INFORMATION BROCHURE

UP Council of Science & Technology (CST)
Science Talent Search Examination

Council of Science & Technology (UP)
"VIGYAN BHAWAN"
9, Nabiullah Road, Surajkund Park, Lucknow-226018
# Table of Contents

1. Introduction .................................................................................................................. 3

2. Scholarship.................................................................................................................... 3

3. Prize............................................................................................................................... 4

4. About the Examination ............................................................................................... 5

5. Basic Features of UPSTSE ......................................................................................... 5
   5.1 General Information on CST UP Talent Search Examination ........................... 6
   5.2 Important Dates related to UPSTSE ................................................................. 6

6. Pre-Examination related Information ....................................................................... 7
   6.1 Eligibility for CST UP STSE ............................................................................. 7
   6.2 UPSTSE Test Papers ......................................................................................... 8
      6.3 List of Cities in which UPSTSE will be held ............................................... 8
   6.4 How to apply ....................................................................................................... 9
      6.4.1 UPSTSE online application processing System (OAPS) ......................... 9
      6.4.2 Filling in Application online ................................................................... 9
      6.4.3 Application Fee Payment Options ......................................................... 11
         6.4.3.1 Online Net Banking Payment Details ........................................... 11
         6.4.3.2 Online Net Banking/e-callan Payment Procedure ......................... 12
      6.4.4 Photograph and Signature Requirements .............................................. 13
         6.4.4.1 Photograph Requirements .............................................................. 13
         6.4.4.2 Signature Specifications ................................................................. 14
   6.5 Admit Cards ........................................................................................................ 14

7. Examination Related Information ....................................................................... 14
   7.1 Structure of UPSTSE ......................................................................................... 14
   7.2 UPSTSE Syllabi .................................................................................................. 16
      7.2.1 Syllabus for Class X examination ............................................................ 16


8. Post-Exam Related Information.................................................................41
  8.1 UPSTSE Score.........................................................................................41
  8.2 UPSTSE Results...............................................................................42
  8.3 UPSTSE Score Card........................................................................42
1. Introduction

Following the recommendation of National Committee of Science & Technology, State Council Of Science & Technology, U.P. was established on 1 of May, 1975 by Govt. of U.P. as an autonomous body registered under Societies Registration Act 1860 by restructuring U.P. State Council of Scientific & Industrial Research; the origin of which lies in Scientific Research Committee constituted under University Grant Commission in the year 1947.

The main aim of the Council is to promote overall development of S&T in the State. Research Promotion; Technology Development, Upgradation and Transfer; Entrepreneurship Development; and S&T Communication and Popularisation are the main activities of the Council.

It sponsors time bound and result-oriented programmes relevant to the state to various Universities, Colleges, Technical Institutions, R&D Laboratories, Voluntary Organisations (VOs) Non-Government Organisations (NGOs) and Individual Innovators.

For the first time in its history, Council of Science and Technology (CST), U.P. has decided to conduct an on-line examination to select meritorious students from class X or Class X pass (henceforth called as Class X examination) and class XII or Class XII pass (henceforth called as Class XII examination) students of different boards of UP in Science Streams for the purpose of awarding scholarships to those students who are opting for Science Streams for their further studies within the state of Uttar Pradesh and thus to promote basic sciences education in the state.

2. Scholarship

A total number of top 1000 students, selected from the merit list of each of the examinations will be chosen for the award of the following scholarship.

Scholarship to top 1000 students from the Class X Examination:

Each of the top 1000 students from the merit list of Class X examination will be awarded the following scholarships:

- Top 1000 students from the merit list of Class X examination will be selected for the award of scholarship of Rs. 2000/- p.m. (Rs. two thousand only) each throughout their studies in class X, class XI or class XII as the case may be.
- Each of the students selected for scholarship from the merit list of Class X examination will also continue getting the scholarship of Rs. 3000 per month for three years during their graduation studies in science stream and an amount of Rs. 4000 per month during their studies in science stream of post-graduation studies, provided the candidates continue their studies within the state of Uttar Pradesh.
➢ Scholarship to top 1000 students from the Class XII Examination:

Each of the top 1000 students from the merit list of Class XII examination will be awarded the following scholarships:

- Top 1000 students from the merit list of Class XII examination will be selected for the award of scholarship of Rs. 2000/- p.m. (Rs. two thousand only) each throughout their studies in class XII as the case may be.
- Each of the students selected for scholarship from the merit list of Class XII examination will also continue getting the scholarship of Rs. 3000 per month for three years during their graduation studies in science stream and an amount of Rs. 4000 per month during their studies in science stream of post-graduation studies, provided the candidates continue their studies within the state of Uttar Pradesh.

3. Prize

Top three students from each of the merit lists of Class-X & Class-XII scholarship examinations will get a cash prize of Rs. 1,00,000/- (Rs. one lac), Rs. 75,000/- (Rs. seventy five thousand) and Rs. 50,000/- (Rs. fifty thousand), for Rank 1, Rank 2 and Rank 3, respectively. The cash prize will be in addition to the scholarship awarded.

- **Tie Breaking rule**
  
  In case of a tie at any of the top three positions in any of the scholarship examinations (Class-X or Class-XII), the following rule for tie breaking will be followed. Candidate getting higher marks in section (Physics, Chemistry, Mathematics and/or Biology) with lower median marks in the test would be awarded a higher rank.
  
  In case the above tie breaking rule does not break the tie among candidates and two candidates get the same rank, then both the candidates will be awarded the same rank and equal prize money for that rank.
  
  In case the above tie breaking rule does not break the tie among candidates and there are more than two candidates at the same rank, even after tie breaking rule is applied, the total prize money for the tied ranks will be equally divided among the candidates getting the same rank.

4. About the Examination

**CST UP Science Talent Search Examination** is an examination within the state of Uttar Pradesh that is primarily intended to test the comprehensive understanding of the candidate of class X and Class XII level in Mathematics, Science (Physics and Chemistry) and/or Biology subjects. The score of this examination will be exclusively used for awarding the UP CST Scholarships, as mentioned above, to those qualified
candidates who are currently studying or completed Class X or Class XII in Science Stream of any board in Uttar Pradesh and currently studying in the Science Streams within the State of Uttar Pradesh.

The information in this brochure is mainly categorized into Pre-Examination (Eligibility, Application submission, Examination Centers, etc.), Examination (Syllabus, Pattern, Marks/Score, Model Question Papers, etc.) & Post-Examination (Answers, Results, Scorecard, etc.) sections.

5. Basic Features of CST UP Science Talent Search Examination (UPSTSE)

1. Examinations for Class X or Class X pass and Class XII or Class XII pass students will be conducted by an ONLINE Computer Based Test (CBT). The online examination paper will contain some questions for which numerical answers must be keyed in by the candidate using the virtual keypad. Rest of the questions shall be of Multiple Choice Question (MCQ) type.

