

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR  
ANANTAPUR – 515 002 (A.P) INDIA**



## **ACADEMIC REGULATIONS**

**Applicable for students admitted into  
B.Pharmacy (Regular) from 2009-10**

**&**

**B.Pharmacy (LES) from 2010-11**

## **Academic Regulations 2009 for B. Pharm (Regular)**

(Effective for the students admitted into I year from the Academic Year 2009-2010 onwards)

### **1. Award of B.Pharm. Degree**

A student will be declared eligible for the award of the B.Pharm. Degree if he fulfils the following academic regulations:

- i. Pursue a course of study for not less than four academic years and in not more than eight academic years.
  - ii. Register for 220 credits and secure all 220 credits
- 2.** Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Pharm. course and their admission is cancelled.

### **3. Courses of study**

The course of study offered is B.Pharm at present and any other course as approved by the authorities of the University from time to time.

### **4. Credits**

	I Year		Semester	
	Periods / Week	Credits	Periods / Week	Credits
Theory	03	06	03	04
	02	04	--	--
Practical	03	04	03	02
Seminar	--	--	6	02
Project	--	--	15	10

### **5. Distribution and Weightage of Marks**

- i. The performance of a student in each semester / I year shall be evaluated subject – wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition seminar and project work shall be evaluated for 50 and 200 marks respectively.
- ii. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

- iii. For theory subjects, during the semester there shall be 2 midterm examinations. Each mid term examination consists of objective paper for 10 marks and subjective paper for 20 marks with duration of 1hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

Objective paper is set for 20 bits for 10 marks. Subjective paper shall contain 5 questions of which student has to answer 3 questions evaluated\* for 20 marks. First mid term examination shall be conducted for I-IV units of syllabus and second mid term examination shall be conducted for V -VIII units. The total marks secured by the student in each mid term examination for 30 marks is considered and the better of the two mid term examinations shall be taken as the final sessional marks secured by each candidate in the subject.

However for first year, there shall be 3 mid term examinations as in the above pattern and the average marks of the best two mid term examinations secured in each subject shall be considered as final marks for sessionals.

\*Note 1: The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction rounded off to the next higher mark

\*Note 2: The mid term examination shall be conducted first by distribution of the Objective paper simultaneously marking the attendance, after 20minutes the answered objective paper is collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet are distributed. After 90minutes the answered booklets are collected back.

- iv. For practical subjects, there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/tasks. The end examination shall be conducted by the laboratory teacher and another examiner.
- v. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic and submit to the department

before the presentation. The report and the presentation shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar shall be evaluated for 50 marks. There shall be no external examination for seminar.

- vi. Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by an External examiner nominated by the university, HOD & Supervisor as a committee. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be made by the departmental committee, on the basis of two seminars given by each student on the topic of his project.
- vii. Laboratory marks and the sessional marks awarded by the College are not final. They are subject to scrutiny and scaling by the University wherever necessary. In such cases, the sessional and laboratory marks awarded by the College will be referred to a Committee. The Committee will arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding.
- viii. The laboratory records and internal test papers shall be preserved in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

#### **6. Attendance Requirements:**

- i. A student shall be eligible to appear for University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester/ I year.
- ii. **Shortage of Attendance below 65% in aggregate shall in NO case be condoned.**
- iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

- iv. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.
- v. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester / I year, as applicable. They may seek re-admission for that semester / I year when offered next.
- vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the University.

## **7. Minimum Academic Requirements:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar he should secure 40% in the internal evaluation.
- ii. A student shall be promoted from II to III year only if he fulfils the academic requirement of securing **40** credits from
  - a. One regular and one supplementary examinations of I year.
  - b. One regular examination of II year I semester  
irrespective of whether the candidate takes the end examination or not as per the normal course of study.
- iii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing **68** credits from the following examinations,
  - a. Two regular and two supplementary examinations of I year.
  - b. Two regular and one supplementary examinations of II year I semester.
  - c. One regular and one supplementary examinations of II year II semester.
  - d. One regular examination of III year I semester.  
Irrespective of whether the candidate takes the end examinations or not as per the normal course of study.

And in case of getting detained for want of credits by sections ii and iii above, the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.

