

**IMPORTANT DATES FOR STATE MEDICAL AND TECHNICAL ENTRANCE EXAMINATION
(SMATEE) 2022**

- 1) Online Application Form fillup : 1st April 2022 (Friday) – 6th May 2022 (Friday)
- 2) Last date of Submission of Application Form: 6th May 2022 (Friday)

- 3) Date of Issue Admit Card : 23rd May 2022 (Monday) – 26th May 2022 (Thursday)

- 4) Date of Examination : 26th May 2022 (Thursday)

- 5) Date of Publication of results : June 3rd Week 2021

EXAM ROUTINE			
<i>Place of Examination</i>	<i>Date & Day</i>	<i>Time</i>	<i>Subject</i>
To be indicated on the Admit Card	26 th May 2022 (Thursday)	11 :00 Am – 2:00 Pm	Physics, Chemistry and Biology

Time schedule for State Medical and Technical Entrance Examination (SMATEE) – 2022

ACTIVITY	TIME
Seat arrangement	25 th May 2022 (Wednesday)
Exam Day	26 th May 2022 (Thursday)
Entering Hall & occupation of allotted seats by candidates, Verification of admit cards by invigilators	10:30 Am
Distribution of Answer sheet	10:45 AM
Test commences	11:00 AM
Submission of Answer Sheet	01:30 PM

1. INTRODUCTION:

The Mizoram State does not have sufficient facilities for Higher Technical Studies within the State. The seats allotted to the State of Mizoram for various courses of Higher Technical Studies by the Central Government is insufficient to meet the demands of the students aspiring for Higher Technical Studies from the State. Therefore, the Government deems it expedient to have a fair selection of promising candidates for those limited seats offered to Mizoram State on merit by means of Written Examination.

The Govt. of Mizoram has framed consolidated guidelines for conducting Selection Examination for selection of candidates for such higher technical studies in respect of degree/diploma courses in various discipline in Agricultural Sciences, Animal Husbandry and Veterinary Sciences, Medical Sciences etc.

The written Examination shall be conducted by a Selection Board duly constituted by the Government of Mizoram. The Selection Board shall also be responsible for preparation, declaration of results, counseling and allotment of seats.

2. MODE OF EXAMINATION

- (a) Selection of Candidates shall be done through a Written Examination in Physics, Chemistry and Biology.
- (b) The standard of Questions to be answered by the candidates in Written Examination shall be equivalent to the courses of Higher Secondary School Leaving Certificate Examination in Science subjects of the Mizoram Board of School Education.

3. ELIGIBILITY OF CANDIDATES:

An applicant must :

- (a) be a citizen of India;
- (b) have completed the age of 17 years at the time of admission or will complete the age of 17 years on or before 31st December of the year of admission and be below 25 years of age on the same date. Relaxation of upper age limit upto 5 years shall be permissible for scheduled caste, scheduled tribe and other backward class candidates only.
- (c) have passed the Higher Secondary School Leaving Certificate Examination in Science conducted by the Mizoram Board of School Education or equivalent Examination recognized by the Government of Mizoram with Physics, Chemistry, Biology and English or have appeared in the Higher Secondary School Leaving Certificate Examination in the above subjects but the results of such Examination in pending.
Provided that such applicant who have not got their result sheets at the time of submission of their applications should submit their final results with mark sheet within fifteen days from the date of publication of their results by the concerned examination Board.
- (d) have obtained not less than fifty percent (50%) of the maximum marks in the subjects concerned; provided that the minimum percentage of marks for candidates belonging to Scheduled Caste, Scheduled Tribe and Other Backward Classes shall be forty percent (40%) in aggregate in the subjects concerned. This requirement may be raised if any particular institution insists a higher percentage.

4. METHOD OF SELECTION AND CATEGORIES :

Method of Categorization and Method of Selection to be applied will be notified by competent authority in due course of time.

5. ONLINE APPLICATION FORM:

Important Dates and Fee Detail

a. Online Submission of Application Form

: 1st April 2022 to 6th May 2022 (upto 11:50 PM)

b. Last date of successful transaction of fee through

: 7th May 2022 (upto 5:00 PM)

c. Fee Payable by Candidate

: ` 900/- paid (with late fee ` 1200/-) by Credit/Debit Card/Net-Banking/UPI/Paytm Processing charges & Goods and Services Tax (GST) are to be paid by the candidate, as applicable. Fee once paid in non-refundable and non-transferable.

d. Place of Examination Centre :

1. Govt. Hrangbana College, Chanmari (350 Candidates)
2. Govt. T. Romana College, Republic Vengthlang (300 Candidates)
3. Govt. Aizawl North College, Chaltlang (216 Candidates)
4. Institute of Advanced Study in Education, Republic Veng (320 Candidates)
5. Govt. J. Thankima College, Bawngkawn (214 Candidates)
6. Mizoram Polytechnic Lunglei (not less than 50, not more than 120 candidates)

All candidates have reach the examination centre at their own expense and have to make their own arrangements to appeared for examination.

e. Downloading of Admit Cards from website : 23rd – 26th May 2022

f. Date of Examination : 26th May 2022 (Thursday)

g. Duration of Examination : 180 minutes (03 hours)

h. Timing of Examination : 11:00 AM to 02:00 PM (IST)

i. Website(s) : www.dhte.mizoram.gov.in , <https://smatee.com>

j. Declaration of Result : To be announced later on the department website

1. Candidates can apply for SMATEE-2022 through the "Online" mode only.

2. Submission of the Online Application Form may be done by accessing the SMATEE website <https://smatee.com/>. The Application Form in any other mode will not be accepted.

3. Only one application is to be submitted by a candidate.

4. Candidates must follow the instructions given in the Information Brochure and on the department website strictly. Candidates not complying with the instructions shall be summarily disqualified.

5. Candidates must ensure that the e-mail Address and Mobile Number provided in the Online Application Form are their own or Parents/Guardians only as all information/communication will be sent by Higher and Technical Education Department through e-mail on the registered e-mail address or SMS on registered Mobile Number only.

6. Instructions for filling Online Application Form:

All candidates shall fill up each set of information of the Application Form at the respective time of availability. In the absence of filling up of any of the set of information, his/her candidature will be cancelled.

The 'columns' to be filled up in each set of information are available in the Information Brochure as Appendix-XVII for your reference.

Download Information Brochure and Replica of Application Form. Read these carefully to ensure your eligibility. In case a candidate is found to fill in more than one application, the Admit Card will be cancelled/withheld and his/her candidature will be forfeited for this/future examination.