2. Biometric information (Photograph and Fingerprints) for randomly selected candidates may be captured before the start of the examination.

3. UPSTS examinations will be held during forenoon and afternoon sessions on SIX consecutive week days between 27th February 2017 and 4th March 2017. Exact details regarding complete examination schedule will be notified at a later date.

4. For CST UP Science Talent Search Examination the entire process of filling up of application form, uploading of certificates/documents, etc., will be online and the candidates would not be required to send any hard copy of their application form/documents, etc., to CST UP office.

5. The payment of application fees would be online through different modes like net banking, debit/credit card, e-challan, etc.

6. The admit cards for CST UP Science Talent Search Test would be available through the online process only. Candidates can download their admit card from test website. No hard copy of admit cards will be posted to the candidates.

5.1 General Information on CST UP Science Talent Search Examination

1. Application Process: For UPSTSE all information related to the candidates will be available in a single UPSTSE Online Application Processing System (OAPS). Candidates have to register and fill the application via ONLINE mode ONLY by accessing the UPSTSE website. The photograph and signature of the applicant must be uploaded during the online application. Please note that all necessary certificates, such as, degree certificate/certificate from the Principal are also to be uploaded. Please note that application forms are not available for sale anywhere else.

2. Downloadable Admit Card: Admit cards will NOT be sent by e-mail/post, they can ONLY be downloaded from the UPSTST website tentatively from 10th February,
2017. The candidate has to bring the printed admit card to the test center along with at least one original (not photocopied/scanned copy) and valid (not expired) photo identification. It may be noted that one of the following photo identifications is ONLY permitted: Driving license, Passport, PAN Card, Voter ID, Aadhaar UID, School/College ID, Employee identification card, or a notarized affidavit with Photo, Signature, Date of Birth and Residential Address. The details of this ID proof have to be given while filling the online application.

3. **Type of Questions:** The question paper for UPSTSE will consist of questions of both multiple-choice type and numerical answer type. For multiple choice type questions, candidates have to choose the answer from among the given choices. For numerical answer type questions, choices will not be given. Candidates have to enter a number as the answer using a virtual keypad.

- **5.2 Important Dates Related to CST UP Science Talent Search Test**

  **Table 5.2: Important dates related to CST UP Science Talent Search Test**

<table>
<thead>
<tr>
<th>UPSTSE Online Application Processing System (OAPS) Website Opens</th>
<th>Thursday</th>
<th>15th December 2016 (00:00 Hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Date for Submission of Online Application through Website</td>
<td>Monday</td>
<td>30th January 2017 (23:59 Hrs)</td>
</tr>
<tr>
<td>Availability of Admit Card on the Online Application Interface for printing</td>
<td>Wednesday</td>
<td>10th February 2017</td>
</tr>
<tr>
<td>UPSTS Online Examination Forenoon: 10:00 AM to 12:00 Noon Afternoon: 12:30 PM to 2:30 PM</td>
<td>Monday to Saturday</td>
<td>Will be Displayed on website</td>
</tr>
<tr>
<td>Announcement of Results on the Online Application Website</td>
<td>Monday</td>
<td>Will be Displayed on website</td>
</tr>
</tbody>
</table>

- **6. Pre-Examination Related Information**

  - **6.1 Eligibility for CST UP Science Talent Search Test**

    Before starting the application process, the candidate must ensure that he/she meets the eligibility criteria of *CST UP Science Talent Search Examination* given in Table 6.1. So please study the following table carefully and make sure that your year of qualification is not later than what is specified.

  **Table 6.1: Eligibility Criteria for CST UP Science Talent Search Test**

<table>
<thead>
<tr>
<th>Qualifying Degree</th>
<th>Qualifying Degree/Examination (Descriptive)</th>
<th>Description of Eligible Candidates</th>
<th>Year of qualification cannot be later than</th>
<th>Copies of Certificates to be submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Class X or Class X Passed Students</td>
<td>X Board from any board in UP or studying in Class X in UP</td>
<td>Students studying in Class X or Passed Class X from any Board in UP who are intending to or have taken admission in Class XI in Science Stream in UP</td>
<td>2017</td>
<td>ONLINE</td>
</tr>
<tr>
<td>For those who have passed Class X: 1. Bonafied Certificate from the Principal about the student studying in UP in Science Stream of Class XI.</td>
<td>For those studying in Class X: 1. Bonafied Certificate from the</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Certificate from Principal

Candidates have to submit a bonafied certificate from their school/college Principal certifying that the student is currently studying in the Science Stream of Class XI for the class X pass students and in the 1st, 2nd or 3rd Year of three year Bachelor Degree Course in Science in UP for the class XII pass students, as determined from Table 6.1, have to obtain one from his/her institution beforehand and upload the same during the online submission of the application form.

**Note:** Download the Bonafied Student Certificate Template from website

### 6.2 CST UP Science Talent Search Test Papers

CST UP Science Talent Search Test will be conducted in the subjects (also referred to as “papers”) shown in Table 6.2. Candidates must familiarize with the paper code for the paper of their choice, as this knowledge will be required at the time of application form submission and appearing for the examination.

### Table 6.2: UP Science Talent Search Test Papers and the Paper Codes

<table>
<thead>
<tr>
<th>Test Paper For Class X examination</th>
<th>Code</th>
<th>Test Paper For Class XII examination</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>MA</td>
<td>Mathematics</td>
<td>MA</td>
</tr>
<tr>
<td>Physics section of Science</td>
<td>PY</td>
<td>Physics</td>
<td>PY</td>
</tr>
<tr>
<td>Chemistry Section of Science</td>
<td>CH</td>
<td>Chemistry</td>
<td>CH</td>
</tr>
<tr>
<td>Biology section of Science</td>
<td>BL</td>
<td>Biology</td>
<td>BL</td>
</tr>
</tbody>
</table>
**NOTE:** Class X examination candidates have to answer all FOUR sections of Mathematics, Physics, Chemistry and Biology. Class XII examination candidates have to answer THREE sections with Physics and Chemistry being compulsory and one section out of Mathematics or Biology.

- **6.3 List of Cities in which UP Science Talent Search Test will be Held**

  **Choice of Examination City:** UP Science Talent Search Test will be conducted in 15 major cities of Uttar Pradesh. At the times of online registration, every candidate should specify three choices of Examination City. Although effort will be made to allot the first choice of city to the candidates, because of operational constraints, the examination committee reserves the right to allot the second or third choices in extreme cases. Table 6.3 gives the tentative list of the cities.

