through a period of competition age where it is not the academic qualification but the Merit in the Academic Qualification and then the Merit of the Competitive Examinations on the basis of which the future of the students is decided and it is not possible to achieve this goal through a casual approach. It needs a strong Will Power and Constant Hardwork which would take us to our set targets. Thus two things are very important; firstly we have to set our target and secondly we have to move each step to reach to the set target. So let us pledge that we will sincerely move every step towards the promised goal and will not waste any moment, so that we fulfill our responsibility as entrusted to us.

DISCIPLINE

Discipline means many things to different people. To parents & teachers it means, '**Nice Behaviour**' & to students, discipline means '**Strictness'**. The real meaning of discipline what school expects from student is '**Self-Control**'; because it is self-control which can make you good student and a successful human being.

F.E.I.
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PLEASE NOTE THE FOLLOWING REGULATIONS:

01. Parents / Guardians are requested to sincerely co-operate with the functioning of the Institute by enforcing regularity, punctuality and discipline and also by taking keen interest in their ward's progress.
02. The progress and conduct of every pupil are ascertained from the reports of all the concerned staff.
03. In deciding the eligibility of a child to sit for Board Examination, the Class Work, the Home Work/ Assignments and the marks obtained in all the tests are taken into consideration. A student should obtain minimum of 40% marks in all the subjects individually in all tests to become eligible to submit Board Examination Form,.
04. Minimum of 80% attendance in theory and 90% attendance in Practicals is compulsory for allowing a student to appear in the Board Examination. Shortage of attendance for whatever raesons shall not be entertained.
05. For Subject/s carrying practicals, a student has to pass theory and practical examinations separately. Failing in either component will be deemed Not Eligible for Final Examination.
06. 20% of the marks in all subjects are earmarked for Internal Assessments which shall be awarded on the basis of all the exams conducted round the year and class attendance.
07. Re-examination is not ordinarily allowed except in case of exigencies like acute illness supported by authentic documents. The full expenses of such examination shall have to be borne by the student.
08. Parents/Guardians are earnestly requested to see the Progress Report and the Evaluated Answer Sheets (which are returned after each test) of their wards and sign them. They should note the subject/s in which the pupil is weak and help/encourage him/her for better performance.
09. In case of unexpected holidays, the students shall utilize the time in completing the prescribed courses with the help of Parents/Guardians and also by utilizing online available resources.
10. Reference Books / Reading Material / Reference Notes are kept available in the School Library. Students, in their own interest, may consult these in the Library itself and extend the habit of self study and develop self prepared Notes.

Subject: General English **Class: 12th**

General English

Class – **XII** Time: **3 hours**

Max Marks: **100** **80** (Theory) + **20** (Internal Assessment)

Prescribed Textbooks:

- Flamingo: English Reader published by National Council of Education Research and Training, New Delhi
- Vistas: Supplementary Reader Published by NCERT, New Delhi

Q. No.	Description	Weightage
	Section "A": Reading Comprehension	**20 marks**
1	One unseen passage of 400-500 words in length for note-making (5 marks) and summarizing (5 marks)	10 marks
2	One unseen prose passage of 400-500 words in length followed by five objective type questions and five multiple choice questions to assess comprehension, vocabulary, interpretation, word formation and inference.	1x10=10 marks
	Section "B": Writing Skills and Grammar	**30 marks**
3	One out of two questions on advertisement / writing formal / informal invitations and replies (50 words)	4 marks
4	One out of two questions on letter writing (business or official letters for making enquiries, registering complaints, asking for and giving information, placing orders and sending replies, letters to the editor giving suggestions / opinions on an issue; letter to the school or college authorities, regarding admissions, school issues, requirements. suitability of courses, etc.) [120 -150 words)	6 marks
5	One out of two questions on writing a resume along with job application (120-150 words)	6 marks
6	One out of two compositions on article / debate / speech / personality profile / personal experience / humorous writing (200-250 words)	6 marks
7	One passage 100-150 words in length for editing to test the following itwms: reflective pronouns, tenses, punctuation, narration, conjunctions, prepositions and change of voice (8 items)	8 marks
	Section "C" Literature	**30 marks**
8	Eight objective type questions (4 from one poetry extract and 4 from one prose extract) to assess comprehension and appreciation.	1x8 = 8 marks
9	Five out of seven short answer type questions based on prose / drama / poetry from both texts to assess inference and critical thinking.	2x5= 10 marks
10	One out of two long answer questions from *Flamingo* to assess global comprehension and extrapolation beyond the texts. Questions to provide evaluating and analytical responses using incidents, events, themes as reference points (120-150 words)	6 marks
11	One out of two long answer questions from *Vistas* to assess global comprehension along with analysis and extrapolation beyond the text. Questions to elicit creative responses and ability to form opinions (120-150 words)	6 marks

Internal Assessment

Assessment of Listening and Speaking Skills

Assessment of Listening and Speaking Skills will be for 20 marks. Practice and assessment to be based on the activities included in the prescribed textbooks and resources and techniques available in the school.

Prescribed Textbooks:

- Flamingo: English Reader published by National Council of Education Research and Training, New Delhi
- Vistas: Supplementary Reader Published by NCERT, New Delhi

For grammar, teachers and students can refer to any standard grammar textbook for further reading and clarification of concepts. Some of the books include:

- English Grammar in Use by Raymond Murphy (Cambridge University Press)
- Oxford Practice Grammar by John Eastwood (Oxford University Press)
- Grammar Practice Activities by Penny Ur (Cambridge University Press)
- A Practical English Grammar by Thomson and Martinet (Oxford University Press)
- High School English Grammar by Wren & Martin (S Chand Publishing)

SYLLABUS BREAK UP

Detailed break-up of the Syllabus as per Examination Schedule

Exam	Section	Description	Marks	Due Date
UT_1	Prose	★ The Last Lesson ★ Lost Spring	25	10th April
	Poetry	☞ My Mother at Sixty-six ☞ An Elementary School Classroom		
	Story	➢ The Third Level ➢ The Tiger King		
	Essay & Speech Writing	✓ Safe and Adventurous Life ✓ Importance of Outdoor games ✓ Evils of Dowry ✓ Covid-19 Pandemic		
	Writing	♣ ♣		
	Letters	**Formal** ➡ ➡ **Informal** ➡ ➡		
	Grammar	✍ Narration ✍		