- iv. A student shall register and put up minimum attendance in all 220 credits and earn all the 220 credits. Marks obtained in all 220 credits shall be considered for the calculation of percentage of marks obtained.
- v. Students who fail to earn 220 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Pharm. course and their admission shall stand cancelled.

**8. Course pattern:**

- i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.
- ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
- iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester / year is offered after fulfilment of academic regulations, whereas he continues to be in the academic regulations he was first admitted.

**9. TRANSITORY REGULATIONS:**

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2.

**10. WITH – HOLDING OF RESULTS:**

If the candidate has not paid dues to the university or if any case of in-discipline or

malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

**11. Award of Class:**

After a student has satisfied the requirements prescribed for the completion of the program and eligible for the award of B.Pharm. Degree he shall be placed in one of the following four classes:

<b>Class Awarded</b>	<b>% of marks to be secured</b>	From the aggregate marks secured for the best 220 Credits.
First Class with Distinction	70% and above	
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

**12. Minimum Instruction Days:**

The minimum instruction days including exams for each semester / I year shall be 90/180 days respectively.

**13.** There shall be no branch transfers after the completion of admission process.

**14.** There shall be no place transfer within the Constituent Colleges.

**15. General:**

- i. The academic regulations should be read as a whole for purpose of any interpretation.**
- ii. Malpractices rules- nature and punishments is appended**
- iii. Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.**
- iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.**
- v. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on roles with effect from the dates notified by the University.**

### ***Academic Regulations for B. Pharm. (Lateral Entry Scheme)***

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2010-2011 and onwards)

#### **1. Award of B.Pharm. Degree**

A student admitted in LES will be declared eligible for the award of the B.Pharm. Degree if he fulfils the following academic regulations:

- i. Pursue a course of study for not less than three academic years and in not more than six academic years.
- ii. Register for 168 credits and secure all 168 credits from II to IV year of Regular B.Pharm. Program

**2.** Students, who fail to fulfil the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.

**3.** The regulations **3** to **6** are to be adopted as that of B. Pharm. (Regular).

#### **7. Minimum Academic Requirements :**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar he should secure 40% in the internal evaluation.
- ii. A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 42 credits from the following examinations.
  - a. Two regular and one supplementary examinations of II year I semester.
  - b. One regular and one supplementary examinations of II year II semester.
  - c. One regular examination of III year I semester.

And in case of getting detained for want of credits the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Fourth year I semester.



**8. Course Pattern**

- i. The entire course of study is of three academic years on semester pattern.
- ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
- iii. When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester / year is offered after fulfilment of academic regulations, whereas he continues to be in the academic regulations he was first admitted.

**9.** The regulations **9** to **10** are to be adopted as that of B.Pharm. (Regular).

**11. Award of Class:**

After a student has satisfied the requirements prescribed for the completion of the program and eligible for the award of B.Pharm. Degree he shall be placed in one of the following four classes:

First Class with Distinction	70% and above	From the aggregate marks secured for 168 Credits. (i.e. II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

**12.** The regulations **12** to **15** are to be adopted as that of B.Pharm. (Regular). All other regulations as applicable for B.Pharm. Four-year degree course (Regular) will hold good for B.Pharm. (Lateral Entry Scheme)

## MALPRACTICES RULES

### DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	<b>Nature of Malpractices/Improper conduct</b>	<b>Punishment</b>
	<i>If the candidate:</i>	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work

		and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

#### Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
  - (i) A show cause notice shall be issued to the college.
  - (ii) Impose a suitable fine on the college.
  - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR  
ANANTAPUR – 515 002 (A.P) INDIA**

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**PLANNING I/c**

To  
All the Principals of Colleges offering B.Pharm course.

Sir,

Please find herewith approved syllabus of I year B.Pharm effective from 2009-10

The academic regulations and syllabus of rest of the course will be notified later.