<table>
<thead>
<tr>
<th>State</th>
<th>Tentative List of Examination Cities*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttar Pradesh</td>
<td>1. Agra</td>
</tr>
<tr>
<td></td>
<td>2. Allahabad</td>
</tr>
<tr>
<td></td>
<td>3. Bareiley</td>
</tr>
<tr>
<td></td>
<td>4. Ghaziabad</td>
</tr>
<tr>
<td></td>
<td>5. Gorakhpur</td>
</tr>
<tr>
<td></td>
<td>6. Jhansi</td>
</tr>
<tr>
<td></td>
<td>7. Kanpur</td>
</tr>
<tr>
<td></td>
<td>8. Lucknow</td>
</tr>
<tr>
<td></td>
<td>9. Meerut</td>
</tr>
<tr>
<td></td>
<td>10. Muradabad</td>
</tr>
<tr>
<td></td>
<td>11. Muzaffarnagar</td>
</tr>
<tr>
<td></td>
<td>12. Noida</td>
</tr>
<tr>
<td></td>
<td>13. Rae Bareily</td>
</tr>
<tr>
<td></td>
<td>14. Saharanpur</td>
</tr>
<tr>
<td></td>
<td>15. Varanasi</td>
</tr>
</tbody>
</table>

* Please consult CST UP website for complete list of cities.

- **6.4 How to Apply**

All candidates have to apply **only ONLINE**. For all candidates applying to appear for the UP Science Talent Search Test an application fee of Rs. 500 will be charged. The application fee is non-refundable.

For **UP Science Talent Search Test** payments would have to be made through online by either using any bank Debit Card/Credit Card, Net Banking or e-challan facilities **ONLY. Additional charges** will be applicable as per the rule of the bank from where the money is being transferred.
6.4.1 UPSTSE Online Application Processing System (OAPS)

An online interface is provided for the entire process of the UPSTSE. With this interface you can

1. Apply for the examination online.
2. Upload photograph, signature and other documents like Degree certificate and the certificate from Principal.
3. Pay the application fee through net-banking.
4. Check the Status of your application form: Received, Under Scrutiny, Accepted, Defect Status, Status after Rectification, Rejected with Valid Reasons, Admit Card Ready for Download, etc.
5. Contact the helpline number/email mentioned in the UPSTSE website in case of any queries/problems.
6. Download Admit Card.
7. View your answers, marks and Test score.

The login to this interface is through your OAPS Enrolment ID and a OAPS password. Keep this information safe and do not disclose it to anyone.

6.4.2 Filling in Application Online

1. OAPS: UPSTSE Online Application Processing System (OAPS website) can be accessed from the following UP CST website: www.upcsttalent.com

2. Registration: You must first register yourself, by providing a valid email address, mobile number and a OAPS password. Choose the email id that you check frequently, as all communications to you from the UPSTSE authorities will be sent to this address (DO NOT USE ANYBODY ELSE’S e-mail ADDRESS. ONLY ONE PERSON CAN REGISTER WITH ONE e-mail ADDRESS). Give your personal mobile number because most of the communications may also be sent via SMS.

OAPS Password: This will be the password that you will be providing to the OAPS during the Enrollment. You must remember this along with the OAPS Enrolment ID to login to OAPS. Choose a password that cannot be guessed easily (it should not be your name, date of birth, or some string of numbers or letters like 12345, abcd, etc.), so as to ensure that the data you provide is not accessible to any person other than yourself.

3. OAPS Enrollment ID: Upon registration, an email containing your OAPS Enrolment ID will be sent to you. You need to remember this along with the OAPS password for all UPSTSE related communications/website operations.

4. Data Requirement for Application Filling: Before you login to OAPS using Enrolment ID and Password, keep the following information ready:
a) Personal information (name, date of birth, your personal mobile number, parent’s name, parent’s mobile number, etc.).

b) Address for Communication (including PIN code).

c) Eligibility degree details (College address, PIN code of college).

d) UPSTSE paper, choice of UPSTSE examination cities,

e) High quality image of your photograph conforming to the requirements specified in Section 6.4.4.1, along with what type of photograph is accepted (Section 6.4.4.2).

f) Good quality image of your signature conforming to the requirements specified in Section 6.4.4.3.

g) Scanned copy of Degree Certificate and Certificate from Principal/HODs in pdf format.

h) Details of a valid ID Proof that you will carry to the examination hall.

i) Your Net-banking login and password to make the application fee payment via online net-banking mode. In case you are making the payment through debit card/credit card have the following information like debit card/credit card number, password, CVV number ready with you.

5. **Application Filling:** Fill in the necessary data in the online application form by carefully following instructions given there. You may edit the data at this stage if you require. Upload the required soft copy of photo, signature and Certificate from Principal (duly signed and stamped by the Principal). Check the correctness of the photo and your signature and documents that are uploaded. If the uploaded soft copy is not correct or you are not satisfied with the quality of the soft copy, you may upload them again.

6. You will have to select the payment option (details given below) while filling the online form.

7. The OAPS allows you to enter data, “Save” partially filled form, “Logout”, and resume filling in by logging in again.

8. Before you make the payment, you will be shown a “Preview” of your application, where you have to carefully check for any errors.

9. Once you press **“Confirm and Final Submit”** button, **no further changes to the application can be made by you.**
10. For online payment follow the instructions given in Section 6.4.3 for payment options.

11. **Problems in Login into OAPS** – This step may be used, if the candidate forgets the password or the Enrollment ID or did not receive the Enrollment ID. Visit the “**Problems in Login into OAPS**” link on the OAPS website.

   a) **In case of forgotten Enrollment ID or non-receipt of Enrollment ID via email**, candidate must provide mobile number and the OAPS Password. The Enrollment ID will be sent to the candidate via SMS.

   b) **In case of forgotten password**, candidate must provide Mobile Number and Enrollment ID, which will be verified and a new OAPS password will be sent to the candidate via SMS/email.

   c) **In case of forgotten Enrollment ID as well as password or payment has not been made**, the candidate must re-enroll. If the payment has been made, then the candidate must contact the helpline number/email mentioned in the UPSTSE website.

---

**6.4.3 Application Fee Payment Options**

All candidates have to apply **only ONLINE**. For all candidates applying to appear for the UPSTSE an application fee of Rs. 500* will be charged. The application fee is non-refundable.

* - **Bank charges will be applicable as per the norm.**

**6.4.3.1 Online Net-banking Payment Details**

1. From the UPSTSE Online Application Processing System (OAPS), you will be redirected to the website of the bank of your choice.

2. You will have to login with your bank’s Net-banking (or Internet Banking) user ID and password.

3. The fee amount and bank charges will be shown to you, and you have to confirm that the payment is for UPSTSE.

4. Once you confirm and the payment is successful, you will be redirected back to the UPSTSE Online Application Website.

5. If you have some difficulty (due to internet connection or power failure), and you are not sure whether your payment has been processed or not, then please login back to OAPS and check the status of the payment. You can also check the status from your bank.
6. In case the fee amount has been debited from your bank account/debit card/credit card, however, OAPS does not acknowledge any fee payment, then the money will be credited back to your account/debit card/credit card within three working days.