TT1	Prose	❖ Deep Water ❖ Journey to the End of the earth	**25**	**15th June**
	Poetry	★ Keeping Quiet ★ A Thing of Beauty		
	Story	☞ The Rat Trap ☞ The Enemy		
	Debates	➢ Gender Discrimination in Society ➢ The Internet v/s Teacher ➢		
	Writing	Article / Speech writing ✓ ✓		
	Letters	♣ ♣		
	Grammar	✍ Conjunction ✍ Voices		
UT2	Prose	❖ Indigo ❖ Poets and Pancakes	**25**	**10th August**
	Poetry	★ A Roadside Stand		
	Story	☞ Should Wizard hot Mommy ☞ On the Face of it		
	Article Writing	➢ The Tourism Potential in India ➢ Education of the Girl Child ➢		
	Writing	✓ CV / Resume writing ✓		
	Letters	♣ ♣		
	Grammar	✍ Tenses ✍		
TT2	Prose	❖ The Interview ❖ Going Places	**25**	**30th September**
	Poetry	★ Aunt Jennifer's Tigers		
	Story	☞ Evans Tries an O-Level ☞ Memories of Childhood		
	Poetic Devices	☞ Simile / ☞ Metaphor / ☞ Image ☞ Personification / ☞ Alliteration / ☞ Hyperbole ☞ Repetition / ☞ Refrain / ☞ Onemoron ☞ Onemetapia / ☞ Irony / ☞		
	Writing	✓ Advertisement and Poster writing ✓ ✓		
	Poetic Devices	♣ ♣		
	Grammar	✍ Prepositions ✍ Punctuations ✍ Reflexive pronouns		

Subject: Physics — Class: 12th

Book Prescribed:

A Textbook of Physics for class XII published by NCERT New Delhi

Suggested Reading:

1. *Concept of Physics by H. C. Verma*
2. *I. I. T. Physics Series by D. C. Pandey*
3. *A Text-Book of Physics by Rascenic, Halliday & Walker*
4. *Textbook of Physics for Class XII – Saraswati Publication.*
5. *Pradeep's Fundamental Physics for Class XII*
6. *Systematic Physics for Class XII - Kalyani Publication.*

COURSE STRUCTURE

Maximum Marks: 100 [**Theory:** 70 marks **(Time: 3 hours); Practicals:** 30 marks]

Theory Examination **Maximum Marks: 70** **Time allowed: 3 hours**

Examination	Unit No.	Name	Completion Date	Marks	Periods
U_1	I	Electrostatics	25th February	08	40
	II	Current Electricity	12th March	07	17
	III	Magnetic Effects of Current and Magnetism	22nd April	08	40
T_1	IV	Electromagnetic Induction and Alternating currents	10th May	08	15
	V	Electromagnetic Waves	12th May	03	2
U_2	VI	Optics	12th June	14	30
	VII	Dual Nature of Matter and Radiation	16th June	04	04
T_2	VIII	Atoms and Nuclei	25th June	06	09
	IX	Electronic Devices	25th July	07	30
	X	Communication System	1st August	05	05

COURSE BREAK UP {Theory}

Unit	Description of Topics
Unit I: Electrostatics	✍ Electric charges; conservation of charge, Coulomb's law – force between two point charges, forces between multiple charges, superposition principle and continuous charge distribution. ✦ Electric field, electric field due to point charge, electric field lines, and electric dipole, electric field due to dipole, Torque on a dipole in uniform electric field. ♣ Electric flux, statement of Gauss's theorem and its application to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside). ❖ Electric potential, potential difference, electric potential due to point charge, a dipole and system of charges; equipotential surfaces, electric potential energy of a system of two point charges and of electric dipole in an electrostatic field. ☞ Conductor and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization, capacitors and capacitance, 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. Van de Graaff generator.

Unit	Description of Topics
Unit II: Current Electricity	➢ Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current. Ohm's law, electric resistance. V-I. Characteristics, (linear, non-linear), electrical energy and power, electric resistivity and conductivity, carbon resistors, colour code for carbon resistors; Temperature dependence of resistance. ❖ Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel. Elementary idea of secondary cells. Kirchoff's laws and their applications. Wheat stone bridge, meter bridge. ✍ Potentiometer-principle and its application to measure potential difference and for comparing e.m.f. of two cells; measurement of internal resistance of a cell.
Unit III: Magnetic Effects of Current and Magnetism	✓ Concept of magnetic field, Oersted's experiment, Biot-Savart law and its application to current carrying circular loop. Ampere's law and its applications to infinite long straight wire, straight and toroidal solenoids. ★ Force on a moving charge in a 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 currentloop in uniform magnetic field, moving coil galvanometerits current sensitivity and conversion to ammeter and voltmeter. ♣ Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in uniform magnetic field, bar magnet as an equivalent solenoid, magnetic field lines, Earth's magnetic field and magnetic elements. Para-dia-and ferro-magnetic substances with examples. ☞ Electromagnets and factors affecting their strength, permanent magnets.
Unit IV: Electromagnetic Induction and Alternating Currents	❖ Electromagnetic induction, Faraday's laws, induced e.m.f. and current; Lenz's law, Eddy currents, self and mutual inductance. ✍ Alternating currents, peak and rms value of alternating current/voltage. Reactance and impedence, LC oscillations (qualitative treatment only) & LCR circuits series, Resonance, power in A.C. circuits, wattles current, AC Generator and transformer.
Unit V: Electromagnetic Waves	✪ Need for displacement current, Electro-magnetic waves and their characteristics (qualitative ideas only) transverse nature of electromagnetic waves. ♣ Electromagnetic spectrum (radio-waves, micro-waves, infra-red, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.
Unit VI: Optics	✣ Ray Optics - Reflection of light; spherical mirrors; mirror formula, Refraction of light - total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lenses formula, lens-makers formula, Newton's relation: displacement method to find position of images (conjugate points), Magnification, power of lens, combination of thin lenses in contact. Combination of a lens and a mirror, Refraction and dispersion of light through a prism. ❖ Scattering of light-blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Elementary idea of Raman effect. ✍ Optical instruments – Human eye, image formation and accommodation, correction of eye defects (myopia, hypermetropia, presbyopia and astigmatism) using lenses. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. ☞ Wave optics-wave front and Huygens principle, reflection and refraction of plane wave at a plane surface using wavefronts. Proofs of laws of reflection and refraction using Huygens 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 Brewter's law, uses of plane polarized light and polaroids.

Unit	Description of Topics
Unit VII: Dual Nature of Matter and Radiation	♦ Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation - particle nature of light. ♣ Matter waves, wave nature of particles, de Broglie relation, Davisson- Germer experiment (experimental details should be omitted; only conclusion should be explained).
Unit VIII: Atoms and Nuclei	▪ Alpha-particle scattering experiment, Rutherford's model of atom, Bohr's Model of atom; energy levels, Hydrogen spectrum. Continuous and characteristics of X-rays. Composition and size of nucleus; atomic masses, isotopes, isobars, isotones, Radioactivity (alpha, beta and gamma) particles/rays and their properties, Radioactive decay law, Mass – energy relation, mass defect, binding energy/ nucleon and its variation with mass no., nuclear fission and nuclear fusion.
Unit IX: Electronic Devices	♣ Energy bands in solids, conductors, insulators and semiconductors, semiconductor diode, I-V characteristics in forward and reverse bias, diode as a rectflier; I-V characteristics of LED, photo diode, solar cell and Zener diode; Zener diode as a voltage regulator, Junction transistors and its action; characteristics of a transistor, transistor as an amplifier (common emitter configuration and oscillator (common Emitter) Logic gates (OR, AND, NOT), concept of NAND and NOR gates, Transistor as a switch.
Unit X: Communication Systems	❑ Elements of communication system (block diagram only), Band width of signals (speech, T.V and digital data); bandwidth of transmission medium, propagation of electromagnetic waves in the atmosphere, sky and space wave propagation. ★ Need for modulation; Production and detection of an amplitude modulated wave.