Sd/- DIRECTOR  
Academic & Planning

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**ANANTAPUR**

**Course Structure (2009-10 onwards)**

**B. PHARMACY**

**I YEAR COURSE STRUCTURE**

S.No.	Subject	T	C	P	C
1	Remedial Mathematics ( for Bi.P.C stream) Remedial Biology ( for M.P.C stream)*	3+1 2+1	6 4	- 3/2	- 2
2	Dispensing and Hospital Pharmacy	3+1	6	3	4
3	Pharmaceutical Inorganic Chemistry	3	6	3	4
4	Pharmaceutical Organic Chemistry-I	3+1	6	3	4
5	Anatomy, Physiology and Health education	3+1	6	3	4
6	English Language Communication Skills	3	6	-	-
	Total	22/21	36/34	12/15	16/18

\* Remedial biology lab for M.P.C stream students will be in alternate weeks while the evaluation of internal and end examination shall be as independent lab.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B. Pharmacy I Year**

**T      C**  
**3+1    6**

**REMEDIAL MATHEMATICS**

**UNIT I**

**Algebra:**

Arithmetic Progression-Geometric Progression-Binomial theorem-partial fractions. Permutations & combinations. Matrices: basic matrix operations. Determinants- Application of determinants to solve simultaneous equations (Cramer's Rule and Cali-Hamilton's theorem).

**UNIT II**

**Trigonometry:** Trigonometric ratios and the relations between  $\sin(A+B)$ ,  $\cos(A+B)$ ,  $\tan(A+B)$  formulae only. Trigonometric ratios of multiple and sub-multiples, angles, heights and distances (simple problems), complex numbers and Demoivre's theorem.

**UNIT III**

**Co-ordinate Geometry:** Distances between points, Area of a triangle, Co-ordinates of a point dividing a given line segment in a given ratio. Locus equation to a straight line in different forms. Angle between straight lines-point of intersection, circles and conic sections.

**UNIT IV**

**Differential Calculus:** Continuity and limit: Differentiation, derivability and derivative, R.H. derivatives and L.H. derivatives, Differentiation, General theorems of derivatives.

**UNIT V**

Derivatives of trigonometric functions (excluding inverse trigonometric and hyperbolic functions). Logarithmic differentiation, partial differentiation, maxima and minima (elementary) and successive differentiation up to second order.

**UNIT VI**

**Integral Calculus:** Integration as an inverse process of differentiation. Definite integrals, integration by substitution, integration by parts, integration of algebraic function of  $e^x$ , evaluation of areas and volumes in simple cases.

**UNIT VII**

**Differential equations:** Formation of a differential equation, order and degree, solution of first order differential equations.

**UNIT VIII**

Applications of first order and first degree differential equation- law of Natural growth and decay.  
Newton's Law of cooling. Definition of Linear differential equations for Homogenous, non homogenous,  
second and higher order equations.

## TEXT BOOKS

1. Intermediate first Year mathematics and Intermediate Second year mathematics., published by Telugu Academy, Himayatnagar, Hyderabad
2. Remedial mathematics by Khan, S.chand

## REFERENCES

3. A Text book of Remedial Mathematics by P.Seshagiri Rao.
4. Higher Engineering Mathematics by Grewal.
5. B.Pharmaceutical mathematics vol-I,vol-II –Laxmi publications
6. Text book of Remedial Mathematics by Dr. A Ramakrishna Prasad Cengage Learning.



## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B. Pharmacy I Year**

**T      C**  
**2+1    4**

### **REMEDIAL BIOLOGY**

#### **UNIT I**

**Plant and animal cell:** Detailed structure, mitosis, meiosis, different types of tissues and their functions.  
Brief classification of plant and animal kingdom.

#### **UNIT II**

Simple and compound microscopes used in biology; section cutting; staining and mounting of sections.  
Morphology and histology of root, stem, bark, wood, leaf, flower, fruit and seed. Modifications of root and stem.

#### **UNIT III**

**Study of parasites:** Structure and life history of parasites: Amoeba, Entamoeba, Trypanosoma, Plasmodium, Taenia, Ascaris, Schistosoma, Oxyuris and Ancylostoma.

#### **UNIT IV**

General structure and life history of insects like Cockroach, Mosquito and Housefly. Comparative gross anatomical features of frog, rat and rabbit.

### **TEXT BOOKS**

1. Intermediate First Year and Second Year Botany / Zoology Text Books printed and published by Telugu Academy, Himayatnagar, Hyderabad.
2. A.C. Dutta, Text Book of Botany
3. Text book of Biology by S.B.Gokhale

### **REFERENCES**

4. Botany for Degree students Vol I & II by B.P. Pandey
5. Concepts of biology, Enger
6. Outlines of zoology by M.Ekambaranatha Ayyar and T.N.Ananda Krishnan
7. A manual for pharmaceutical biology practicals by S.B.Gokhale and C.K.Gokhale

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B. Pharmacy I Year**

**T C**  
**3+1 6**

**DISPENSING & HOSPITAL PHARMACY**

**Section-A: DISPENSING PHARMACY**

**UNIT I- Genesis and Evolution of Pharmacy:** History of Pharmacy, origin and development of the Pharmacopoeias, History of Ayurveda, salient features of IP, USP and BP.