7. In such a case, you may initiate a fresh payment using OAPS, even without waiting for the money to be credited back to your account/debit card/credit card, so that your application is on time.

**6.4.3.2 Online Net Banking/e-challan Payment Procedure**

1. At the secure payment site choose the method of payment which is Net Banking/e-challan.

2. Login with your Net Banking/SBI “User Name” and “Password”.

3. Follow the instruction as shown and fill in the details and make the payment. The details of the process of how to fill through Net Banking/e-challan may be seen at UPSTSE website.

4. Once the payment is successful a “Fee Payment Number” will be generated which is unique and **MUST be saved by the candidate** as it will be used in the later stages when he/she fills up the UPSTSE Application form.

5. After successful payment of the Application Fees the candidate will be required to fill in his/her details (as given in Section 5.4.2) to complete the UPSTSE Application process.

6. It is essential that the candidate fills in the details (as given in Section 4.4.2) without any error as the application **is liable to be rejected if there is any error**. As a checklist the candidate **MUST verify that he/she has filled in and uploaded the following as required**
   a) Personal information (name, date of birth, your personal mobile number, parent’s name, parent’s mobile number etc.).
   b) Address for Communication (including PIN code).
   c) Eligibility degree details (College address, PIN code of college).
   d) The signed application form (with photograph affixed) with Principal’s certificate, if that is the proof of your eligibility to appear in UPSTSE **OR** Other eligibility documents required to appear in UPSTSE (e.g., degree certificate).
   e) High quality image of your photograph conforming to the requirements specified in Section 5.4.4.1.
   f) Good quality image of your signature conforming to the requirements specified in Section 5.4.4.2.
   g) Details of a valid ID Proof that you will carry to the examination hall.
   h) **Fee payment number.**
Note: Before submitting the UPSTSE Application please ensure that all the details and all the necessary supporting documents are filled/uploaded and there is NO ERROR. Application once submitted CANNOT be changed/rectified. The current status of your application will be updated after the receipt and scrutiny of your application by the UPSTSE authorities. This status can be checked anytime by logging into OAPS.

6.4.4 Photograph and Signature Requirements

The UPSTSE Online Application Processing System requires that your photograph and signature be uploaded electronically at the time of submitting your application. Uploading photograph or signature that does not meet the specifications can result in the disqualification of the application without any refund of the application fee.

6.4.4.1 Photograph Requirements

Please pay attention to upload good quality photograph. Poor quality of the photograph submitted will lead to rejection of your UPSTSE application, without any refund of the application fee. The UPSTSE score card will be printed with the photograph you submit.

1. The photograph must be in color and must be taken in a professional studio. Photograph taken using a mobile phone and other self-composed portraits are NOT acceptable.
2. The photograph must be taken in a white or a very light background.
3. The photograph must have been taken after 1st July 2016.
4. In the photograph, the face should occupy about 50% of the area, and with a full-face view looking into the camera directly.
5. The main features of the face must not be covered by hair of the head, any cloth or any shadow. Forehead, eyes, nose and chin should be clearly visible.
6. If you normally wear spectacles, glare on glasses is not acceptable in your photo. Glare can be avoided with a slight downward tilt of the glasses or by removing the glasses for the photo shoot.
7. You must not wear spectacles with dark or tinted glasses, only clear glasses are permitted.
8. Ask your photo studio to provide the image in a JPEG format and also on a standard 3.5 cm × 4.5 cm (Width x Height) print.
9. Maximum pixel resolution for JPEG: 480 × 640 (0.3 Mega pixel) (Ask your studio to reduce it to this resolution if it is higher).
11. For your own benefit it may be prudent not to intentionally change your facial features or hair style as in the photograph until the day of the exam.

◆ 6.4.4.2 Signature Specifications

1. Please draw a rectangular box of size 2 cm × 7 cm (Height x Width) on an A4 white paper. Put your signature with black or dark blue ink pen within this box.
2. Get the signature digitally image scanned by a professional using a scanner, and get the image cropped to the box by the professional.
3. Only JPEG image formats will be accepted.
4. The maximum pixel resolution for the image is 160 × 560.
5. The minimum pixel resolution for the image is 80 × 280.
6. Photographs of the signatures taken using mobile phone are not acceptable, and can result in disqualification of the application without any refund of the fee.

➢ 6.5 Admit Card

The Admit Card can only be downloaded from the UPSTSE website tentatively from 10th February, 2017. Admit Cards will NOT be sent by post/email. Bring a print-out of the downloaded Admit Card to the Test Center along with the original and valid photo identification (NO photocopy / scanned copy / NOT expired). **Please note that you have to give details of this ID proof while filling the online application.** Candidates will NOT be permitted to take the test, if this original and valid photo identification is not presented. It may be noted that you would have specified one of the following IDs during the online application process: Driving License, Passport, PAN Card, Voter ID, Aadhaar UID, School/College ID, Employee Identification Card, or a Notarized Affidavit with Photo, Signature, Date of Birth and Residential Address.

◆ 7. Examination Related Information

➢ 7.1 Structure of UPSTSE

❖ Proposed Modalities of the test for Class X examination:

➢ The test will be of two hours duration with a total number of 52 Multiple-choice (MCQ) and Numerical Answer type (NAT) questions from Mathematics and Science subjects (Physics, Chemistry and Biology) of class X level. Whereas there will be negative marking for MCQ type questions, no negative marking will be there for the NAT questions. Each candidate will be provided with an individual console that will be connected to a secured LAN in the test centre.

❖ Question Paper details for Class X examination:
i) For class X test, there will be a total number of 52 questions, with 13 questions each in Mathematics, Physics, Chemistry and Biology sections.

ii) Out of the 13 questions, there would be at least 6 questions of Numerical Answer Type (NAT) where the candidate has to solve the problem to get a numerical answer that will be placed by computer mouse clicking from a number pad in the console and the rest 7 would be of Multiple Choice Questions (MCQ) where the candidate has to select ONE answer out of the four choices given.

iii) Out of 13 questions in each section, first 7 questions (Q.1-Q.7) will carry 2 marks each and the rest of the 6 questions (Q.8-Q.13) will carry 4 marks each. Negative marking of (-0.5 or -1) will be given for the wrong answer of the MCQ-type questions. No negative marking for the NAT-type questions.

iv) Questions will be both in Hindi and English.

❖ **Proposed Modalities of the test for class XII examination:**

> The test will be of two hours duration with a total number of 51 Multiple-choice (MCQ) and Numerical Answer type (NAT) questions from Physics, Chemistry, Mathematics/Biology subjects of class XII level. For the NAT-type questions, the students enter a number as their answer rather than choosing one of the four choices. The computer program used to evaluate the ONLINE paper will award marks to the candidate if the answer lies within a particular range specified by the paper setters. There is no negative marking for wrong answers to these questions.