Practicals: 30 marks *[Internal Assessment: 10 marks; External Examination: 20 marks (Time: 3 hours)]*

- Every student will perform at least 15 experiments (7 from section A & 8 from section B).
- The activities mentioned here should be for the purpose of demonstration.
- One project of three marks is to be carried out by the students.

Evaluation Scheme for External Practical Examination: *[Total Marks: 20]*

✓ *One experiment from each of the two Sections*	**10 marks**
✓ *One activity from each of the two Sections (two activities in total)*	**2+2=4 marks**
✓ *Record of one Investigatory Project and viva based on project*	**2 marks**
✓ *Practical record of experiments and activities*	**2 marks**
✓ *Viva-voce on experiments and activity*	**2 marks**

COURSE BREAK UP {Practicals} ***Practicals****: 30 marks (External: 20; Internal: 10)*

Section A *Experiments*

1. To determine resistance per cm. of a given wire by plotting a graph of potential difference vs. current (Ohm's law)
2. To find resistance of a given wire using metre bridge and hence determine the specific resistance of its material.
3. To verify the laws of combination (series/parallel) of resistance using a metre bridge.
4. To compare the e.m.f of two given primary cells using potentiometer.
5. To determine internal resistance of a given primary cell using potentiometer.
6. To determine resistance of a galvanometer by using half deflection method and also find its figure of merit.
7. To convert the given galvanometer (of known resistance and figure of merit) into an ammeter and voltmeter of desired range and to verify the same.

8. To find the frequency of the a.c. mains with a Sonometer.

Section A Activities

1. To measure the resistance and impedance of an inductor with or without iron care.
2. To measure resistance voltage (AC/DC), current (AC) and check continuity of a given circular using multi metre.
3. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.
4. To study the variation in potential drop with length of a wire for a steady current.
5. To draw the diagram of a given open circuit comprising at least a battery, rheostat, key; ammeter and voltmeter. Make the components that are not connected in proper order and correct the circuit and also circuit and also circuit diagram.

Section B Experiments

1. To find the focal length of a convex mirror, using a convex lens.
2. To find the local length of a concave lens using a convex lens.
3. To find the value of v for different values of u in case of a concave mirror and also to find its focal length.
4. To find the focal length of a convex lens by plotting a graph between u and v or between l/u and l/v.
5. To determine angle of minimum deviation (δm) for a given prism by plotting a graph between angle of incidence and angle of deviation (δm).
6. To determine refractive index of a glass slab using a traveling microscope.
7. To find refractive index of a liquid using I) concave mirror II) Convex lens and plane mirror.
8. To draw the characteristics of a common-emitter n-p-n or p-n-p transistor and to find out the values of current and voltage gains.
9. To draw the I-V characteristics curve of a p-n junction in forward bias and reverse bias.
10. To draw the characteristic curve of a zener diode and to determine its reverse breaks down voltage.

Section B Activities

1. To study effect of intensity of light by varying distance of the source on an L.D.R.
2. To identify a diode, a LED, a transistor, and IC, a resistor and a capacitor from mixed collection of such items.
3. Use of multimeter to: i) Identify base of transistor; ii) Distinguish between n-p-n and p-n-p transistors; iii) See the unidirectional flow of current in case of a diode and an LED; iv) Check whether a given electronic component (e.g. diode, transistor or IC) is in working order.
4. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.
5. To observe polarization of light using two polariods.
6. To observe diffraction of light due to a thin slit.
7. To study the size and nature of the image formed by i) convex lens, ii) concave mirror, on a screen by using a candle and screen for different distances of the candle from the lens/ mirror.
8. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.

Suggested Investigatory Projects:

1. To investigate whether the energy of a simple pendulum is conserved.
2. To determine the radius of gyration about the centre of mass of a scale used as a bar pendulum.
3. To investigate changes in the velocity of a body under the action of a constant fare and determine its acceleration.
4. To compare effectiveness of differences materials as absorbers of sound of heat.
5. To determine the wave length of laser beam by diffraction.
6. To study various factors on which the internal resistance, emf of a cell depends.
7. To construct a time switch and study dependence of its time constant on various factors.
8. To study infrared radiations emitted by different sources using photo-transistor.
9. To compare effectiveness of different materials and insulators.
10 To design an automatic traffic signal system using suitable combination of logic gates.
11 To study luminosity of various electric lamps of different powers and make.
12 To compare the young's modulus of Elasticity of different specimens of rubber and also draw their elastic hysterises curve.

Subject: Chemistry **Class: 12th**

Books Suggested:

Textbook of Chemistry for class XII published by NCERT New Delhi

Suggested Readings

1. *Textbook of Chemistry for Class XII – Saraswati Publication.*
2. *Pradeep's New Course Chemistry for Class XII*
3. *Systematic Chemistry for Class XII - Kalyani Publication.*
4. *Arihant Chemistry*
5. *Dinesh Companion Chemistry for Class XII*
6. *ABC Chemistry*

COURSE STRUCTURE

Maximum Marks: 100 **[Theory: 70 marks** (Time: 3 hours); **Practicals: 30 marks]**

Theory **Maximum Marks: 70** **Time allowed: 3 hours**

Exams.	Unit No.	Name	Completion Date	Marks	Periods
U_1	I	Solid State	30th January	4	25
	II	Solutions	28th February	5	20
	III	Electrochemistry	25th March	5	20
	IV	Chemical Kinetics	15th April	5	20
	V	Surface Chemistry	25th April	4	08
	VI	General Principles & Processes of Isolation of Elements	30th April	3	04
T_1	VII	p – Block Elements	20th May	8	14
	VIII	d – and f – block elements	30th May	5	10
	IX	Coordination Compounds	10th June	3	8
	X	Haloalkanes and Haloarenes	20th June	4	6
U_2	XI	Alcohols, Phenols and Ethers	30th June	4	10
	XII	Aldehydes, Ketones and Carboxylic acids	20th July	6	18
T_2	XIII	Organic Compounds containing Nitrogen	25th July	4	04
	XIV	Biomolecules	30th July	4	05
	XV	Polymers	5th August	3	05
	XVI	Chemistry in every day life	14th August	3	06

COURSE BREAK UP

Unit	Description
Unit I: Solid State	❁ Classification of solids based on different binding forces: molecular, ionic, covalent and metallic solids, amorphous solids and crystalline solids (elementary idea only), unit cell in two dimensional & three dimensional lattices, packing efficiency, calculation of density of unit cell, packing in solids, voids, number of atoms per unit cell in a cubic unit cell, point defects. ❁ Properties of solids (electrical, magnetic& dielectric), Band theory of metals, conductors, semiconductors and insulators and n & p type semiconductors.
Unit II: Solutions	✦ Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties: relative lowering of vapor pressure of a solution, Raoult's law, elevation of boiling point, depression in freezing point temperature and osmotic pressure), determination of molecular masses using colligative properties. Abnormal molecular mass, Van't Hoff factor and calculations involving it.