- k. Follow the steps given below to Apply Online :
- Step-1: Apply for Online Registration using your Parents/Guardians or your own unique Email Id and Mobile No.
- Step-2: Fill in the Online Application Form.
- Step-3: Upload scanned images of candidate's latest passport size Photograph (jpg file size: 10 kb to 200 kb); Category Certificate (SC/ST/OBC/EWS etc.); (pdf file size: 50kb to 300kb), Residential Certificate (pdf file size: 50kb to 300kb). For photography, the focus needs to be on the face (80% face coverage, ears clearly visible, on white background).
- Step-4: Pay the fee using SBI/HDFC/ICICI/Paytm Payment Gateway through Debit Card/Credit Card/Net-banking/UPI/Wallet and keep proof of fee paid safely for future reference. In case the Confirmation Page is not generated after payment of the prescribed Fee, then the candidate should approach the concerned Bank/Payment Gateway integrator (the helpline number and email given in Appendix- XVI of the Information Brochure), for ensuring the successful payment. In spite of the above, if a successful transaction is not reflected on the Portal, the candidate may contact SMATEE Helpline. If the payment issue is still not resolved, the candidate may pay a second time.
- However, any duplicate payment received from the candidate by SMATEE in the course of said transactions will be refunded through the same payment mode through which the duplicate payment is received, after fee reconciliation by SMATEE.
7. Download, save and print copy of Confirmation Page after successful remittance of fee and keep copies safely for future reference.
All the above-mentioned 4 Steps can be done together in one go or at different times.
8. Candidates are advised to regularly visit the SMATEE website and also check their e-mails/SMS for the latest updates.
9. Candidates shall appear at their own cost at the Examination Centre on the Date and Timing indicated on their Admit Card issued by the Higher and Technical Education Department.
10. Any request to change the Examination Centre, Date, and Time provided on the Admit Card shall not be considered under any circumstances.

11. Candidates are advised to take Passport size colored photographs with white background. The photographs are to be used for uploading in the Online Application Form and also for Counseling/Admission. This is to ensure that the same photograph is used for all documents and for all purposes related to SMATEE-2022.

Note:

1. The final submission of the Online Application Form will remain incomplete if step-3 and step-4 under point 6 are not completed. Such forms will stand rejected and no correspondence on this account will be entertained.

2. No request for refund of fee once remitted by the candidate will be entertained by Higher and Technical Education Department under any circumstances.

3. The entire application process of SMATEE-2022 is online, including uploading of scanned images and documents, Payment of Fees, and Printing of Confirmation Page. Therefore, candidates are not required to send/submit any document(s) including Confirmation Page to Higher and Technical Education Department through Post/ Fax/ by Hand/Email.

4. All Candidates appearing in SMATEE - 2022 must regularly check updates on the website of SMATEE (<https://smatee.com>); Higher and Technical Education Department <https://www.dhte.mizoram.gov.in/>; and other concerned Authorities of participating States /Universities /Institutions, till the conclusion of the final round of Counseling.

DISCLAIMER

1. Candidates are advised to read the Information Brochure carefully and go through the instructions regarding filling out the Online Application Form available on the SMATEE website <https://smatee.com/>, before starting online registration.

2. The candidate should ensure that all information entered during the online registration process is correct.

3. Online information provided by candidates like name of the candidate, contact/ address details, category, nationality, educational qualification details, date of birth, etc. will be treated as correct /final. Any request for changes in information after the closure of the correction period will not be considered by Higher and Technical Education Department under any circumstances. Any candidate found to mislead by providing inaccurate information will be debarred from taking the examination.

4. Higher and Technical Education Department does not have any liability that may arise due to incorrect information provided by the candidate(s) during the registration process.

5. Higher and Technical Education Department does not edit /modify/alter any information entered by the candidates after completion of the application process under any circumstances. Higher and Technical Education Department does not guarantee that any request for change in information thereafter will be entertained. Therefore, candidates are advised to exercise utmost caution and care for filling up correct details in the Application Form.

(1) Please keep visiting the Website (<https://dhte.mizoram.gov.in/>) for the latest updates / public notices/notifications/announcements to be issued from time to time regarding SMATEE-2022 (other than the information available in this Information Brochure).

(2) Usage of Data and Information: Higher and Technical Education Department can use the data provided by the End-User (Candidates/ Test-Takers in this Case) for making the Confirmation Page of the Application/Admit Card /OMR Answer Sheet / Counseling etc. available to them as well as for internal purpose(s) including training, research and development, analysis and another permissible purpose (s).

6. APPLICATION FOR EXAMINATION

- (1) All applications in prescribed form is obtainable from the office of the Higher and Technical Education Office (Tech Wing), Chaltlang and Department Website (<https://dhte.mizoram.gov.in>) on payment of such fees as maybe prescribed, and duly filled in, should be submitted to the same for which a specified date shall be fixed. Applications received after the specified date shall not be accepted.
- (2) Every application form duly filled in shall be accompanied by attested copies of the following documents:
 - (a) *Certificate of High School Leaving Certificate or equivalent examination.*
 - (b) *Marksheet of the Higher Secondary School Leaving Certificate or equivalent examination.*
 - (c) *Caste/Tribe certificate.*
 - (d) *Residential certificate.*
 - (e) *Voters I.D. of either parents or legal guardian.*
 - (f) *Family ration card in the absence of (e) above.*
 - (g) *Admit Card (Class X and Class XII/Diploma)*
 - (h) *Recent passport - size photographs, printed from the same photo, one copy of which is to be firmly affixed to the application form submitted by the applicant, while the other loose copy (to be enclosed in an envelope) shall be meant for admission Card.*
 - (i) *Birth Certificate.*
- (3) A candidate not in possession of the aforementioned Certificates and Mark sheets at the time of submission of his or her application form may submit authenticated Provisional Documents issued by the concerned Secondary or equivalent Board or by the Principal of the Educational Institute from where the candidate has studied or appeared at the Higher Secondary School leaving Certificate or equivalent Examination, showing the subjects taken and the date of birth recorded therein.
Incomplete application shall be liable to be rejected without assigning any reason
- (4) No candidate should mutilate the Admit Card issued to him/her or change any entry made therein after it has been received by him or her. Candidates are advice to make photo copies of the admit card in case of loss or damage to the original admit card.
- (5) The Information Brochure can be downloaded from the office website.
- (6) Every candidate shall have to pay ` 900/- (Rupees Nine hundred fifty) only as fees for Examination, application form, etc. and ` 50/- (Rupees fifty) only as counseling fees in the manner as may be prescribed, at the time of submitting the Application form. **Fee once paid will not be refunded.**

6. SYLLABUS, etc FOR THE EXAMINATION

- (1) All eligible candidates shall have to appear for a Written Examination in the following papers of Class – XI and Class - XII Courses and standard of **Mizoram Board of School Education**; provided marks weightage is 40% from class XI and 60% from class XII courses.

	<u>Subjects</u>	<u>No of Questions</u>	<u>Maximum marks</u>
(a)	Physics	25	100 marks
(b)	Chemistry	25	100 marks
(c)	Biology	50	200 marks
	TOTAL	100	400 Marks

- (2) The marks secured by the candidates in the Written Examination only shall be taken into consideration for allotment of seats.
- (3) All candidates shall bring their Admit card and shall produce the same before the Controller of Examination or any other Officer as may be authorized, on the day the examination is held on any subject and before such examination is commenced.

7. MODALITIES FOR CONDUCT OF THE SELECTION EXAMINATION

- (1) **Date of Examination**
The Selection Examination will be conducted every year on such date as may be notified by the Director of Higher & Technical Education from time to time.
- (2) **Scheme of Examination**
In the Selection Examination, the candidates must appear in the following papers:-
(a) Physics, Chemistry and Biology (Zoology and Botany)
(b) Duration of Examination is 180 minutes.
(c) Physics and Chemistry shall carry 100 marks each, Biology carry 200 Marks.
(d) 100% Technical Entrance Questions should be of objective type.
- (3) **Examination Centre**
The Selection Examination will be held every year at the place/places as decided by the Selection Board Committee.