**UNIT II- Dispensing Pharmacy:** Principles of dispensing, parts of prescription, handling of prescription, source of errors in prescription and care required in dispensing procedures including labeling of dispensed products. Weights and Measures, introduction to Latin terms, Percentage calculations, alligation method, proof spirit calculations, displacement value and calculations of isotonicity adjustment. General dispensing procedures, posology-calculations of doses.

**UNIT III- Principles involved and procedures adopted in dispensing of the following classes of preparations.**

(i) Mixtures ii) Solutions iii) Emulsions iv) Powders v) Lotions & liniments vi) Ointments and vii) Suspensions

Definition of the following preparations like creams, capsules, pastes, jellies, suppositories, ophthalmic, lozenges, pills, inhalations, paints ,gargles, sprays and tablet triturates .

**Extraction and Galen cal products:** Principle and methods of extraction, preparation of infusion, tinctures, dry and soft liquid extracts.

**UNIT IV- Incompatibilities:** Physical, chemical and therapeutic incompatibilities – methods of overcoming and handling of prescriptions with incompatibility.

**Section-B: HOSPITAL PHARMACY**

**UNIT V- Organization:** Organization of a hospital and hospital pharmacy, responsibilities of a hospital pharmacist, pharmacy and therapeutic committee.

**UNIT VI- Drug distribution:** Procedural manual, drug distribution, dispensing to out-patients, in-patients and ambulatory patient-dispensing of ancillary and controlled substances, drug information center(DIC).

**Unit VII- Hospital Management:** Budget preparation and implementation, hospital formulary, organization of drug store, purchase and inventory control, patient counseling, role of Pharmacist in community health care and education.

**UNIT VIII- Records:** Prescription filling, drug profile, patient medication profile, cases on drug interaction, adverse reactions, idiosyncratic cases.

Note: End Exam students should write 5 out of 8 questions choosing at least two from each section

#### TEXT BOOKS

- 1 Dispensing Pharmacy, Cooper & Gunns CBS, Publ. and Distributors New Delhi.
- 2 Health Education and Community Pharmacy, Gupta AK, CBS, Publ. and Distributors New Delhi.
- 3 Hospital Pharmacy. JS Quadry,

#### REFERENCES

1. Essential dosage calculations -Hospital Pharmacy. Lorria & William William Hassan,.
2. Dispensing Pharmacy, R.M Metha.
3. Text Book of Pharmaceutics, E.A. Rawlins, Bentley's ELBS publ.
4. Health Education and Community Pharmacy, NK Jain, CBS, Publ. and Distributors New Delhi.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Pharmacy I Year

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3      C  
6

PHARMACEUTICAL INORGANIC CHEMISTRY

UNIT - I

1. Classification of Inorganic Pharmaceuticals based on their applications and therapeutic uses.
2. Sources of impurities, quality control and test for purity
3. Qualitative tests for anion and cations
4. Limit tests for arsenic, heavy metals, lead, iron, chloride and sulphate.

*Note: Definition, Preparation, principle behind Assays / Limit tests and Uses of the compounds mentioned in Unit II to Unit VII*

UNIT - II

1. **Electrolytes:**
  - a. **Sodium and potassium replenishers:** Sodium chloride, compound sodium chloride solution (Ringer solution), potassium chloride, ORS.
  - b. **Calcium replenishers:** Calcium gluconate, dibasic calcium phosphate, calcium chloride.
2. **Acid base regulators:** Sodium bicarbonate, sodium lactate, sodium citrate/potassium citrate, sodium acetate and ammonium chloride
3. **Dialysis fluids:** Haemodialysis fluids.

UNIT III

**Gastro-intestinal agents.**

1. **Acidifiers and Antacids:** Dilute hydrochloric acid, sodium acid phosphate, sodium bicarbonate, aluminium hydroxide gel, dried aluminium hydroxide gel, magnesium oxide (Magnesia), magnesium hydroxide mixture, magnesium trisilicate.
2. **Adsorbents and related drugs:** Light kaolin, heavy kaolin and activated charcoal.
3. **Laxatives:** Magnesium sulphate, sodium phosphate.