Unit III: ***Electrochemistry***	Redox reactions, conductance in electrolytic solutions, specific conductivity, molar conductivity, variation of conductivity with concentration, Kohlrausch's law and its applications. Electrolysis and laws of electrolysis (elementary idea), dry cell - electrolytic cells and galvanic cells; lead accumulator, emf of a cell, standard electrode potential, Nernst equation and its application to chemical cells, relation between Gibb's energy change and emf of a cell, fuel cells, corrosion
Unit IV: ***Chemical Kinetics***	Rate of reaction (average and instantaneous rate of a reaction), factors affecting rate of reactions: (concentration, temperature, catalyst), rate law, specific rate constant and order molecularity of a reaction, integrated rate expression of zero and first order reactions and their derivations, half life period. Concept of collision theory (elementary idea, no mathematical derivation), Activation energy, Arrhenious equation.
Unit V: ***Surface Chemistry***	Adsorption - physical and chemical adsorption, factors affecting adsorption of gases on solids; Catalysis: homogeneous and heterogeneous, activity & selectivity. Enzyme catalysis, Colloidal state: distinction between true solution, colloids and suspensions. Types of colloids - lyophilic and lyophobic, multimolecular, macromolecular and associated colloids (micelles), properties of colloids: Tyndall effect, Brownian movement, Electrophoresis, Coagulation, Emulsions - types of emulsions. Elementary idea about nanomaterials.
Unit VI: General Principles & Processes of Isolation of Elements	Principles and methods of extraction: concentration, oxidation, reduction, electrolytic method & refining; occurrence & principles of extraction of aluminium, copper, zinc & iron
Unit VII: ***p-Block Elements***	***Group 15 Elements:*** General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen: preparation, properties & uses. Compounds of nitrogen: preparation & properties of ammonia and nitric acid, oxides of nitrogen (structure only), Phosphorus – allotropic forms; compounds of phosphorus: preparation & properties of phosphine, halides (PCl_3, PCI_5) and oxo-acids (elementary idea only). ***Group 16 Elements:*** General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; dioxygen: preparation, properties & uses. Classification of oxides; ozone. Sulphur - allotropic forms; compounds of sulphur: preparation, properties & uses of SO_2 and Sulphuric acid: industrial process of manufacture, properties and uses, other oxides and oxoacids of sulphur (structures only). ***Group 17 Elements:*** General introduction, electronic configuration, oxidation states, trends in physical and chemical properties; compounds of halogens - preparation, properties and uses of Chlorine and hydrochloric acid, interhalogen compounds, oxoacids of halogens (structures only). ***Group 18 Elements:*** General introduction, electronic configuration, occurrence, trends in physical & chemical properties & Uses.
Unit VIII: ***d and f block elements***	General introduction, electronic configuration, occurrence and characteristics of the transition metals, general trends in properties of first row transition metals (metallic character, IE, electrode potential, oxidation state, ionic radii, catalytic properties, colored ions, complex formation, magnetic properties, interstitial compounds, alloy formation). Preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$. Lanthanides: electronic configuration, oxidation state, chemical reactivity and lanthanide contraction and its consequences. Actinides - electronic configuration, oxidation states and comparison with lanthaniods.
Unit IX: ***Coordination Compounds***	Co-ordination compounds: Introduction, ligands, co-ordination number, color, magnetic properties and shapes, IUPAC nomenclature of mononuclear co-ordination compounds. Bonding (Werner's theory, VBT and CFT); structural and stereoisomerisms, importance of coordination compounds in qualitative inclusion of analysis, extraction of metals and biological systems.

Unit X: Haloalkanes and Haloarenes	❖ ***Haloalkanes:*** Nomenclature, nature of C-X bond, physical & chemical properties, mechanism of substitution reactions. Stability of carbocations, R-S and d-l configurations. ❖ ***Haloarenes:*** Nature of C-X bond, substitution reactions (directive influence of halogens for monosubstituted compounds only), Stability of carbocations, R-S and D-L configurations ❖ Uses and environmental effects of – dichloromethane, trichloromethane, tetrachloromethane, iodoform, freon, and DDT.
Unit XI: ***Alcohols, Phenols and Ethers***	➢ ***Alcohols:*** Nomenclature, methods of preparation, physical & chemical properties (of primary alcohols only), identification of primary, secondary & tertiary alcohols; mechanism of dehydration of alcohols, uses, some important compounds – methanol and ethanol. ➢ ***Phenols:*** Nomenclature, methods of preparation, physical & chemical properties, acidic nature of phenol, electrophillic substitution reactions, uses of phenols. ➢ ***Ethers:*** Nomenclature, methods of preparation, physical & chemical properties and uses.
Unit XII: ***Aldehydes, Ketones & Carboxylic acids***	• ***Aldehydes and Ketones:*** Nomenclature, nature of carbonyl group, methods of preparation, physical & chemical properties & mechanism of nucleophilic addition reaction to C = O group, reactivity of alpha hydrogen in aldehydes, uses. • ***Carboxylic Acids:*** Nomenclature, acidic nature, methods of preparation, physical & chemical properties and uses.
Unit XIII: Organic Compounds containing Nitrogen	✓ ***Amines:*** Nomenclature, classification, structure, methods of preparation, physical & chemical properties, uses, identification of primary, secondary & tertiary amines. ✓ ***Cyanides and Isocyanides:*** Structures of cyanide and isocyanide groups, nomenclature, preparation, physical properties and chemical reactions. ✓ ***Diazonium Salts:*** Preparation and chemical reactions (mechanism of diazotization), and importance in synthetic organic chemistry.
Unit XIV: ***Bio-molecules***	☪ ***Carbohydrates:*** Classification (aldoses and ketoses), monosaccharides: Glucose, fructose: structure, preparation and chemical reactions; oligosaccharides (sucrose, lactose & maltose) Polysaccharides: (starch, cellulose and glycogen); importance. ☪ ***Proteins:*** Elementary idea of amino acids: peptide bond, polypeptides and primary, secondary, tertiary and quaternary structure of proteins (Qualitative idea only). Denaturation of proteins; enzymes, lipids & harmones, their classification & functions. ☪ ***Nucleic Acids:*** DNA and RNA (purines and pyrimidines, nucleosides, nucleotides and fragments up to four nucleotides). ☪ ***Vitamins:*** Classification and functions, sources and deficiency diseases.
Unit XV: ***Polymers***	☪ Natural & synthetic polymers, methods of polymerization (addition and condensation), co-polymerization, and some important polymers: natural and synthetic like polythene, nylon, Bakelite, polyesters and rubber. Biodegradable and non-biodegradable polymers.
Unit XVI: ***Chemistry in everyday life***	***i) Chemicals in medicine and health care*** - analgesics, tranquillizers, antiseptics, disinfectants, antimicrobials, anti-fertility drugs, anti-histamines, antibiotics, antacids. ***ii) Chemicals in food*** - preservatives, artificial sweetening agents. ***iii) Cleansing agents*** – Soaps and detergents, cleansing action.