8. CONDUCT OF EXAMINATION

- (a) The Examination Hall will be opened 90 minutes before the commencement of the Examination. Candidates are expected to take their seats immediately after opening of the examination hall. If the candidates do not report in time, they are likely to miss some of the general instructions to be announced in the Examination Hall.
- (b) A candidate who does not possess a valid Admit Card shall not be admitted into the Examination Hall.
- (c) A candidate who comes 30 minutes after the commencement of Examination shall not be permitted to sit in the Examination Hall without a special permission of the Controller of Examination. A candidate who comes one hour after the commencement of the Examination under no circumstances shall be admitted.
- (d) A candidate shall not be allowed to carry any textual materials, printed or written, bits of papers or any other objectionable materials inside the Examination Room/ Hall.
- (e) Use of Electronics such as Calculator, Mobile handsets, etc. shall not be allowed.
- (f) No candidate, without the special permission of the Centre Superintendent or the Invigilator concerned, will leave his/her seat or Examination Room until the full duration of the paper is over. Candidates should not leave the room/hall without handing over their OMR to the Invigilator on duty.
- (g) Twenty minutes before the commencement of the paper, each candidate will be given an OMR. Candidates will fill in the required particulars on the OMR sheet with Ball Point Pen only. Candidates should take extreme care in filling the particulars as the **OMR sheets will not be replaced under any circumstance**.
- (h) Five minutes before the commencement of the examination Question papers will be distributed to the candidates.

- (i) Candidates shall maintain complete silence and attend to their papers only. Any conversation or gesticulation or disturbance in the Examination Hall shall be taken into account as misbehavior and if a candidate is found using unfair means or impersonating, his candidature shall be cancelled and he shall be liable to debarment of taking further examination either permanently or for a specified period according to the nature of offence.
- (j) During the examination time, the invigilator will check Admit Card of all the candidates to satisfy himself/herself about the identity of each candidate. The invigilator will also put his/her signatures in the place provided in the OMR Sheet.
- (k) After completing the examination and before handing over the OMR Sheets, the candidate should check again that all the particulars required in the OMR Sheets have been correctly written.
- (l) Candidates are NOT allowed to carry any Instruments, Geometry or Pencil box, Handbag, Purse, any kind of Paper/ Stationery/ Textual material (printed or written material), Eatables, Mobile Phone/ Earphone/ Microphone/ Pager, Calculator, Docu Pen, Slide Rules, Log Tables, Camera, Tape Recorder, Electronic Watches with facilities of calculators, any metallic item or electronic gadgets/ devices in the Examination Hall/Room.
- (m) The candidates must sign on the Attendance Sheet at the appropriate place as proof of having attended the examination.
- (n) For those who are unable to appear on the scheduled date of examination for any reason, special examination shall not be held under any circumstances.

9. RE-CHECKING OF OMR

Re-checking of OMR papers/sheets may be allowed by the Selection Board according to the merit of the case and decision of the Selection Board shall be final. Candidates shall have to pay ` 500/- (Rupees five hundred) only as fee for re-evaluation. However, **re-checking will not be permitted if OMR is used for checking of answer papers/sheets.**

10. SYSTEM OF MARKING

- (a) Each objective question shall carry four marks. Questions without any response shall be awarded ZERO mark. More than one answer indicated against a question will be deemed as an incorrect response.
- (b) A negative mark shall be awarded against wrong answer. For each incorrect response, one fourth ($1/4^{\text{th}}$) of the total marks allotted to the question will be deducted. **The candidates are advised not to attempt an item in the answer sheet if they are not sure of the correct response.**

11. ISSUE OF PHOTOCOPY OF OMR SHEET :

In order to ensure transparency and accountability in the SMATEE, provisions for obtaining a photocopy of evaluated OMR sheet has been made as follows :

- (a) A photocopy of the answer sheet shall be given on request accompanied by a fee of Rs. 100/- (Rupees one hundred) only.
- (b) Photocopy of OMR sheet can be applied for and claimed only by the candidate himself/herself upon production of his/her original admit card issued by the Examining Board for the examination under consideration. The Board **will not entertain** any application/claims made on behalf of the candidate(s).
- (c) A period of 10 (ten) days after the declaration of results shall be given to the candidates to apply for a photocopy of OMR sheet. Upon the expiry of this period, no application shall be entertained.
- (d) A candidate who desires to get a photocopy of the OMR sheet shall have to sign an undertaking with a pledge to maintain utmost confidentiality. Any violation of the undertaking will render the result of the candidate null and void and the Examination of the candidate shall be liable to be cancelled.

- (e) While giving the photocopy of the OMR sheet, names of the Examiner and Scrutinizer which appear on the sheet shall be concealed.

12. MERIT LIST :

- (a) The Examination Board shall prepare a list of the candidates in order of merit on the basis of the marks obtained in the Written Examination.
- (b) In case of two or more candidates obtaining equal marks in the merit list, the inter-merit of such candidates shall be determined in order of preferences as under :
- (i) Candidates obtaining higher marks in Biology (Botany and Zoology) in the Selection Examination.
- (ii) Candidates obtaining higher marks in Chemistry in the Selection Examination.
- (iii) Candidates obtaining higher marks in Physics in the Selection Examination
- (c) Candidate older in age shall be preferred in case of marks obtained being equal.
- (d) If the resolution is not possible after this criterion, candidates will be given the same rank.
- (e) No weightage will be given for higher qualifications.

13. ALLOTMENT OF SEAT

- (1) All the selected candidates will be required to appear in person before Officers of , Higher & Technical Education(Tech Wing) for checking of all the documents listed below in original on the date, time and venue to be intimated to them :
- (a) *Certificate, Mark sheet and Admit Card in the High School Leaving Certificate or equivalent examination.*
- (b) *Certificate, Mark sheet and Admit Card in the Higher Secondary School Leaving Certificate or equivalent examination.*
- (c) *Certificate showing the candidate's Caste, Tribe or Class in case he is a member of Scheduled Caste, Scheduled Tribe or other Backward Class issued by the Deputy Commissioner of the Administrative District or any other competent authority in the Administrative District in which the applicant resides.*
- (d) *Residential Certificate and Voter ID Card showing that the parent (s) of the applicant is residing permanently in Mizoram State.*
- (e) *Birth Certificate.*
- (f) *Security deposit of ` 5000/- for those who are allotted seats from counseling and can withdraw after submission of joining report to the office within stipulated time.*

Those candidates who fail to produce the original documents at the time of personal appearance, shall be liable to have their allotted seats cancelled. ***If any candidate is found to have furnished false information or certificate (s) or to have withheld or concealed any material/ information to gain personal advantage, he shall be disqualified.*** If selection or even admission has already been done or effected, it shall be cancelled at any stage of his/her study and such other action as deemed necessary may be taken against him/her, under any law for the time being in force in the state of Mizoram.

Note : The decision of the Selection Board on the authenticity of the documents shall be final and no representation on that score shall be entertained.

15. JOINING REPORT

All the allotted students should submit their joining report to the Jt. Director, Higher & Technical Education(Tech Wing) through the Principal of the respective Colleges/Institutions within one month from the date of joining. Their applications should be supported by attested copies of admission receipts, etc.