> Whereas there will be no negative marking for the NAT questions, negative marking will be awarded for the MCQ type questions. Candidates will be instructed to answer Physics and Chemistry sections compulsorily and select one among Mathematics and Biology. Other modalities will be the same as for the class X test.

❖ **Question Paper details for Class XII examination:**

i) For class XII test, there will be a total number of 68 questions, with 17 questions each in Mathematics, Physics, Chemistry and Biology sections.

ii) All Candidates have to compulsorily answer the Physics and Chemistry sections and select one from Mathematics or Biology Sections.

iii) Out of the 17 questions, there would be at least 8 questions of Numerical Answer Type (NAT) where the candidate has to solve the problem to get a numerical answer that will be placed by computer mouse clicking from a number pad in the console and the rest 9 would be of Multiple Choice Questions (MCQ) where the candidate has to select ONE answer out of the four choices given.

iv) Out of 17 questions, first 9 questions (Q.1-Q.9) will carry 2 marks each and the rest of the 8 questions (Q.10-Q.17) will carry 4 marks each. Negative marking of (-0.5 or -1) will be given for the wrong answer of the MCQ-type questions. No negative marking for the NAT-type questions.

v) Questions will be both in Hindi and English.
7.2. UPSTSE Syllabi

7.2.1 Syllabus for Class X Examination

MATHEMATICS SECTION

NUMBER SYSTEMS

REAL NUMBERS

Euclid’s division lemma, Fundamental Theorem of Arithmetic –

ALGEBRA

1. POLYNOMIALS
   - Zeros of a polynomial. Relationship between zeros and coefficients of quadratic polynomials. Statement and simple problems on division algorithm for polynomials with real coefficients.

2. PAIR OF LINEAR EQUATIONS IN TWO VARIABLES
   - Pair of linear equations in two variables and graphical method of their solution, consistency/inconsistency.
   - Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically - by substitution, by elimination and by cross multiplication method. Simple situational problems. Simple problems on equations reducible to linear equations.

3. QUADRATIC EQUATIONS
   Standard form of a quadratic equation ax^2 + bx + c = 0, (a ≠ 0). Solutions of quadratic equations (only real roots) by factorization, by completing the square and by using quadratic formula. Relationship between discriminant and nature of roots. Situational problems based on quadratic equations related to day to day activities to be incorporated.

4. ARITHMETIC PROGRESSIONS (8) Periods
   Motivation for studying Arithmetic Progression Derivation of the n\text{th} term and sum of the first n terms of A.P. and their application in solving daily life problems.

GEOMETRY

1. TRIANGLES
   - Definitions, examples, counter examples of similar triangles.
• (Prove) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
• (Prove) If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.
• (Prove) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.
• (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.
• (Motivate) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.
• (Motivate) If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse, the triangles on each side of the perpendicular are similar to the whole triangle and to each other.
• (Prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
• (Prove) In a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.
• (Prove) In a triangle, if the square on one side is equal to sum of the squares on the other two sides, the angles opposite to the first side is a right angle.

2. CIRCLES
• Tangent to a circle at, point of contact
  • 1. (Prove) The tangent at any point of a circle is perpendicular to the radius through the point of contact.
  • 2. (Prove) The lengths of tangents drawn from an external point to a circle are equal.

3. CONSTRUCTIONS
• 1. Division of a line segment in a given ratio (internally).
• 2. Tangents to a circle from a point outside it.
• 3. Construction of a triangle similar to a given triangle.

TRIGONOMETRY

1. INTRODUCTION TO TRIGONOMETRY
- Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); motivate the ratios whichever are defined at 0 degree and 90 degree. Values (with proofs) of the trigonometric ratios of 30, 45 and 60 degrees. Relationships between the ratios.

2. TRIGONOMETRIC IDENTITIES
- Proof and applications of the identity \( \sin^2 A + \cos^2 A = 1 \). Only simple identities to be given. Trigonometric ratios of complementary angles.

- Simple problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only 30°, 45°, 60°.

STATISTICS AND PROBABILITY

1. STATISTICS
- Mean, median and mode of grouped data (bimodal situation to be avoided).
  Cumulative frequency graph.

2. PROBABILITY
- Classical definition of probability. Simple problems on single events (not using set notation).

COORDINATE GEOMETRY

1. LINES (In two-dimensions)

MENSURATION

1. AREAS RELATED TO CIRCLES
- Motivate the area of a circle; area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60°, 90° and 120° only. Plane figures involving triangles, simple quadrilaterals
2. SURFACE AREAS AND VOLUMES

(i) Surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones. Frustum of a cone.

(ii) Problems involving converting one type of metallic solid into another and other mixed problems. (Problems with combination of not more than two different solids be taken.)

CHEMISTRY SECTION- For Class X Examination

Materials
Chemical Substances - Nature and Behaviour

Chemical reactions: Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.

Acids, bases and salts: Their definitions in terms of furnishing of H+ and OH− ions, General properties, examples and uses, concept of pH scale (Definition relating to logarithm not required), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.

Metals and non metals: Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and its prevention.

Carbon compounds: Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes and alkynes), difference between saturated hydrocarbons and unsaturated hydrocarbons. Chemical properties of carbon compounds (combustion, oxidation, addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

Periodic classification of elements: Need for classification, Modern periodic table, gradation in properties, valency, atomic number, metallic and non-metallic
PHYSICS SECTION- For Class X Examination

How Things Work

Effects of Current

Magnetic effects of current: Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming’s Left Hand Rule. Electromagnetic induction. Induced potential difference, Induced current. Fleming’s Right Hand Rule, Direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

Natural Resources

Sources of energy: Different forms of energy, conventional and non-conventional sources of energy: Fossil fuels, solar energy; biogas; wind, water and tidal energy; Nuclear energy. Renewable versus non-renewable sources of Energy. Conservation of natural resources.
Management of natural resources. Conservation and judicious use of natural resources. Forest and wild life; Coal and Petroleum conservation. Examples of people’s participation for conservation of natural resources.
Regional environment: Big dams: advantages and limitations; alternatives, if any. Water harvesting. Sustainability of natural resources.

Natural Phenomena
Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of
curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification.

Refraction; Laws of refraction, refractive index.

Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens; Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses.

Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life.

**BIOLOGY SECTION- For Class X Examination**

**World of Living**

**Life processes:** ‘Living Being’. Basic concept of nutrition, respiration, transport and excretion in plants and animals.

**Control and co-ordination in animals and plants:** Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals: Nervous system; Voluntary, involuntary and reflex action; Chemical co-ordination: animal hormones.