PRACTICALS — ***Maximum Marks: 30*** *[External: 20 & Internal: 10]*

Evaluation Scheme for Practical Examination:

☪ Volumetric analysis	= **06 marks**
☪ Salt Analysis	= **06 marks**
☪ Content Based Experiment	= **04 marks**
☪ Class record, Project work and viva	= **04 marks**
Total	**= 20 marks**

A. Surface Chemistry

i) Preparation of one Lyophilic and one Lyophobic solution:
Lyophilic solution – Starch, Egg albumin and Gum.
Lyophobic solution – Aluminium hydroxide, Ferric hydroxide, Arsenious sulphide.

ii) Study of the role of emulsifying agents in stabilizing the emulsion of different Oils.

B. Chemical Kinetics.

i) Effect of Concentration and Temperature on the rate of reaction between Sodium thiosulphate and Hydrochloric acid.

ii) Study of Reaction Rates of any one of the following:

a) Reaction of Iodide ions with Hydrogen Peroxide at room temperature using different concentration of iodide ions.

b) Reaction between Potassium Iodate (KIO_3) and Sodium Sulphite (Na_2SO_3) using Starch solution as indicator (clok reaction).

C. THERMOCHEMISTRY

Any one of the following experiments:

i) Enthalpy of dissolution of $CuSO_4$ or KNO_3.

ii) Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH).

iii) Determination of enthalpy change during interaction (Hydrogen bond formation) between Acetone & Chloroform.

D. ELECTRO CHEMISTRY

i) Variation of cell potential in Zn/Zn^{2+} // Cu^{2+}/ Cu with change in concentration of electrolytes ($CuSO_4$ or $ZnSO_4$) at room temperature.

E. CHROMATOGRAPHY

i) Separation of Pigments from extracts of Leaves and Flowers by paper chromatography and determination of R_F values.

ii) Separation of constituents present in an inorganic mixture containing two cations only (constituents having wide difference in R_F values to be provided)

F. PRAPARATION OF INORGANIC COMPOUNDS

i) Preparation of double salt of Ferrous Ammonium Sulphate or Potash Alum.

ii) Preparation of Potassium Ferric Oxalate.

G. TEST FOR THE FUNCTIONAL GROUPS PRESENT IN ORANIC COMPOUNDS

Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (primary) groups.

H. Study of Carbohydrates, Fats & Proteins in pure form & detection of their presence in given foodstuffs

I. Determination of concentration/ molarity of $KMnO_4$ solution by titrating it against a standard solution of:

i) Oxalic Acid

ii) Ferrous Ammonium Sulphate.

J. Qualitative Analysis

Determination of one Cation and one Anion in a given salt (insoluble salts to be excluded):
Cations: Pb^{2+}, Cu^{2+}, As^{3+}, Al^{3+}, Fe^{3+}, Mn^{2+}, Zn^{2+}, Ni^{2+}, Co^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Mg^{2+}, NH_4^+
Anions: CO_3^{2-}, S^{2-}, SO_3^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, PO_4^{3-}, $C_2O_4^{2-}$, CH_3COO^-

PROJECT WORK

Wherever feasible may include

1) Model Preparation

2) Investigatory Project

- ✓ To prepare Rayon thread from filter paper by cupra ammonium process.
- ✓ Determine the Oxalate content of Guava fruits at different stages of ripening.
- ✓ Study of Insecticides and Pesticides in various Fruits and Vegetables.
- ✓ To determine the amount of Casein present in different samples of Milk from different sources.
- ✓ Preparation of Soyabean milk and its comparison with natural Milk.
- ✓ To determine presence of adulterants in common foods such as Sugar, Butter, Oil, Red Chilly paper, Turmeric powder, Rice
- ✓ Prevention of Rusting of iron by using Cathode Protection Method.

3) Science Exhibits.

4) Participation in Science fairs.

Subject: Biology Class: 12th

Books prescribed:

- A Textbook of Biology for Class XII published by NCERT, New Delhi

Suggested Readings:

- Trueman's Elementary Biology for class XII by Bhatia and Tyagi
- Textbook of Biology for Class XII – Saraswati Publication.
- Pradeep's Text book of Biology for Class XII
- Dinesh A to Z in Biology for Class XII
- MTG Biology
- Arihant Biology

COURSE STRUCTURE [(Maximum Marks: 100; Theory: 70; Practicals: 30)]

[Theory: 70 marks (Botany: 35 marks & Zoology: 35 marks)] Time allowed: 3 hours

Section "A": Botany Maximum Marks: 35

Examination	Unit No.	Description	Completion Date	Marks	Periods
U_1	Unit I	Reproduction in Flowering Plants	15th April	07	25
T_1	Unit II	Genetics	15th June	09	45
U_2	Unit III	Biology and Human welfare	15th July	07	30
T_2	Unit IV	Ecology and Environment	15th August	12	45

Section "B": Zoology Maximum Marks: 35

Examination	Unit No.	Description	Completion Date	Marks	Periods
U_1	Unit I	Reproduction	Ending March	11	70
T_1	Unit II	Genetics and Evolution	15th May	12	70
U_2	Unit III	Biology & Human Welfare	Ending June	07	40
T_2	Unit IV	Biotechnology & its Application	15th August	05	20