UNIT -IV

1) **Mineral Nutrients / Supplements**

- (a) **Haematinics** – Ferrous sulphate, ferrous fumarate, ferrous gluconate, ferric ammonium citrate, iron and dextrose injection.
- (b) **Halogens:** Iodine, Iodides.

2) **Pharmaceutical aids**

- (a) **Excipients:** Dicalcium phosphate, magnesium stearate, talc and calcium carbonate (Precipitated chalk).
- (b) **Suspending agents:** Bentonite, colloidal silica.
- (c) **Colorants:** Titanium oxide, Ferric oxide

UNIT - V

- (a) **Expectorants:** Ammonium chloride, potassium iodide.
- (b) **Emetics:** Potassium antimony tartarate, copper sulphate.
- (c) **Antidotes:** Sodium thiosulphate, sodium nitrite.

## UNIT -VI

### *Topical agents:*

- 1) **Astringents:** Zinc sulphate, calcium hydroxide, Bismuth sub carbonate.
- 2) **Topical protectants:** Zinc oxide, calamine, zinc stearate, talc, titanium-dioxide, heavy kaolin and light kaolin (only uses).
- 3) **Silicone polymers:** Activated dimethicone.
- 4) **Anti-infectives:** Hydrogen peroxide solution, potassium permanganate, silver nitrate (silver protein), iodine, (solutions of iodine, povidone iodine), boric acid, zinc undecylenate, mercury compounds (yellow mercuric chloride).

## UNIT- VII

### *Dental products:*

- 1) **Fluorides:** Sodium fluoride, sodium monofluorophosphate and stannous fluoride.
- 2) **Oral antiseptics and astringents:** Hydrogen peroxide, magnesium peroxide, zinc peroxide and mouth washes.
- 3) **Dentifrices:** Calcium carbonate, dibasic calcium phosphate, calcium phosphate, sodium metaphosphate and strontium chloride.
- 4) **Cements & fillers :** Zinc oxide (uses only).

## UNIT-VIII

### **Miscellaneous Medicinal Agents**

- |    |                      |   |                           |
|----|----------------------|---|---------------------------|
| a) | Antineoplastics      | : | Cisplatin                 |
| b) | Antidepressants      | : | Lithium carbonate         |
| c) | Diagnostic agents    | : | Barium sulphate           |
| d) | Surgical aids        | : | Plaster of Paris          |
| e) | Antirheumatic agents | : | Sodium aurothiomalate     |
| f) | Internal parasiticid | : | Sodium antimony gluconate |
| g) | Anti thyroid agents  | : | Potassium perchlorate     |

## TEXT BOOKS

- 1. Pharmaceutical Inorganic Chemistry by Madan-S.Chand
- 2. Inorganic Medical and Pharmaceutical Chemistry, J.H Block, E.Roche, T.O Soine and C.O. Wilson, Lea & Febiger Philadelphia PA.

## REFERENCES

- 1. Practical pharmaceutical chemistry, Part-I, A.H.Beckett and J.B.Stenlake, The Athtone press, University

of London, London.

2. Inorganic chemistry, Gary L. Miessler and Donald A. Tarr, 3/e, Pearson education, New Delhi
3. Inorganic pharmaceutical chemistry, P. Gundu Rao, Vallabh Prakashan, Delhi.
4. Advanced Inorganic Chemistry, G.D. Tuli, Satya prakash
5. Modern inorganic chemistry, Jolly
6. Indian Pharmacopoeia 1996, 2006.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Pharmacy I Year

T C  
3+1 6

### PHARMACEUTICAL ORGANIC CHEMISTRY-I

#### UNIT – I

**Structure and Activity of Organic Molecules:** Shapes of organic molecules, bond lengths, bond angles and bond dissociation energies. Electronic effects in organic molecules: inductive effect, electromeric or mesomeric effect, hyperconjugation, concept of resonance; types of organic reagents and reactions.

#### UNIT – II

##### **Study of Hydrocarbons:**

**Aliphatic/Alicyclic Hydrocarbons:** Nomenclature, isomerism (chain, conformational and geometrical) relative stabilities (heats of combustion and hydrogenation), ring stabilities of cyclohexane, chair-boat conformation, Bayer's strain theory and sachse-mohr theory. Free radical substitution reactions (halogenation) of alkanes, selectivity of halogens.