**Reproduction:** Reproduction in animals and plants (asexual and sexual) reproductive health-need and methods of family planning. Safe sex vs HIV/AIDS. Child bearing and women’s health.

**Heredity and Evolution:** Heredity; Mendel’s contribution- Laws for inheritance of traits: Sex determination: brief introduction; Basic concepts of evolution.

**7.2.2 SYLLABUS FOR CLASS XII Examination**

**MATHEMATICS - For Class XII Examination**

**UNIT 1: SETS, RELATIONS AND FUNCTIONS:**

Sets and their representation; Union, intersection and complement of sets and their algebraic properties; Power et; Relation, Types of relations, equivalence relation. function; one-one, into and onto functions, composition of functions.

**UNIT 2: COMPLEX NUMBERS AND QUADRATIC EQUATIONS:**
Complex numbers as ordered pair 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 coefficients, nature of roots, formation of quadratic equations with given root.

**UNIT 3: MATRICES AND DETERMINANTS:**

Matrices, algebra of matrices, type 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: SEQUENCE AND SERIES:**

Arithmetic and Geometric progressions. insertion of arithmetic, geometric means between two given number. Relation between A.M. and G.M. Sum upto n terms of special series: \( S_n, S_{n^2}, \) \( S_{n^3} \). Arithmetico-Geometric progression.

**UNIT 8: LIMIT, CONTINUITY AND DIFFERENTIABILITY:**

Real - valued function, 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 normal.

**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
\[ \int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{a^2 - x^2}, \int \frac{dx}{ax^2 + bx + c}. \]

\[ \int \frac{dx}{\sqrt{a x^2 + bx + c}}, \int \frac{(px + q)dx}{ax^2 + bx + c}, \int \frac{(px + q)dx}{\sqrt{a x^2 + bx + c}}. \]

\[ \int \sqrt{a^2 \pm x^2} \, dx, \int \sqrt{x^2 - a^2} \, dx \]


UNIT 10: DIFFERENTIAL EQUATIONS:

Ordinary differential equation, 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, Bayes’ 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.

PHYSICS - For Class XII Examination
The syllabus contains two Sections - A and B. Section - A pertains to the Theory Part having 80% weightage, while Section - B contains Practical Component (Experimental Skills) having 20% weightage.

SECTION - A
UNIT 1: PHYSICS AND MEASUREMENT

UNIT 2: KINEMATICS

UNIT3: LAWS OF MOTION
Static and Kinetic friction, laws of friction, rolling friction.
Dynamics of uniform circular motion: Centripetal force and its applications.

UNIT4: 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 nonconservative forces: Elastic and inelastic collisions in one and two dimensions.

UNIT5: 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 or 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.

UNIT5: GRAVITATION

UNIT 7: PROPERTIES OF SOLIDS AND LIQUIDS
Elastic behaviour. 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,

UNIT 8: THERMODYNAMICS

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 equipartition 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 (SHM) and its equation; phase; oscillations of a spring-restoring force and force constant; energy in SHM- 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-f characteristics of Ohmic and nonohmic conductors, Electrical energy and power, Electrical resistivity, Colour code for resistors; Series and parallel combinations of resistors; Temperature dependence of resistance.

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, wattless current. 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 e.m. 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.


UNIT 17: DUAL NATURE OF MATTER AND RADIATION

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. Radioactivity- alpha, 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, tansistor 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).

SECTION-B

UNIT 21: EXPERIMENTAL SKILLS

Familiarity with the basic approach and observations of the experiments and activities:

1. Vernier calipers - its use to measure internal and external diameter and depth of a vessel.
2. Screw gauge - its use to determine thickness/diameter of thin sheet/wire.
3. Simple Pendulum - dissipation of energy by plotting a graph between square of amplitude and time.
5. Young's modulus of elasticity of the material of a metallic wire.
6. Surface tension of water by capillary rise and effect of detergents.
7. Co-efficient of Viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.
8. Plotting a cooling curve for the relationship between the temperature of a hot body and time.
9. Speed of sound in air at room temperature using a resonance tube.
10. Specific heat capacity of a given (i) solid and (ii) liquid by method of mixtures.
11. Resistivity of the material of a given wire using metre bridge.
12. Resistance of a given wire using Ohm's law.
13. Potentiometer-
   (i) Comparison of emf of two primary cells.
   (ii) Determination of internal resistance of a cell
14. Resistance and figure of merit of a galvanometer by half deflection method.
15. Focal length of:
   (i) Convex mirror
   (ii) Concave mirror, and
   (iii) Convex lens
   using parallax method.
16. Plot of angle of deviation vs angle of incidence for a triangular prism.
17. Refractive index of a glass slab using a travelling microscope.
18. Characteristic curves of a p-n junction diode in forward and reverse bias.
19. Characteristic curve of a Zener diode and finding reverse break down voltage.
20. Characteristic curves of a transistor and finding current gain and voltage gain.
21. Identification of Diode, LED, Transistor, IC Resistor, Capacitor from mixed collection of such items.
22. Using multimeter to:
   (i) Identify base of a transistor
   (ii) Distinguish between npn and pnp type transistor
   (iii) See the unidirectional flow of current in case of a diode and an LED.
   (iv) Check the correctness or otherwise of a given electronic component (diode, transistor or C).

CHEMISTRY - For Class XII Examination

SECTION: A PHYSICALCHEMISTRY

UNIT1: SOME BASIC CONCEPTS IN CHEMISTRY

Matter and its nature. Dalton's atomic theory; Concept of atom, molecule, element and compound: Physical quantities and their measurement 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.

UNIT2: 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 behaviour, compressibility factor and van der Waals equation.

**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. Calculation involving unit cell parameters, imperfection in solids: Electrical and magnetic properties.

UNIT 3: ATOMIC STRUCTURE
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. Concept of atomic orbitals as one electron wave functions; Variation of $\psi$ and $\psi^2$ with r for l=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; Rule 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 STRUCTURE
Kossel - Lewis approach to chemical bond formation, concept of ionic and covalent bond.

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, anti bonding), 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

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: $\Delta S$ of the universe and $\Delta G$ of the system as criteria for spontaneity. $\Delta G^\circ$ (Standard Gibbs energy change) and equilibrium constant.
UNIT6: SOLUTIONS
Different methods for expressing concentration of solution - molality, molarity, mole function, 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.

UNIT7: EQUILIBRIUM
Meaning of equilibrium, concept of dynamic equilibrium.
Equilibria involving physical processes: Solid -liquid, liquid - gas and solid - gas equilibria, Henry's law, general characteristics of equilibrium involving physical processes.
Equilibria involving chemical processes: Law of chemical equilibrium, equilibrium constants (Kp and Kc) and their significance. significance of ΔG and ΔG” in chemical equilibria, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst; LeChatelier's principle. Ionic equilibrium: Weak and strong electrolytes, ionization of electrolytes, various concepts of acids and bases (Arrhenius, Bronsted - 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.