Paper: Biology **Maximum Marks: 70** **Time allowed: 3 hours**

COURSE BREAK UP

Section "A" (Botany)	**Marks: 35**
Unit	**Description**
Unit I: Reproduction in Flowering Plants	✦ **Asexual Reproduction:** Vegetative propagation in plants, micropropagation. ✦ **Sexual Reproduction:** Flower structure, Development of male & female gametophytes. ✦ Pollination: types, agencies & examples, Out breeding devices. Pollen-Pistil interaction, Double fertilization, Post fertilization events, Development of endosperm, embryo, seed and fruit. Special modes: apomixis and polyembryony, significance of seed & fruit formation.
Unit II: Genetics	❨ Heredity and variation ❨ Mendelian inheritance, Deviations from Mendelism: incomplete dominance, co-dominance, Multiple alleles, Pleiotropy, Chromosomal theory of inheritance, Elementary idea of polygenic inheritance, Chromosomes & genes,
	☪ Search for genetic material & DNA as genetic material: Structure of DNA & RNA, DNA packaging, DNA Replication (Semiconservative), Central dogma, Protein Biosynthesis: Transcription, translation, genetic code, Gene expression and regulation (lac-operon),
Unit III: Biology & Human Welfare	❖ **Plant breeding:** Introduction, steps in plant breeding and application of plant breeding, and single cell protein, Biofortification. ❖ **Tissue culture:** Cellular totipotency, technique and application of tissue culture ❖ **Microbes in Human Welfare:** in household food processing, industrial production, sewage treatment, Production of energy (Biogas), biocontrol agent (Biopesticides) & Biofertilizers. ❖ Genetically Modified organism - Bt crops ❖ Biopiracy and patents.
Unit IV: Ecology & Environment	⊕ **Meaning of ecology, environment, habitat and niche:** Organisms and environment. ⊕ **Population and ecological adaptations:** Population Interactions-mutualism, competition, predation, parasitism. Population attributes - growth, birth rate and death rate, age distribution. ⊕ **Ecosystems:** Patterns, Components, energy flow, nutrient cycling (carbon and phosphorus), decomposition and productivity. Pyramids of number, biomass, energy. ⊕ Ecological succession. Ecological Services: Carbon fixation, Pollination, Oxygen release. ⊕ **Biodiversity and its conservation:** Threats to, and need for biodiversity conservation. ⊕ Hotspots, endangered organisms, extinction, Red Data Book. Biodiversity conservation - biosphere reserves, national parks and sanctuaries. ⊕ **Environmental Issues:** Air and water pollution and their control, solid waste management, agrochemicals and their effects, Radioactive waste management, Green house effect and global warming, Ozone depletion in stratosphere, Deforestation, Any three case studies as success stories addressing environmental issues.

Section "B" (Zoology)	Marks: 35
Unit	**Description**
Unit I: Reproduc-tion	**i) Asexual Reproduction:** Uniparental, modes: binary fission, sporulation, budding, gemmule, fragmentation, regeneration. ii) **Human Reproduction** - Male and female reproductive systems, Microscopic anatomy of testis & ovary; Gametogenesis (spermatogenesis & oogenesis. Menstrual cycle), Fertilization, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (elementary idea), Parturition (elementary idea) and Lactation (elementary idea).
	iii) **Reproductive Health:** Need for reproductive health & prevention of Sexually Transmitted Diseases (STD), Birth control - need & methods, Contraception and Medical Termination of Pregnancy (MTP), Amniocentesis, Infertility & assisted reproductive technologies: IVF, ZIFT, GIFT (Elementary idea for general awareness).
Unit II: Genetics and ***Evolution***	➢ Sex determination in humans, birds and honeybee. ➢ Inheritance pattern of Hemophilia and Color blindness in human beings. ➢ Mendelian Disorders in humans: Chromosomal disorders in humans, Down's syndrome, Turner's & Klinefelter's syndromes. ➢ Genome and Human Genome project. ➢ DNA fingerprinting. ➢ Origin of life: Theories & evidences with special reference to Darwin & Modern Synthetic theory of evolution, Hardy-Weinberg's principal. Adaptive radiation. ➢ Origin and evolution of Man.
Unit III: Biology & Human Welfare	**Health and Disease:** Basic concepts of immunology, vaccines; pathogens, paracites causing human diseases (Typhoid, Hepatitis, Malaria, Filariasis, Ascariasis, Common Cold, Amoebiasis, Ring Worm); Cancer, HIV and AIDS. **Insects & human welfare:** Silk, honey, lac. Adolescence, drug & alcohol abuse. Poultry, Dairy Farming
Unit IV: Biotechnology & its Application	i) Genetic Engineering (Recombinant DNA technology), cloning ii) Applications in Health: Human insulin & vaccine production, gene therapy iv) Biosafety issues.

Practicals: 30 marks [Internal assessment: 10 marks; External examination: 20 marks (Time: 3 hours)]

Periods: 30 for Botany and 30 for uZoology

Botany based Practicals	*15 marks*	*Zoology based Practicals*	*15 marks*
i. Internal assessment:	*5 marks*	**i. Internal Assessment:**	*5 marks*
ii. External examination:	*10 marks*	**ii. External examination:**	*10 marks*

List of Experiments – Botany

1. Study pollen germination on a slide.
2. Collect and study soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity of soil. Correlate with the kinds of plants found in them.
5. Study of plant population density by Quadrat method.
6. Study of plant population frequency by Quadrat method.

Study / observation of the following (Spotting) – Botany

1. Flowers adapted to pollination by different agencies (wind, insect)
2. Pollen germination on stigma through a permanent slide.

4(a). Meiosis in onion bud cell through permanent slides.

6. Mendelian inheritance using seeds of different color / size of any plant.
8. Exercise on controlled pollination - Emasculation, Tagging and Bagging.

10(a). Two plants found in xerophytic conditions. Comment upon their morphological adaptations.

11(a). Plants found in aquatic conditions. Comment upon their morphological adaptations.

List of Experiments –Zoology

3. Collect water from two different Water bodies around you and study them for pH, clarity and presence of any living organisms.
4. Study the presence of suspended particulate matter in air at the two widely different sites.
7. Prepare a temporary mount of Onion root tip to study Mitosis.
8. To study the effect of the different temperatures and three different pH on the activity of Salivary Amylase on Starch.

Study / observation of the following (Spotting) – Zoology

3. Identification of stages of gamete development *i.e.*, T.S. Testis and T.S. Ovary through permanent slides (from any mammal)

4(b). Meiosis in Grasshopper Testis through permanent slides.

5. T.S. of Blastula through permanent slides.
7. Prepared pedigree charts of genetic traits such as rolling of Tongue, Blood Groups, Widow's Peak, and color blindness.
9. Identification of common disease causing organisms like *Ascaris*, *Entamoeba*, *Plasmodium*, Ringworm through permanent slides or specimens. Comment on symptoms of diseases that they cause.

10(b). Two animals found in Xerophytic conditions. Comment upon their morphological adaptations.

11(b). Animals found in Aquatic conditions. Comment upon their morphological adaptations.

Subject: Mathematics **Class: 12th**

Prescribed Textbook:

Mathematics Textbook for Class XII, NCERT Publication

Suggested Readings:

1. ***Pradeep's New Course Mathematics for Class XII***
2. ***Dinesh Mathematics for Class XII***
3. ***Mathematics for Class XII by H. K. Dass and Aggarwal (for Concept)***
4. ***Mathematics for Class XII by R. D. Sharma***
5. ***Mathematics for Class XII by A. K. Roy (Oxford Publication)***
6. ***Full Marks by Saraswati Publishers (for Notes)***
7. ***NCERT Solved Question by Saraswati Publishers*** – *Nasir Ahmad Shah (for Notes)*

COURSE STRUCTURE

Maximum Marks: 100 ***Time allowed: 3 hours***

Exam	Unit No.	Name of the Chapter	Completion Date	Marks	Periods
U_1	***Unit I: Relations & Functions***	1. Relations and Functions	31st December	10	14
		2. Inverse Trigonometric Functions	18th January		
	Unit II: Algebra	1. Matrices	5th February	13	10
		2. Determinants	25th February		
T_1	***Unit III: Calculus***	1. Continuity and Differentiability	25th March	44	12
		2. Applications of Derivatives	25th April		8
		3. Integrals	25th May		8
		4. Applications of the Integrals	15th June		8
		5. Differential Equations	30th June		16
U_2	***Unit V:*** Linear Programming	1. Linear Programming	10th July	06	16
T_2	***Unit IV:*** Vectors and three-dimensional Geometry	1. Vectors	25th July	17	16
		2. Three-dimensional Geometry	25th August		16
	Unit VI: Probability	1. Probability	30th September	10	12

COURSE BREAK UP

Unit	Description of Chapters
Unit I: Relations and Functions	**1. Relations and Functions** Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one function (or injective function) and onto function (or surjective function), Bijective function, composite functions, inverse of a function. Binary operations. **2. Inverse Trigonometric Functions** Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.
Unit II: Algebra	**1. Matrices** Diagonal, Scaler & Identity Matrices Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices, Square matrix. Difference of Matrices Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order Concept of elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries). **2. Determinants** Determinant of a square matrix (up to 3 x 3 matrices), properties of determinants, minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix. Cramer's rule and its applications.