**Alkenes:** Electrophilic addition reactions of alkenes, Markovnikov's rule, Anti-Markovnikov's rule, Kharasch effect, Bayer's oxidation (cis-hydroxylation, polymerisation).

**Alkadienes:** Stability & 1,4 addition reactions of conjugated alkadienes.

**Alkynes:** Acidity of 1-alkynes, formation of metal acetylides. Stereo specific reduction of alkynes. Addition of hydrogen halide (HCl) addition of water and keto-enol tautomerism.

#### UNIT – III

**Aromatic Hydrocarbons:** Kekule's structure of benzene, bond lengths, heats of hydrogenation and stability, molecular orbital picture of benzene, aromaticity, Huckel's rule, nomenclature of benzene derivatives, characteristic reactions of benzene, theory of reactivity and orientation in monosubstituted benzenes.

**Polynuclear aromatic hydrocarbons:** Nomenclature, structure and aromatic character of naphthalene, anthracene, phenanthrene and naphthacene resonance structures, electron density and reactivity. Electrophilic substitution, oxidation and reduction reactions.

#### UNIT – IV

**Halogen Compounds-Aliphatic:** Nomenclature, general methods of preparation, characteristic nucleophilic substitution reactions, factors that play role in  $SN^1$  and  $SN^2$ , Walden inversion, elimination reaction and Saytzeff's rule.

**Halogen Compounds-Aromatic:** Nomenclature, low reactivity of halo benzenes towards nucleophilic substitution, arenas, Benzyne ion concept..

#### UNIT – V

**Alcohols:** Nomenclature, classification, general methods of preparation, physical properties, hydrogen bonding, characteristic nucleophilic substitution reactions (replacement of -OH by -Cl), elimination reactions, and relative reactivities of  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  alcohols, Meerwein Ponderff Verley reduction.

**Ethers:** Nomenclature, Williamson's synthesis, action of hydro iodic acid on ethers (Ziesel's method).



**Phenols:** Nomenclature, general methods of preparation, physical properties, acidity of phenols, stability of phenoxide ion, reactions of phenols, Kolbe-schmidt reaction stability of conjugated dienes, and Fries rearrangement, Reamer-Tiemann Reaction.

#### UNIT – VI

**Carbonyl Compounds:** Nomenclature, two important methods of preparation, polarity of carbonyl group, relative reactivities of carbonyl compounds, nucleophilic addition and addition-elimination reactions, oxidation-reduction reactions, aldol condensation, Cannizzaro reaction, benzoin condensation, Perkins reactions, Reformatsky reaction, Oppenauer oxidation.

#### UNIT – VII

*Carboxylic acids and their derivatives:*

**Carboxylic acids:** Nomenclature, intermolecular association, stability of carboxylate anion, two important methods of preparation, decarboxylation, functional groups reactions, reduction of carboxylic acids.

**Acid derivatives:** (acid chlorides, anhydrides, esters and amides). Nomenclature, reactions like hydrolysis, reduction of esters and amides, Hofmann's degradation of amides. Brief account of preparation and properties of malonic and acetoacetic esters, their importance in organic syntheses.

#### UNIT – VIII

*Nitrogen Compounds:*

**Nitro compounds:** Nomenclature, acidity of nitro compounds containing  $\alpha$ - hydrogens, reductive reactions of aromatic nitro compounds.

**Amines:** Nomenclature, basicity of amines, classification, relative reactivity, Hinsberg method of separation, acylation reactions. Diazotisation and reactions of diazonium salts.

**Nitriles and isonitriles:** Nomenclature, two methods of synthesis, reactivity and functional reactions.

### TEXT BOOKS

1. Advanced pharmaceutical organic chemistry, Bahl & Bahl, S.Chand
2. Organic chemistry, T.R.Morrison and R.N.Boyd, Pearson Education India , New Delhi.