INSTRUCTION FOR FILLING-UP OF APPLICATION FORM

1. Name & Address

Name should be written in Capital Letters : MALSAWMKIMI
Father Name : LALTHANTLUANGA
Date of Birth : 09/09/1999 Sex : Male/ Female
Place of Birth : Aizawl Nationality : Indian Caste : ST/OBC/SC
Date of Issued Caste Certificate : 18/08/2018
Date of Issued Residential Certificate : 19/09/2017
Permanent Address:
Locality. E.g.: Chite, etc House No. : Eg. A-2/25
Town/City. E.g.: Lunglei, Aizawl, etc Pin Code : 796001
District - E.g.: Aizawl, Lunglei, etc. State : Mizoram
Contact No. - Please write your Contact Phone No.
Email ID: Eg. Malsawmkimi @ gmail.com
Police Station - Your nearest Police station E.g.: Kulikawn

2. Particulars in Middle School or equivalent examination

Name of School : Gospel Centenary School
Address of School : Mission Veng
Year of Passing : 1995

3. Particulars in HSLC or equivalent examination

Name of School : Govt. Chaltlang HSS
Address of School : Chaltlang, Aizawl
Name of Examination : Eg. HSLC
Name of Exam. Board: Eg. MBSE
Roll No : eg. 1234 Percentage : 80 %
Year of Passing: 2013 Full Mark: 500 Total Marks Obtained: 400
Division: Distinction

4. Particulars in HSSLC or equivalent examination

Name of School : Govt. Chaltlang HSS
Name of Examination : Chaltlang, Aizawl
Name of Exam. Board : Eg. HSSLC
Roll No : Eg. 5678 Percentage : 80 % Percentage in PCB : 80%
Year of Passing: 2015 Full Mark : 500 Total Marks Obtained: 400
Division: Distinction

Subjects	Full Mark	Mark Obtained
English	100	86
Physics	100	80
Chemistry	100	75
Biology	100	85
Total	300	240

5. Candidates waiting for Result of HSSLC or equivalent Examination

School Last attended : Govt. Chaltlang HSS
Name of Examination : HSSLC

Name of Exam. Board : MBSE
Exam. Roll Number : T01234

Calculate percentage of marks as given below:

Percentage of Marks in PCB = $\frac{\text{Total of Marks obtained in Physics, Chemistry \& Biology}}{\text{Total of Full Marks in Physics, Chemistry \& Biology}}$

**LIST OF COLLEGES / INSTITUTIONS WHERE SEAT ALLOTTED BY GOVERNMENT OF INDIA
FOR MIZORAM STATE QUOTA UNDER SMATEE (As per 2021 – 2022)**

Sl. No	Name of Branch & Name of Institution	No. of Seats
1.	Bachelor of Science (Nursing)	50
	a College of Nursing, SSKM Hospital Campus, Kolkata	1
	b Regional Institute of Para Medical and Nursing Sciences (RIPANS)	12
	c Regional Nursing College, Guawhati, Assam	2
	d Regional Institute of Medical Science, Imphal, Manipur	5
	e Mizoram College of Nursing (MCoN), Falkawn	30
2.	Bachelor of Pharmacy (B. Pharm)	19
	a Regional Institute of Para Medical and Nursing Sciences (RIPANS), Aizawl	12
	b Dibrugarh University, Dibrugarh, Assam	2
	c Regional Institute of Pharmaceutical Science and Technology(RIPSAT),Tripura	5
3.	Bachelor of Science in MLT (B.Sc. (MLT))	12
	a. Regional Institute of Paramedical & Nursing Sciences, Aizawl	12
4.	Bachelor of Veterinary Science and Animal Husbandry (BVSc)	19
	a College of Veterinary Sciences & Animal Husbandry, Selesih, Mizoram	12
	b Assam Agricultural University College of Veterinary Science, Jorhat, Guwahati	4
	c College of Veterinary Science & Animal Husbandry, Jalukie, Nagaland	3
5.	Bachelor of Science (Agriculture)	18
	a School of Agriculture Sc & Rural Dev. Medziphema, Nagaland	4
	b College of Agriculture, Iroisemba, Manipur	9
	c Assam Agricultural University, Jorhat	1
	d College of Horticulture & Forestry, Pasighat, Arunachal Pradesh	2
	e College of Post Graduate Studies, Barapani, Meghalaya	2
6.	Bachelor of Science (Horticulture)	14
	a College of Horticulture & Forestry, Pasighat, Arunachal Pradesh	6
	b College of Agriculture, Ranipool, Sikkim	1
	c Assam Agriculture University, Jorhat	1
	d College of Agriculture, Selesih, Mizoram	6
7.	Bachelor of Science (Fishery)	4
	a College of Fishery, (CAU), Lembucherra, Agartala, Tripura	3
	b. Assam Agriculture University, Jorhat	1
8.	Bachelor of Science (Forestry)	6
	a College of Horticulture & Forestry, Pasighat, Arunachal Pradesh -	4
	b Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni - Solan (HP)	1
	c. College of Horticulture & SEHRE , Thunag, Mandhi (HP)	1
9.	B.Sc. (Home Science)	4
	a. Assam Agricultural University, Jorhat, Assam	2
	b. College of Home Science, Tura, Meghalaya	2
10.	Bachelor in Optometry & Ophthalmic Technology (BOOT)	12
	a. Regional Institute of Paramedical & Nursing Sciences, Aizawl	12

11. Bachelor in Radiography & Imaging Technology (BRIT)	12
a. Regional Institute of Paramedical & Nursing Sciences, Aizawl	12
12. Bachelor of Science (Sericulture)	2
a. Assam Agriculture University, Jorhat	2
13. Bachelor of Science (Nutrition & Dietetics)	1
a. Collage of Home Science, Dakopgre, Tura	1
14. Diploma in Pharmacy (D. Pharm)	13
a. Dibrugarh University, Assam	5
b. Regional Institute of Pharmaceutical Science and Technology(RIPSAT) Agartala, Tripura	8
15. Bachelor of Science in Community Science (B.Sc(C.Sc))(Female)	3
a. College of Home Science, Tura, Meghalaya	3
16. Downtown University, Dispur, Guawhati, Assam(NEC)	31
a. Bachelor of Science in Physiotherapy (BPT)	4
b. Bachelor of Science in Advance Imaging Technology	3
c. Bachelor of Science in Trauma, Emergency and Disaster Management	3
d. Bachelor of Science in Medical Laboratory Technology	3
e. Bachelor of Science in Operation Theater Technology	3
f. Bachelor of Science in Dialysis	3
g. Bachelor of Science in Optometry	3
h. Bachelor of Science in Food, Nutrition and Dietetics	3
i. Bachelor of Science in Biotechnology	3
j. Bachelor of Science in Microbiology	3

INSTRUCTIONS FOR USE OF ANSWER SHEET

MIZORAM STATE COUNCIL FOR TECHNICAL EDUCATION SID-2

OMR ANSWER SHEET

1. NAME OF THE CANDIDATE, USE ENGLISH CAPITAL LETTERS ONLY.

2. FATHER'S NAME, USE ENGLISH CAPITAL LETTERS ONLY.

3. ROLL NO.

01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80

4. Q. BOOKLET SET

05
10
15
20

5. DATE OF EXAMINATION

DD	MM	YY	YY	YY	YY	YY	YY
01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80