Unit III: Calculus

1. Continuity and Differentiability

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivate of implicit functions.

Concept of exponential and logarithmic functions to the base e.

Logarithmic functions as inverse of exponential functions.

$\lim 1/x$, $\lim 1/x$, , $\lim (1+ 1/x)^x$, $\lim (1+ x)^{1/x}$, $\lim \frac{\log(1+ x)}{x}$, $\lim \frac{ex -1}{x}$

x->0 x->∞ x->∞ x->0 x->0 x->0

Derivative of logarithmic and exponential functions.

Logarithmic differentiation, derivative of functions expressed in parametric forms.

Second order derivatives.

Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretations and simple applications.

2. Applications of Derivatives

Applications of derivatives: rate of change, increasing / decreasing functions, tangents & normals, approximation, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool).

Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals

Integration as inverse process of differentiation.

Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type to be evaluated.

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

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

$$\int \sqrt{ax^2 + bx + c}\, dx \quad \int dx/a + bCosx \quad \int dx/a + bSinx$$

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

Definite integrals as a limit of a sum, Fundamental Theorem of Calculus (without proof).

Basic properties of definite integrals and evaluation of definite integrals.

4. Applications of the Integrals

Applications in finding the area under simple curves, especially lines, areas of circles / parabolas / ellipses (in standard form only), area under the curve y = sin x, y = cos x, area between the two above said curves (the region should be clearly identifiable).

	5. Differential Equations Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type: $\frac{dy}{dx} + py = q$, where p and q are functions of x and $\frac{dx}{dy} + px = q$, where p and q are functions of y.
Unit V: Linear Programming	**1. Linear Programming** Introduction, definition of related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimal feasible solutions (up to three nontrivial constraints).
Unit IV: **Vectors and three-dimensional Geometry**	**1. Vectors** Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors. Scalar triple product. **2. Three - dimensional Geometry** Direction cosines/ratios of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes. (iii) a line and a plane. Distance of a point from a plane.
Unit VI: **Probability**	**1. Probability** Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem, Random variable and its probability distribution, mean and variance of random variable. Repeated independent (Bernoulli) trials and Binomial distribution.

Subject: *Environmental Science* **Class: 12th**

Book Prescribed:

- ***A Textbook of Environmental Science for Class XII published by J and K BOSE in collaboration with Foundation Books Pvt Limited New Delhi***
- ***Elements of Environmental Science***
- ***Environmental Science by K. C. Santara***

COURSE STRUCTURE

Maximum Marks: 100 marks (Theory: 70 marks & Practicals: 30 marks)

The subject deals with the interdependence of living things within their environment and provides an insight into the orderly interplay of the factors influencing environmental change. The impact of human demands on renewable and non-renewable resources, and the limited availability of these resources in nature, have been linked to correlate with patterns of human behavior necessary to evolve a sustainable environmental paradigm.

AIMS:

"Environment education should simultaneously attempt to create awareness, transmit information, teach knowledge, develop habits and skills, promote values, provide criteria and standards and present guidelines for problem solving and decision-making. It, therefore, aims at both cognitive and affective behavior modifications. The latter necessitates both classroom and field activities. This is as action-oriented, project centered and participatory process leading to self-confidence, positive attitudes and personal commitment to environment protection. Furthermore, the process should be implemented through an interdisciplinary approach."

1. To acquire knowledge of the origin and functioning of the nature system and its correlation with the living world.
2. To develop an understanding that human beings, plants and animals are part of a natural phenomenon and are interdependent.
3. To appreciate the influence of human activity on the natural processes.
4. To develop awareness of the need and responsibility to keep the natural system in a condition that sustains life.
5. To develop sensitivity in personal attitudes to environmental issues.
6. To develop an understanding of how local environments contribute to the global environment.
7. To develop sense of responsibility and concern for the welfare of the environment and all life forms which share this planet?
8. To develop a sound basis for further study, personal development and participation in local and global environmental concerns.

Theory ***Maximum Marks: 70*** ***Time allowed: 3 hours***

Examination	Lesson No.	Chapter Name	Completion Date	Marks	Periods
U_1	1	Air and Noise Pollution		10	
T_1	2	Water Pollution		10	
	3	Soil Degradation		10	
	4	Solid and Hazardous Waste Management		10	
U_2	5	Biodiversity Management		10	
T_2	6	Global Environmental Issues		10	
	7	Environmental Management and Legislation		10	

Practicals / Assignment / Course Work / Project Work: 30 marks

COURSE BREAK UP

Lesson	Detailed Description of Topics
Unit 1: Air and Noise Pollution	☆ Air pollution: sources and types ☆ Impact of air pollution on environment ☆ Control of air pollution (gaseous and particulate matter) ☆ Noise pollution: sources and effects on health ☆ Control of noise pollution
Unit 2: Water Pollution	✍ Water pollution: sources and impacts ✍ Concept of Eutrophication and bio-magnification ✍ Marine pollution ✍ water pollution control ✍ Sewage treatment (primary and secondary)
Unit 3: Soil Degradation	➢ Soil composition and profile ➢ Soil types (Indian classification of soil) ➢ Soil erosion: causes, impacts and control ➢ Soil pollution: causes and impacts ➢ Control of soil pollution

Unit 4: *Solid & Hazardous Waste Management*	✪ Solid Wastes: sources, generation and impacts. ✪ Disposal of solid wastes (composting, incineration, sanitary landfill) ✪ Management of solid waste. ✪ Hazardous waste: definition and characteristics ✪ Management of hazardous waste (deep well injection, plasma torch, incineration)
Unit 5: *Biodiversity Management*	❖ Biodiversity and its levels ❖ Importance of biodiversity ❖ Threats of biodiversity: causes and impacts ❖ Concept of threatened species (as per IUCN: extinct, endangered, vulnerable, rare) ❖ Biodiversity conservation: *in-situ, ex-situ*
Unit 6: Global Environmental Issues	☞ Climate change and global warming: causes, impacts and international efforts for combating global warming (Kyoto protocol) ☞ Ozone layer depletion: causes, impacts and global efforts for control (Montreal protocol) ☞ Acid rain: causes, impacts and control ☞ Smog and its types ☞ Desertification and its control
Unit 7: *Environmental Management and Legislation*	✓ Concept of sustainable development ✓ Environmental Impact assessment: scope and key elements ✓ Salient features of Water (Prevention and Control of Pollution) Act, 1974 ✓ Salient features of Air (Prevention and Control of Pollution) Act, 1981 ✓ Salient features of Environment Protection Act, 1986

Practicals / Assignment / Course Work / Project Work ***Marks: 30***

Practicals

1. Determination of pH of different water and soil samples.
2. Determination of soil texture using feel method.
3. Documentation of macrophytic aquatic plants.
4. Visit to a nearby lake/wetland/river/hydropower plant and preparation of a field report.
5. Collection of data regarding different types of solid waste generated in your locality.
6. Compilation of names of different endangered and endemic plant and animal species of your locality.