UNIT8: 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. molar conductivities and their variation with concentration: Kohlramsch’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.

UNIT9: CHEMICAL KINETIS
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 reaction (no derivation).

UNIT 10: SURFACE CHEMISTRY
**Absorption** - Physisorption and chemisorption and their characteristics, factors affecting adsorption of gases on solids- Freundlich and Langmuir adsorption isotherms, adsorption 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.

**SECTION -B**

**INORGANIC CHEMISTRY**

**UNIT 11: CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES**

Modern 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 method) 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 AND ALKALINE EARTH METALS)**

**Group - 1 and 2 Elements**

General introduction, electronic configuration and general trend 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 and 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 behaviour of the first element in each group.

**Groupwise study of the p-block elements**

Group-13
Preparation, properties and uses of boron and aluminium; Structure, properties and uses of borax, boric acid, diborane, boron trifluoride, aluminium 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. (PCI₃, PCI₅); Structures of oxides and oxoacids of nitrogen and phosphorus.

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

**Group-17**
Preparation, properties and uses of 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 I6: 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 K₂Cr₂O₇ and KMnO₄.

**Inner Transition Elements**
Lanthanoids-Electronic configuration, oxidation states 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 co-ordination compounds, isomerism; Bonding-Valence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of co-ordination 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; Green house 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.

SECTION-C

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: 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 rearrangement.

UNIT 21: HYDROCARBONS

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

**Alkanes** - Conformations: Sawhorse and Newman projections (of ethane); Mechanism of halogenation of alkanes.
Alkenes - Geometrical isomerism; Mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen halides (Markownikoff's and peroxide effect); Ozonolysis and polymerization.

Alkynes - Acidic character: Addition of hydrogen, halogens, water and hydrogen halides; Polymerization.


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 α-hydrogen. aldol condensation, Cannizzaro reaction, Halofom 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 biomolecules.
CARBOHYDRATES - Classification: aldoses and ketoses: monosaccharides (glucose and fructose) and constituent monosaccharides of oligosaccharides (sucrose, lactose and maltose).

PROTEINS- Elementary Idea of α-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, amiline yellow, iodoform.

- Chemistry involved in the titrimetric exercises- Acids, bases and the use of indicators, oxalic acid vs \text{KMnO}_4, Mohr’s salt vs \text{KMnO}_4.

- Chemical principles involved in the qualitative salt analysis:
  Cations -\text{Pb}^{2+},\text{Cu}^{2+},\text{Al}^{3+},\text{Zn}^{2+},\text{Ni}^{2+},\text{Ca}^{2+},\text{Ba}^{2+},\text{Mg}^{2+},\text{NH}_4^+
  Anions -\text{CO}_3^{2-},\text{S}^{2-},\text{SO}_4^{2-},\text{NO}_3^-,\text{NO}_2^-,\text{Cl}^-,\text{Br}^-,\text{I}^-
  (Insoluble salts excluded).

- Chemical principles involved in the following experiments:
  1. Enthalpy of solution of \text{CuSO}_4.
  2. Enthalpy of neutralization of strong acid and strong base.
  3. Preparation of lyophilic and lyophobic sols.

Kinetic study of reaction of iodide ion with hydrogen peroxide at room temperature.

BIOLOGY - For Class XII Examination
Unit-I  Reproduction

Chapter-1: Reproduction in Organisms
Reproduction, a characteristic feature of all organisms for continuation of species; modes of reproduction - asexual and sexual reproduction; asexual reproduction - binary fission, sporulation, budding, gemmule formation, fragmentation; vegetative propagation in plants.

Chapter-2: Sexual Reproduction in Flowering Plants
Flower structure; development of male and female gametophytes; pollination - types, agencies and examples; outbreeding devices; pollen-pistil interaction; double fertilization; post fertilization events - development of endosperm and embryo, development of seed and formation of fruit; special modes-apomixis, parthenocarpy, polyembryony; Significance of seed dispersal and fruit formation.

Chapter-3: Human Reproduction
Male and female reproductive systems; microscopic anatomy of testis and ovary; gametogenesis - spermatogenesis and oogenesis; menstrual cycle; fertilisation, embryo development upto blastocyst formation, implantation; pregnancy and placenta formation (elementary idea); parturition (elementary idea); lactation (elementary idea).

Chapter-4: Reproductive Health
Need for reproductive health and prevention of Sexually Transmitted Diseases (STDs); birth control - need and methods, contraception and medical termination of pregnancy (MTP); amniocentesis; infertility and assisted reproductive technologies - IVF, ZIFT, GIFT (elementary idea for general awareness).

Unit-II  Genetics and Evolution

Chapter-5: Principles of Inheritance and Variation
Heredity and variation: Mendelian inheritance; deviations from Mendelism - incomplete dominance, co-dominance, multiple alleles and inheritance of blood groups, pleiotropy; elementary idea of polygenic inheritance; chromosome theory of inheritance; chromosomes and genes; Sex determination - in humans, birds and honey bee; linkage and crossing over; sex linked

inherence - haemophilia, colour blindness; Mendelian disorders in humans - thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.
Chapter-6: Molecular Basis of Inheritance
Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; transcription, genetic code, translation; gene expression and regulation - lac operon; genome and human and rice genome projects; DNA fingerprinting.

Chapter-7: Evolution
Origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidences); Darwin's contribution, modern synthetic theory of evolution; mechanism of evolution - variation (mutation and recombination) and natural selection with examples, types of natural selection; Gene flow and genetic drift; Hardy - Weinberg's principle; adaptive radiation; human evolution.

Unit-III  Biology and Human Welfare

Chapter-8: Human Health and Diseases
Pathogens; parasites causing human diseases (malaria, dengue, chickengunia, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm) and their control; Basic concepts of immunology - vaccines; cancer, HIV and AIDS; Adolescence - drug and alcohol abuse.

Chapter-9: Strategies for Enhancement in Food Production
Improvement in food production: Plant breeding, tissue culture, single cell protein, Biofortification, Apiculture and Animal husbandry.

Chapter-10: Microbes in Human Welfare
In household food processing, industrial production, sewage treatment, energy generation and microbes as biocontrol agents and biofertilizers. Antibiotics; production and judicious use.

Unit-IV  Biotechnology and Its Applications

Chapter-11: Biotechnology - Principles and processes Genetic Engineering (Recombinant DNA Technology).
Chapter-12: Biotechnology and its Application
Application of biotechnology in health and agriculture: Human insulin and vaccine production, stem cell technology, gene therapy; genetically modified organisms - Bt crops; transgenic animals; biosafety issues, bio piracy and patents.