ANSWERS

1	A	B	C	D	21	A	B	C	D	41	A	B	C	D	61	A	B	C	D	81	A	B	C	D
2	A	B	C	D	22	A	B	C	D	42	A	B	C	D	62	A	B	C	D	82	A	B	C	D
3	A	B	C	D	23	A	B	C	D	43	A	B	C	D	63	A	B	C	D	83	A	B	C	D
4	A	B	C	D	24	A	B	C	D	44	A	B	C	D	64	A	B	C	D	84	A	B	C	D
5	A	B	C	D	25	A	B	C	D	45	A	B	C	D	65	A	B	C	D	85	A	B	C	D
6	A	B	C	D	26	A	B	C	D	46	A	B	C	D	66	A	B	C	D	86	A	B	C	D
7	A	B	C	D	27	A	B	C	D	47	A	B	C	D	67	A	B	C	D	87	A	B	C	D
8	A	B	C	D	28	A	B	C	D	48	A	B	C	D	68	A	B	C	D	88	A	B	C	D
9	A	B	C	D	29	A	B	C	D	49	A	B	C	D	69	A	B	C	D	89	A	B	C	D
10	A	B	C	D	30	A	B	C	D	50	A	B	C	D	70	A	B	C	D	90	A	B	C	D
11	A	B	C	D	31	A	B	C	D	51	A	B	C	D	71	A	B	C	D	91	A	B	C	D
12	A	B	C	D	32	A	B	C	D	52	A	B	C	D	72	A	B	C	D	92	A	B	C	D
13	A	B	C	D	33	A	B	C	D	53	A	B	C	D	73	A	B	C	D	93	A	B	C	D
14	A	B	C	D	34	A	B	C	D	54	A	B	C	D	74	A	B	C	D	94	A	B	C	D
15	A	B	C	D	35	A	B	C	D	55	A	B	C	D	75	A	B	C	D	95	A	B	C	D
16	A	B	C	D	36	A	B	C	D	56	A	B	C	D	76	A	B	C	D	96	A	B	C	D
17	A	B	C	D	37	A	B	C	D	57	A	B	C	D	77	A	B	C	D	97	A	B	C	D
18	A	B	C	D	38	A	B	C	D	58	A	B	C	D	78	A	B	C	D	98	A	B	C	D
19	A	B	C	D	39	A	B	C	D	59	A	B	C	D	79	A	B	C	D	99	A	B	C	D
20	A	B	C	D	40	A	B	C	D	60	A	B	C	D	80	A	B	C	D	100	A	B	C	D

6. CANDIDATE'S SIGNATURE

7. INVIGILATOR'S SIGNATURE

INSTRUCTIONS

1. All entries should be confined to the areas provided.
2. Make your signature with a ball-point pen at S.No. 6 on Side 2.
3. Information in Boxes 1 to 6 on Side 2 as well as your answers are to be marked with Black/Blue Ball Point Pen only. For detailed directions in this regard. See INSTRUCTIONS FOR MARKING given below.
4. Please note that in this answer sheet the question numbers progress from top to bottom.

INSTRUCTIONS FOR MARKING ANSWERS

1. Use Black/Blue Ball Point Pen only.
2. Marks should be DARK and should completely fill the bubble/ovals so that the alphabet inside the bubble/oval is not visible.
3. Darken only ONE bubble/oval for each question as shown in the example below. If you darken more than one bubble/oval, your answer will be treated as wrong.

WRONG METHODS

A B C D

WRONG METHODS

X B C D

WRONG METHODS

A B C D

WRONG METHODS

A B C D

RIGHT METHOD

A B C D

4. CHANGING AN ANSWER is not allowed. The candidates must fully satisfy themselves about the accuracy of the answer before darkening the appropriate bubble/oval as no change in answer once marked is allowed. Use of eraser, whitener / correction fluid on the answer sheet is not permissible as the Answer Sheets are machine readable & it may lead to wrong evaluation.
5. Answers should be filled in carefully only in the bubble/oval space provided. Please do not make any stray marks on the answer sheet.
6. Rough work MUST NOT be done on the answer sheet. Use your test booklet for this purpose.
7. Mark your answer only in the appropriate space against the number corresponding to the question you are answering.

Counseling and Related Activities for SMATEE – 2022

Sl.No	Activity	When to Start	When to Complete	Place
1	Selling of Application Form SMATEE	1 st April 2022 (Friday)	6 th May 2022 (Friday)	www.dhte.mizoram.gov.in , https://smatee.com
2	Last date of Submission of Application Form SMATEE	6 th May 2022 (Friday)	6 th May 2022 (Friday)	www.dhte.mizoram.gov.in , https://smatee.com
3	Date of Issue Admit Card SMATEE	23 rd May 2022 (Monday)	26 th May 2022 (Thursday)	www.dhte.mizoram.gov.in , https://smatee.com
4	Date of Examination SMATEE	26 th May 2022 (Thursday)	26 th May 2022 (Thursday)	Examination centre
5	Tentative Date of Publication of results SMATEE	June 3 rd Week 2022	June 3 rd Week 2022	www.dhte.mizoram.gov.in , https://smatee.com and at Jt. Director Technical Wing Office, Chaltlang
6	Online Registration first round (Tentative)	4 th July 2022 (Mon) 10:00 Am	7 th July 2022 (Thu) 5:00 PM	https://mc.mizoram.gov.in/
7	1st round Results (Tentative)	11 th July 2022 (Monday) 01:00 Pm	11 th July 2022 (Monday) 01:00 Pm	https://mc.mizoram.gov.in/
8	Reporting at the reporting centre against 1st round of Allotment (Tentative)	12 nd July 2022 (Tue) 10:00 AM	14 th July 2022 (Thu) 04:00 PM	Office of the Jt. Director Technical Wing Office, Chaltlang
9	Security Deposit for first round (Tentative)	12 nd July 2022 (Tue) 10:00 AM	14 th July 2022 (Thu) 04:00 PM	Office of the Jt. Director Technical Wing Office, Chaltlang
10	Last date for Joining for 1 st round (Tentative)	12 nd July 2022 (Tue) 10:00 AM	15 th July 2022 (Fri) 04:00 PM	Allotted Institutions
11	2 nd round/MOP-UP- round counseling (Tentative)	To be notified later		Office of the Jt. Director Technical Wing Office, Chaltlang /Dawrpui Multipurpose Hall

12	Conduct of Educational Fair with Private Institution.	28 th July 2022 (Thu) 10:00 AM	29 th July 2022 (Fri) 05:00 PM	Office of the Jt. Director Technical Wing Office, Chaltlang /Dawrpui Multipurpose Hall
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GENERAL INSTRUCTIONS

The following instructions are hereby issued for compliance of examinations officials and candidates for State Medical and Technical Entrance Examination (SMATEE) - 2022.

1. About Covid-19 :

- 1.1 Covid-19 positive candidates are allowed to appear the examination in separate room.
- 1.2 All candidates shall be screened by thermal scanner before they enter the exam hall.
- 1.3 Candidates having high temperature and Covid-19 positive will write the exam in separate isolation room.
- 1.4 All candidates will wear at least a two-layered mask.
- 1.5 All candidates should maintain and follow Covid-19 Appropriate Behavior (CAB) as notified by the competent authority from time to time.

2. Permissible items to be carried in the exam hall

- 2.1 Mask
- 2.2 Hand Sanitizer
- 2.3 Transparent water bottle.
- 2.4 Admit card bearing passport size photograph of the candidate (Compulsory)
- 2.5 Identity card (e.g. voter's ID, Aadhaar card, Driving license, Class X/XII admit cards etc)
- 2.6 Non programmable wrist watch, for those who need.
- 2.7 Those who bring their own vehicle are allowed to carry their vehicle keys inside the exam hall.
- 2.8 Umbrella/Raincoat
Note :Those candidates who bring unauthorized items will be made to put their unauthorized items outside the exam halls and the examination officials will not be responsible in case of loss or damage of such items.