Suggested Assignments

The Practical/Project work carrying 30 marks has to be undertaken under the guidance of the teacher and to be evaluated as a part of the Internal Assessment. The project work could take one of following forms:

1. *Address a current environmental problem (preferably at local or regional scale) and should include problem identification and analysis, use of secondary data as well as some collection primary data, design of solution, documentation of the entire process in the form of a solution proposal or make a field study of the effect of human interaction on the natural environment and write a project report (1500 worlds) on the likely impact of the interaction on the global environment.*
2. *Design and conduct an environment impact assessment. The candidates may use secondary data, demonstrate their capacity to collect and analysis primary data by incorporating some primary data collected and use it in a few sectors of their work.*
3. *Systematic monitoring of an aspect of the local environment over a period of at least six months. The candidate must use quantitative techniques of monitoring, sampling scientifically. The data collection must be interpreted and presented in the form of a project report (1500 worlds).*
4. *Conduct a study on the density and population of plants growing in a particular area using the quadrate method and prepare a report.*
5. *Make a field study of the effect of human interaction on the natural environment and write a project report (1500 worlds) on the likely impact of the interaction on the global environment.*
6. *Prepare an original study/essay (2000 words) on an area of the prescribed curriculum that is indicative of his /her appreciation/concern for environmental issues and make a functional model to support the above.*

Signs of Good Students:

- Complete their assignments.
- Talk politely & listen to the instruction given.
- Stay on task.
- Choose productive rather than destructive activities.
- Wait to be called on.
- Try again and again.
- Control their tempers.
- Respect teachers & other students.
- Always truthful, positive & helping others.

Ways to strengthen your self-discipline

1. Decide that you really want to be someone who's self-disciplined & successful.
2. Make a personal commitment to develop and strengthen these traits.
3. Be accountable. Accept responsibility for your own behaviour. Don't blame others for your actions.
4. Practice to be good. Self-discipline is something you can teach yourself.
5. Do activities that enhance your self-discipline like prayer, exercise etc.
6. Eliminate harmful habits, *e.g.*, if you spend time watching unethical videos or TV programs or browsing websites, make a conscious decision to spend your time in healthier, more productive ways.
7. Think before speaking negative about somebody, the other might be correct.
8. Make good friends and read good books.
9. Have good attitude, do not complain all the time.
10. Learn from mistakes, ask yourself, what went wrong? and how could I do it better next time?

DISCIPLINE IN STUDENTS

Discipline is essential for the overall development of students and you are expected to behave in a controlled and disciplined manner. Below are some guidelines you are expected to follow:

- ☞ Be punctual and regular.
- ☞ Be respectful and obedient to all.
- ☞ Come out of your class only during authorised breaks.
- ☞ Take care of your belongings as well as the school property.
- ☞ Use the dust bins to keep the school clean.
- ☞ Maintain order and discipline in the classroom as well as in the campus.
- ☞ Avoid shouting, running and playing rough games.
- ☞ Avoid use of abusive language, stealing, cheating and smoking.
- ☞ Avoid malpractices during examinations.
- ☞ Desist from hearing and watching immoral, improper & indecent radio and TV programmes.
- ☞ Do not bring objectionable print & electronic material to school.
- ☞ Do not keep mobile phones.
- ☞ Do not write anything on the walls and furniture.
- ☞ Don't waste time in idle gossip.

Kind **Words** are the **Flowers**;
Kind **Hearts** are the **Gardens**;
Kind **Thoughts** are the **Roots**;
Kind **Deeds** are the **Fruits**.

✪ The desire for Discipline is the beginning of Wisdom.
✪ Success is Realization of the estimates which you place upon yourself.
✪ Examination makes you feel the Necessity of Toil.
✪ Good Books are the Concentrated Essence of the World's Wisdom.
✪ Good, Better, Best; Never be at Rest, Till your Good is Better & Better becomes the Best.
✓ Reading maketh a Full Man; Conference Ready Man & Writing an Exact Man.
✓ Truth is the Highest Virtue, but Higher still is Truthful Living.
✓ Character is what you are in the Dark.

♣ Life is an Echo, where what you Give comes Back.
♣ An inch of Time cannot be Bought by an inch of Gold.
♣ Studies serve for Delight, for Ornament & for Ability.
♣ The Roots of Education are Bitter, but the Fruit is Sweet.

➢ Most of our suspicion of others is based on a knowledge of our own weaknesses; examine your attitudes towards others to know yourself.
➢ Don't try to Change Others. Change Yourself if you want Peace. It is easier to Protect your Feet with Slippers than to Cover the Earth with Carpet.
➢ **Life is struggle, our hardships teach us a lot we come out of the world of fantasy and every other thing seems to be meaningless and we start to live in the world of reality that is life.**

When I Asked God for **Strength**; He Gave Me Difficult **Situations** to Face
When I Asked God for **Brain & Brawn**; He Gave Me **Puzzles** in Life to Solve
When I Asked God for **Happiness**; He Showed Me Some **Unhappy People**
When I Asked God for **Wealth**; He Showed Me How to **Work Hard**
When I Asked God for **Favours**; He Showed Me Opportunities to **Work Hard**
When I Asked God for **Peace**; He Showed Me How to **Help Others**
God Gave Me Nothing I **Wanted**; He Gave Me Everything I **Needed**

- Swami Vivekananda

❖ Easy *is to **judge** mistakes of others*; **Difficult** *is to **recognize** our own mistakes*
❖ Easy *is to **talk** without thinking*; **Difficult** *is to **refrain** the tongue*
❖ Easy *is to **forgive** others *; **Difficult** *is to **ask** for forgiveness*
❖ Easy *is to **criticize** others.*; **Difficult** *is to **improve** oneself...*
❖ Easy *is to **make** mistakes.*; **Difficult** *is to **learn** from them...*
❖ Easy *is to **think** about improving*; **Difficult** *is to stop thinking it and put it into **action***
❖ Easy *to **read** this *; Difficult *to **follow***