Unit-V Ecology and Environment

Chapter-13: Organisms and Populations
Organisms and environment: Habitat and niche, population and ecological adaptations; population interactions - mutualism, competition, predation, parasitism; population attributes - growth, birth rate and death rate, age distribution.

Chapter-14: Ecosystem
Ecosystems: Patterns, components; productivity and decomposition; energy flow; pyramids of number, biomass, energy; nutrient cycles (carbon and phosphorous); ecological succession; ecological services - carbon fixation, pollination, seed dispersal, oxygen release (in brief).

Chapter-15: Biodiversity and its Conservation
Concept of biodiversity; patterns of biodiversity; importance of biodiversity; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Red Data Book, biosphere reserves, national parks, sanctuaries and Ramsar sites.

Chapter-16: Environmental Issues
Air pollution and its control; water pollution and its control; agrochemicals and their effects; solid waste management; radioactive waste management; greenhouse effect and climate change; ozone layer depletion; deforestation; any one case study as success story addressing environmental issue(s).

A. List of Experiments
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. Correlate with the kinds of plants found in them.

3. Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organism.
4. Study the presence of suspended particulate matter in air at two widely different sites.

5. Study the plant population density by quadrat method.

6. Study the plant population frequency by quadrat method.

7. Prepare a temporary mount of onion root tip to study mitosis.

8. Study the effect of different temperatures and three different pH on the activity of salivary amylase on starch.

9. Isolate DNA from available plant material such as spinach, green pea seeds, papaya, etc.

B. Study/observation of the following (Spotting)

1. Flowers adapted to pollination by different agencies (wind, insects, birds).

2. Pollen germination on stigma through a permanent slide.

3. Identification of stages of gamete development, i.e., T.S. of testis and T.S. of ovary through permanent slides (from grasshopper/mice).

4. Meiosis in onion bud cell or grasshopper testis through permanent slides.

5. T.S. of blastula through permanent slides (Mammalian).

6. Mendelian inheritance using seeds of different colour/sizes of any plant.

7. Prepared pedigree charts of any one of the genetic traits such as rolling of tongue, blood groups, ear lobes, widow's peak and colour blindness.

8. Controlled pollination - emasculation, tagging and bagging.

9. Common disease causing organisms like Ascaris, Entamoeba, Plasmodium, Roundworm through permanent slides or specimens. Comment on symptoms of diseases that they cause.

10. Two plants and two animals (models/virtual images) found in xeric conditions. Comment upon their morphological adaptations.

11. Two plants and two animals (models/virtual images) found in aquatic conditions. Comment upon their morphological adaptations.

C. Items for Identification/ familiarity with the apparatus for assessment in practicals (All experiments)

Beaker, flask, petridishes, soil from different sites- sandy, clayey, loamy, small potted plants, aluminium foil, paint brush, test tubes, starch solution, iodine, ice cubes, Bunsen burner/water bath, large colourful flowers, Maize inflorescence, model of developmental stages highlighting morula and blastula of frog, beads of different shapes (cubes, round) /size, smooth and rough, tags of different shapes, bags, Ascaris, Cacti (Opuntia).

D. List of Practicals
1. Study of the soil obtained from at least two different sites for their texture and water holding capacity.

2. Study of presence of suspended particulate matter in air at two widely different sites.

3. Study of the effect of different temperatures on the activity of salivary amylase.

4. Study of flowers adapted to pollination by different agencies (wind, insects).

5. Identification of T.S of morula or blastula of frog.


7. Preparation of pedigree charts of genetic traits such as rolling of tongue, colour blindness.

8. Study of emasculation, tagging and bagging by trying out an exercise on controlled pollination.

9. Identify common disease causing organisms like Ascaris and learn some common symptoms of the disease that they cause.

10. Comment upon the morphological adaptations of plants found in xerophytic conditions.

8. Post-Exam Related Information

8.1 UPSTSE Score

After the evaluation of the answers, the raw marks obtained by a candidate will be converted to a normalized UPSTSE Score.

Score of a candidate is being computed using the formula given below.

Calculation of Normalized Marks (multi-session papers)

All class X and class XII level papers of UPSTSE will be conducted in multi-sessions. Hence, for these papers, a suitable normalization is applied to take into account any variation in the difficulty levels of the question papers across different sessions. The normalization is done based on the fundamental assumption that "in all multi-session UPSTSE papers, the distribution of abilities of candidates is the same across all the sessions". This assumption is justified since the number of candidates appearing in multi-session papers in UPSTSE is large and the procedure of allocation of session to candidates is random. Further it is also ensured that for the same multi-session paper, the number of candidates allotted in each session is of the same order of magnitude.

Based on the above, and considering various normalization methods, the committee arrived at the following formula for calculating the normalized marks, for class X and class XII level papers of UPSTSE.

Normalization mark of \( i^{th} \) candidate in the \( t^{th} \) session \( \hat{M}_{ij} \) is given by
\[ \tilde{M}_{ij} = \frac{\bar{M}_t^q - M^q_t}{\bar{M}_{ti} - M_{iq}} (M_{ij} - M_{iq}) + M^q_t \]

where

\( M_{ij} \): is the actual marks obtained by the \( j^{th} \) candidate in \( i^{th} \) session

\( \bar{M}_t^q \): is the average marks of the top 0.1\% of the candidates considering all sessions

\( M^q_t \): is the sum of mean and standard deviation marks of the candidates in the paper considering all sessions

\( \bar{M}_{ti} \): is the average marks of the top 0.1\% of the candidates in the \( i^{th} \) session

\( M_{iq} \): is the sum of the mean marks and standard deviation of the \( i^{th} \) session

After the evaluation of the answers, normalized marks based on the above formula will be calculated corresponding to the raw marks obtained by a candidate and the UPSTSE Score will be calculated based on the normalized marks.

After the declaration of the results, UPSTSE Scorecards can be downloaded by the candidates whose marks are greater than or equal to the qualifying mark decided by the UPSTSE Committee. There is no provision for the issue of hard copies of the UPSTSE Scorecards.

The UPSTSE Committee has the authority to decide the qualifying mark/score for each UPSTSE paper. In case any claim or dispute arises in respect of UPSTSE, it is hereby made absolutely clear that the Courts and Tribunals in Lucknow alone shall have the exclusive jurisdiction to entertain and settle any such dispute or claim.

8.2 UPSTSE Results

UPSTSE results will be announced on March 27, 2017 at 17:00 hrs and will be available on the UPSTSE Online Application Website.

8.3 UPSTSE Score Card

After the declaration of the results, candidates can download their UPSTSE Score Card for the paper (for which he/she has taken the examination). Downloadable score cards will be available to only those candidates whose marks are equal to or above the qualifying marks in that paper. The UPSTSE score cards can be downloaded between March 27, 2017 to May 29, 2017 and for that the candidate should access the UPSTSE website.