3. Dress Code :

- 3.1 Candidates should wear slippers or chappals without socks in the exam hall. High heeled and thick shoe soles are not allowed.
- 3.2 They should wear proper dress.
- 3.3 If candidates want to wear cultural/customary dress, they should properly inform the exam centre authorities.

4. About vehicle :

- 4.1 In order to enable traffic official to easily identify SMATEE candidates, all candidates are informed to paste SMATEE bearing label on their vehicle.
- 4.2 Those who want to wait for their wards at the exam site are advised to carry their own refreshment
- 4.3 Candidates should give the contact numbers of persons who are to pick them up after the exam to the concerned persons or Traffic on duty.

5. Arrival and departure time at the centre :

- 5.1 Examination will be conducted from 11:00 AM - 2:00 PM
- 5.2 All candidates should arrive at their respective exam hall exactly at their allotted time slot.
- 5.3 Due to the Covid-19 pandemic mandatory maintenance of social distancing is required, as such, the first batch of candidates will arrive at 9:30 AM and last batch at 10:44 AM.
- 5.4 Candidates will be allowed to leave their exam hall after 1(one) hour by observing social distancing.
- 5.5 After 2:00 PM exit of the candidates shall be done in room-wise manner by observing social distancing
- 5.6 Candidates who have completed the exam must go home straight away in the exam centre without loitering.

6. Seating arrangement and distribution of question booklets :

- 6.1 Candidates are allotted exam hall. They should go straight to their respective exam hall on arrival.
- 6.2 The invigilators of the concern hall shall arrange one candidate per bench in zig zag position as soon as they enter their allotted exam hall on first come first serve basis. Candidates' roll nos will not be pasted on the desks.
- 6.3 The question booklet contains Physics, Chemistry and Biology group together. The candidates should answer Physics, Chemistry and Biology in only one OMR Answer sheet.
- 6.4. Candidates are allowed to take home their Question paper booklet.
- 6.5 In order to enable the candidates to have ample time to fill their particulars in the OMR sheet and to study the nature of the Question Booklet. The Question booklet and OMR Answer sheets may be distributed 15 minutes before the commencement of the examination.
- 6.7 After distribution of the Question booklets and OMR sheet, the invigilators should verify the candidates' particulars including their passport size photograph after which they will obtain signatures of the candidates in the attendance sheets. The invigilators will also give their signatures in the space provided for signature of the invigilators..
- 6.8 After completion of the examination, every candidate should positively submit their OMR Answer sheet. No candidate is allowed to leave the exam hall without submitting his/her OMR Answer sheet.

7. Filling up of OMR Answer sheets :

- 7.1 Each and every candidate should fill up their particulars in the OMR Answer sheet carefully. If they have any doubt, they can ask the invigilators.
- 7.2 Candidates should carefully fill up the 'O' Circle of the OMR Answer sheet while giving the correct answer, putting tick (✓) mark is not allowed.
- 7.3 Demonstration on how to fill the OMR Answer sheet is attached herewith.
- 7.4 Ball pen will be provided in the exam hall.
- 7.5 The Question booklet contains 1-100 questions. Physics Questions are numbered 1-25, Chemistry Questions are numbered 26-50 and Biology Questions are numbered 51-100.

8. About refreshment :

- 8.1 Candidates are allowed to bring transparent water bottle for their consumption in the exam hall.
- 8.2 In case of dire need due to hunger candidates may ask their invigilator for biscuits as an immediate relief.

- 9. Packing of the examination materials after completion of the examination :**
- 9.1 OMR Answer Sheets may be packed in the same envelop that was used for dispatch. If required new envelops for packing the OMR sheets are also provided.
 - 9.2 All unused materials may be packed in one large envelop and marked as “unused materials”.
 - 9.3 Officials from Technical Wing, H&TE will collect the examination materials from the centre officials after it is ready for collection.

SYLLABUS FOR THE ENTRANCE EXAMINATION PHYSICS (Class XI)

Unit - I : Physical World and Measurement

Physics: Scope and excitement; nature of physical laws; Physics, technology and society. Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

Unit - II : Kinematics

Frame of reference (Inertia and non-inertia frames), Motion in a straight line: Position-time graph, speed and velocity. Uniform and non-uniform motion, average speed and instantaneous-velocity. Uniformly accelerated motion, velocity-time and position-time graphs, relations for uniformly accelerated motion (graphical treatment).

Elementary concepts of differentiation and integration for describing motion. Scalar and vector quantities: Position and displacement vectors, general vectors and notation, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity.

Unit vectors. Resolution of a vector in a plane -rectangular components.

Scalar and Vector products of Vectors. Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

Unit - III : Laws of Motion

Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications.

Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road).

Unit - IV : Work, Energy and Power

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power. Notion of potential energy, potential energy of a spring, conservative forces; conservation of mechanical energy (kinetic and potential energies); non-conservative forces; motion in a vertical circle, elastic and inelastic collisions in one and two dimensions.

Unit - V : Motion of System of Particles and Rigid Body

Centre of mass of a two-particle system, momentum conservation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod.

Moment of a force, torque, angular momentum, conservation of angular momentum with some examples.

Equilibrium of rigid bodies, rigid body rotation and equation of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration. Values of M.I. for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorem and their applications.

Unit - VI : Gravitation

Kepler's laws of planetary motion. The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth.

Gravitational potential energy; gravitational potential. Escape velocity, orbital velocity of a satellite. Geostationary satellites.

Unit - VII : Properties of Bulk Matter

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, poisson's ratio; elastic energy.

Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes) . Effect of gravity on fluid pressure.

Viscosity, Stokes' law, terminal velocity, Reynolds's number, streamline and turbulent flow. Critical velocity, Bernoulli's theorem and its applications.

Surface energy and surface tension, angle of contact, excess of pressure, application of surface tension ideas to drops, bubbles and capillary rise.

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases.

Anomalous expansion. Specific heat capacity: , calorimetry; change of state latent heat.

Heat transfer-conduction and thermal conductivity, convection and radiation. Qualitative ideas of Black Body Radiation, Wein's displacement law, and Green House effect.

Newton's law of cooling and Stefan's law

Unit - VIII : Thermodynamics

Thermal equilibrium and definition of temperature (Zeroth law of Thermodynamics). Heat, work and internal energy. First law of thermodynamics. Isothermal and adiabatic processes.

Second law of thermodynamics: Reversible and irreversible processes. Heat engines and refrigerators.

Unit- IX : Behaviour of Perfect Gas and Kinetic Theory

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 (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

Unit - X : 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 (qualitative ideas only), resonance.

Wave motion. Longitudinal and transverse waves, speed of wave motion. 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

PHYSICS (Class XII)

Unit - I : Electrostatics

Electric charges and their conservation. Coulomb's law force 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, statement of Gauss's theorem and its applications 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 a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipoles in an electrostatic field.

Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, 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 - II : Current Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity and mobility, and their relation with electric current; Ohm's law, electrical resistance, V- I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity.

Carbon resistors, colour code for carbon resistors; series and parallel combinations of 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.

Kirchhoff's laws and simple applications. Wheatstone bridge, metre bridge.

Potentiometer – principle and applications to measure potential difference, and for comparing emf 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 infinitely long straight wire, straight and toroidal solenoids. 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 a 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. 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 a 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 strengths. Permanent magnets.

Unit - IV : 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; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current. AC generator and transformer.

Unit - V : Electromagnetic Waves

Need for displacement current.

Electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves.

Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays) including elementary facts about their uses.

Unit - VI : 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 lens formula, lens-maker's formula. Magnification, power of a 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.

Optical instruments: Human eye, image formation and accommodation, correction of eye defects (myopia and hypermetropia) using lenses.

Microscope and astronomical telescopes (reflecting and refracting) and their magnifying powers.

Wave optics: Wavefront and Huygens' principle, reflection and refraction of plane wave at a plane surface using wavefronts.

Proof 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. Polarisation, plane polarised light; Brewster's law, uses of plane polarised light and Polaroids.

Unit - VII : Dual Nature of Matter and 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 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 - IX : Electronic Devices

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

Unit - X : Communication Systems

Elements of a communication system (block diagram only); bandwidth of signals (speech, TV 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.

CHEMISTRY (Class XI)

Unit - I : Some Basic Concepts of Chemistry

General Introduction: Importance and scope of chemistry.

Historical approach to particulate nature of matter, laws of chemical combination, Dalton's atomic theory: concept of elements, atoms and molecules.

Atomic and molecular masses. Mole concept and molar mass; percentage composition and empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry

Unit - II : Structure of Atom

Discovery of electron, proton and neutron; atomic number, isotopes and isobars. Thomson's model and its limitations, Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and sub-shells, dual-nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals; rules for filling electrons in orbitals. Aufbau principle, Pauli exclusion principle and Hund's rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

Unit - III : Classification of Elements and Periodicity in Properties

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements atomic radii, ionic radii, inert gas radii, ionization enthalpy, electron gain enthalpy, electronegativity, valence. Nomenclature of elements with atomic number greater than 100.

Unit - IV : Chemical Bonding and Molecular Structure

Valence electrons, ionic bond, covalent bond, bond parameters, Lewis-structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization involving s, p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only). Hydrogen bond.

Unit - V : States of Matter: Gases and Liquids

Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of the molecule, Boyle's law, Charles's law, Gay Lussac's law, Avogadro's law, ideal behaviour, empirical derivation of gas equation, Avogadro's number, ideal gas equation. Kinetic energy and molecular speeds (elementary idea), deviation from ideal behaviour, liquefaction of gases, critical temperature.

Liquid State Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).

Unit - VI : Thermodynamics

Concepts of system, types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions.

First law of thermodynamics internal energy and enthalpy, heat capacity and specific heat, measurement of ΔH and ΔU , Hess's law of constant heat summation, enthalpy of : bond dissociation, combustion, formation, atomization, sublimation; phase transition; ionization, solution and dilution.

Introduction of entropy as a state function, Second law of thermodynamics, Gibbs energy change for spontaneous and non-spontaneous process, criteria for equilibrium.

Third law of thermodynamics - Brief introduction.

Unit - VII : Equilibrium

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium

constant, factors affecting equilibrium Le Chatelier's principle; ionic equilibrium ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of pH, Hydrolysis of salts (elementary idea), buffer solutions, Henderson equation, solubility product, common ion effect (with illustrative examples).

Unit - VIII : Redox Reactions

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions in terms of loss and gain of electron and change in oxidation numbers, applications of redox reactions.

Unit - IX : Hydrogen

Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen; hydrides ionic, covalent and interstitial; physical and chemical properties of water, heavy water; hydrogen peroxide-preparation, reactions, use and structure; hydrogen as a fuel.

Unit - X : s-Block Elements (Alkali and Alkaline earth metals)

Group 1 and Group 2 elements:

General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses.

Preparation and Properties of Some Important Compounds:

Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogencarbonate, biological importance of sodium and potassium.

CaO, CaCO₃, and industrial use of lime and limestone, biological importance of Mg and Ca

Unit - XI : Some p-Block Elements

General Introduction to p-Block Elements

Group 13 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group; Boron-physical and chemical properties, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalis.

Group 14 elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first element. Carbon - catenation, allotropic forms, physical and chemical properties; uses of some important compounds: oxides.

Important compounds of silicon and a few uses: silicon tetrachloride, silicones, silicates and zeolites, their uses.

Unit - XII : Organic Chemistry -Some Basic Principles and Techniques

General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds.

Electronic displacements in a covalent bond. Inductive effect, electromeric effect, resonance and hyper conjugation.

Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions; electrophiles and nucleophiles, types of organic reactions.

Unit - XIII : Hydrocarbons

Classification of Hydrocarbons. Aliphatic Hydrocarbons

Alkanes Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.

Alkenes Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation; chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.

Alkynes Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water.

Aromatic hydrocarbons: Introduction, IUPAC nomenclature; Benzene: resonance, aromaticity, chemical properties: mechanism of electrophilic substitution— nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation; directive influence of functional group in mono substituted benzene; carcinogenicity and toxicity.

Unit - XIV : Environmental Chemistry

Environmental pollution Air, water and soil pollution, chemical reactions in atmosphere, smogs, major atmospheric pollutants; acid rain, ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming pollution due to industrial wastes; green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

CHEMISTRY (Class XII)

Unit - I : Solid State

Classification of solids based on different binding forces :molecular, ionic covalent and metallic solids, amorphous and crystalline solids(elementary idea),unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids ,number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals ,conductors, semiconductors and insulators and n and 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 vapour pressure, Raoult's law, elevation of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant-Hoff factor.

Unit - III : Electrochemistry

Redox reactions, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, 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 Gibbs energy change and EMF of a cell, fuel cells; corrosion.

Unit - IV : Chemical Kinetics

Rate of a reaction (average and instantaneous), factors affecting rates of reaction: concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for-zero and first order reactions), concept of collision theory (elementary idea, no mathematical treatment). Activation energy, Arrhenius equation.

Unit - V : Surface Chemistry

Adsorption physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis :homogenous and heterogeneous, activity and selectivity; enzyme catalysis; colloidal state; distinction between true solutions, colloids and suspensions; lyophilic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions types of emulsions.

Unit - VI : General Principles and Processes of Isolation of Elements

Principles and methods of extraction concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.

Unit - VII : p-Block Elements

Group 15 element: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen preparation, properties and uses; compounds of nitrogen: preparation and properties of ammonia and nitric acid, oxides of nitrogen (Structure only); Phosphorous-allotropic forms; compounds of phosphorous: preparation and properties of phosphene ,halides (PCl_3 , PCl_5) and oxoacids (elementary idea only).

Group 16 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; classification of oxides; ozone. Sulphur allotropic forms; compounds of sulphur: preparation, properties and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).

Group 17 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds, oxoacids of halogens (structure's only).

Group 18 elements: General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.

Unit - VIII: d and f Block Elements₂

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$.

Lanthanoids - electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.

Actinoids – Electronic configuration, oxidation states and comparison with lanthanoids.

Unit - IX : Coordination Compounds

Coordination compounds: Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds,

bonding, Werner's theory, VBT, CFT; isomerism (structural and stereo), importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems).

Unit - X : Haloalkanes and Haloarenes

Haloalkanes : Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions. Optical rotation.

Haloarenes: Nature of C-X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only).

Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

Unit - XI : Alcohols, Phenols and Ethers

Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols, mechanism of dehydration, uses, with special reference to methanol and ethanol.

Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols.

Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses.

Unit - XII : Aldehydes, Ketones and Carboxylic Acids

Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses.

Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

Unit - XIII : Organic Compounds Containing Nitrogen

Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines.

Cyanides and Isocyanides – will be mentioned at relevant places in context.

Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.

Unit - XIV : Biomolecules

Carbohydrates Classification (aldoses and ketoses), monosaccharide (glucose and fructose), DL configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen): importance.

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

Hormones Elementary idea (excluding structure).

Vitamins Classification and functions.

Nucleic Acids: DNA and RNA

Unit - XV : Polymers

Classification Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polythene, nylon, polyesters, bakelite; rubber. Biodegradable and non-biodegradable polymers.

Unit - XVI : Chemistry in Everyday Life

Chemicals and medicines analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.

Chemicals in food preservatives, artificial sweetening agents, elementary idea of antioxidants.

Cleansing agents soaps and detergents, cleansing action.

BIOLOGY (Class XI)

Unit - I : Diversity of Living Organisms

What is living? Biodiversity; Need for classification; Three domains of life; Taxonomy & Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy Museums, Zoos, Herbaria, Botanical gardens.

Five kingdom classification; Salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids.

Salient features and classification of plants into major groups- Algae, Bryophytes, Pteridophytes, Gymnosperm and Angiosperm (three to five salient and distinguishing features and at least two examples of each category); Angiosperms- classification up to class, characteristic features and examples.

Salient features and classification of animals- non chordate up to phyla level and chordate up to classes level (three to five salient features and at least two examples).

Unit - II : Structural Organisation in Animals and Plants

Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence - cymose and racemose, flower, fruit and seed (To be dealt along with the relevant practical of the Practical Syllabus).

Animal-tissues; Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only)

Unit - III : Cell Structure and Function

Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles structure and function, Endomembrane system- endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids; microbodies; Cytoskeleton, cilia, flagella, centrioles (ultra structure and function); Nucleus nuclear membrane, chromatin, nucleolus.

Chemical constituents of living cells: Biomolecules structure and function of proteins, carbohydrates, lipid, nucleic acids; Enzymes types, properties, enzyme action.

Cell division: Cell cycle, mitosis, meiosis and their significance.

Unit - IV : Plant Physiology

Transport in plants: Movement of water, gases and nutrients; Cell to cell transport, Diffusion, facilitated diffusion, active transport; Plant - water relations- Imbibition, water potential, osmosis, plasmolysis; Long distance transport of water Absorption, apoplast, symplast, transpiration pull, root pressure and guttation; Transpiration-Opening and closing of stomata; Uptake and translocation of mineral nutrients Transport of food, phloem-transport, Mass flow hypothesis; Diffusion of gases (brief mention).

Mineral nutrition: Essential minerals, macro and micronutrients and their role; Deficiency symptoms; Mineral toxicity; Elementary idea of Hydroponics as method to study mineral nutrition; Nitrogen metabolism- Nitrogen cycle, biological nitrogen fixation.

Photosynthesis: Photosynthesis as a means of Autotrophic nutrition; Where does photosynthesis take place; How many pigments are involved in Photosynthesis

(Elementary idea); Photochemical and biosynthetic phases of photosynthesis; Cyclic and non cyclic photophosphorylation; Chemiosmotic hypothesis; Photorespiration; C₃ and C₄ pathways, Factors affecting photosynthesis.

Respiration : Exchange of gases; Cellular respiration glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); Energy relations - Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.

Plant growth and development: Seed germination; Phases of plant growth and plant growth rate; Conditions of growth; Differentiation, dedifferentiation and redifferentiation; Sequence of developmental process in a plant cell; Growth regulators auxin, gibberellin, cytokinin, ethylene, ABA; Seed dormancy, Vernalisation; Photoperiodism.

Unit - V : Human Physiology

Digestion and absorption: Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; Calorific value of proteins, carbohydrates and fats (for box item not to be evaluated); Egestion; Nutritional and digestive disorders- PEM, indigestion, constipation, vomiting, jaundice, diarrhea.

Breathing and Respiration: Respiratory organs in animals (recall only); Respiratory system in humans; Mechanism of breathing and its regulation in humans Exchange of gases, transport of gases and regulation of respiration, Respiratory volumes; Disorders related to respiration-Asthma, Emphysema, Occupational respiratory disorders.

Body fluids and circulation: Composition of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system Structure of human heart and blood vessels; Cardiac cycle, cardiac output, ECG, Double circulation; Regulation of cardiac activity, Disorders of circulatory system-Hypertension, Coronary artery disease, Angina pectoris; Heart failure.

Excretory products and their elimination: Modes of excretion -Ammonotelism, ureotelism, uricotelism; Human excretory system structure and function; Urine formation, Osmoregulation; Regulation of kidney function Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion, Disorders-Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney.

Locomotion and Movement: Types of movement - ciliary, flagellar muscular; Skeletal muscle contractile proteins and muscle contraction; Skeletal system and its functions(To be dealt with the relevant practical of Practical syllabus); Joints; Disorders of muscular and skeletal system- Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

Neural control and coordination: Neuron and nerves; Nervous system in humans central nervous system, peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sensory perception; Sense organs; Elementary structure and function of eye and ear.

Chemical coordination and regulation: Endocrine glands and hormones; Human endocrine system- Hypothalamus, Pituitary; Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulators, Hypo-and hyperactivity and related disorders (Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goitre, exophthalmic goitre, diabetes, Addison's disease).

Imp: Diseases related to all the human physiology systems to be taught in brief.

BIOLOGY (Class XII)

Unit - I : Reproduction

Reproduction in organisms: Reproduction, a characteristic feature of all organisms for continuation of species; Modes of reproduction Asexual and sexual; Asexual reproduction; Modes Binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants.

Sexual reproduction in flowering plants: Flower structure; Development of male and female gametophytes; Pollination-types, agencies and examples; Outbreedings 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 and fruit formation.

Human Reproduction: Male and female reproductive systems, Microscopic anatomy of testis and ovary; Gametogenesis- spermatogenesis & oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea), Parturition (Elementary idea); Lactation (Elementary idea).

Reproductive health: Need for reproductive health and prevention of sexually transmitted diseases (STD); 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

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; Chromosome and genes, Sex determination - In humans, birds, honey bee; Linkage and crossing over; Sex linked inheritance - Haemophilia, Colour blindness; Mendelian disorders in humans Thalassaemia; Chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.

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 genome project; DNA finger printing.

Evolution: Origin of life; Biological evolution and evidences for biological evolution (Paleontological, comparative anatomy, embryology and molecular evidence); 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

Health and Disease: Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology vaccines; Cancer; HIV and AIDS; Adolescence, drug and alcohol abuse.

Improvement in food production: Plant breeding, tissue culture, single cell protein, Biofortification; Apiculture and Animal husbandry.

Microbes in human welfare: In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

Unit - IV : Biotechnology and Its Applications

Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology).

Application of Biotechnology in health and agriculture: Human insulin and vaccine production, gene therapy; Genetically modified organisms- Bt crops; Transgenic Animals; Biosafety issues Biopiracy and patents.

Unit - V : Ecology and environment

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.

Ecosystems: Patterns, components; productivity and decomposition; Energy flow; Pyramids of number, biomass, energy; Nutrient cycling(carbon and phosphorous); Ecological succession; Ecological Services Carbon fixation, pollination, oxygen release. Biodiversity and its conservation: Concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity; Biodiversity conservation; Hotspots, endangered organism, extinction, Red Data Book, biosphere reserves, National parks and sanctuaries.

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 global warming, Ozone depletion; Deforestation; Any three case studies as success stories addressing environmental issues.