### REFERENCES

1. Organic chemistry, Bruce,
2. Reactions and Mechanism, Jerry March, 4<sup>th</sup> ed
3. Organic chemistry, Carey
4. Organic chemistry, Pillai
5. The Fundamentals Principles of Organic Chemistry Vol.I & Vol. II, I.L. Finar, ELBS/Longman.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B. Pharmacy I Year**

**T      C**  
**3+1    6**

**ANATOMY PHYSIOLOGY AND HEALTH EDUCATION**

**UNIT-I**

**Scope of anatomy and physiology, basic terminology used in these subjects.** Structure of cell, its components and their functions. Elementary tissues of the human body: epithelial, connective, muscular and nervous tissues, their sub- types and characteristics. Body fluids, Homeostasis

**UNIT-II**

**Skeletal system:** Structure, composition and functions of skeleton classification of joints, types of movements at joints,

**Skeletal muscles:** Gross anatomy, physiology of muscle contraction, physiological properties of skeletal muscles and their disorders.

**UNIT-III**

**Haemopoietic system:** Composition and functions of blood and its elements, their disorders, blood groups and their significance, mechanism of coagulation, disorders of platelets and coagulation. Anemia and its types.

**Lymph and Lymphatic System:** Composition, formation and circulation of lymph; disorders of lymph and lymphatic system. Basic physiology and functions of spleen.

**UNIT-IV**

**Cardiovascular system:** Basic anatomy of the heart. Physiology of heart, blood vessels and circulation. Basic pulmonary, coronary and hepatic system. Understanding of cardiac cycle, heart sounds and electrocardiogram. Blood pressure and its regulation. Brief outline of cardiovascular disorders like hypertension, hypotension, atherosclerosis, angina, myocardial infarction, congestive heart failure and cardiac arrhythmias.

**UNIT-V**

**Digestive System:** Gross anatomy of the gastro-intestinal tract, functions of its different parts including those of liver, pancreas and gall bladder, various gastrointestinal secretions and their role in the absorption and digestion of food, peptic ulcer, ulcerative colitis and hepatic disorders.

#### **UNIT-VI**

**Respiratory System:** Anatomy of respiratory organs. Functions of respiration, mechanism and regulation of respiration, respiratory volumes and vital capacity. Asthma, tuberculosis.

#### **UNIT-VII**

**Concepts of health & disease,** disease causing agents and prevention of disease.  
Balanced diet and nutritional deficiency disorders,

**First Aid:** Emergency treatment of shock, snakebites, burns, poisoning, fractures and resuscitation methods.

#### **Demography and family planning:**

Demography cycle, population problem, family planning and various contraceptive methods. Medical termination of pregnancy.

#### **UNIT-VIII**

**Brief outline of communicable diseases,** their causative agents, modes of transmission and prevention :-chicken pox, measles, influenza, diphtheria whooping cough, tuberculosis, poliomyelitis, hepatitis, cholera, typhoid, food poisoning, helmenthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy, syphilis, gonorrhoea and Aids.

## **TEXT BOOKS**

- 1 Human Anatomy & physiology and Health education, Dr.Jayaveera, K.N,Vrushabendra Swamy.BM, S.Chand
2. Essential of Human Anatomy & Physiology, Elaine N. Marieb
3. Principles of Anatomy and Physiology, Tortora, G.J and Anagnodokas, N.P Harper & Row Publishers N.Y

## **REFERENCES**

1. Text Book of Human Anatomy, Ross & Willson, M.J.Mycek S.B Gerther and MMPER
2. Human Physiology, C.C.Chatterjee.
3. fundamentals of Anatomy & Physiology, Rizzo,.
4. Human Anatomy, Mc Kinley,.
5. Textbook of Medical Physiology, Guyton, AC Guyton WB Sannders Company, 1995.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B. Pharmacy I Year**

**T     C**  
**3     6**

## **ENGLISH**

### **1. INTRODUCTION :**

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students' handbooks.

The teacher should focus on the skills of reading, writing, listening and speaking while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two way communications in place of the one-sided lecture.

The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

### **2. OBJECTIVES:**

- a. To improve the language proficiency of the students in English with an emphasis on LSRW skills.
- b. To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.
- c. To develop study skills as well as communication skills in formal and informal situations.

### **3. SYLLABUS :**

#### **Listening Skills:**

##### Objectives

1. To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

*Students should be given practice in listening and identifying the sounds of English language and to mark stress , right intonation in connected speech.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

#### **Speaking Skills :**

##### Objectives

1. To make students aware of the role of ability to speak fluent English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Role play – Individual/Group activities
- Describing objects/situations/people

(Using exercises from all units of the prescribed text) • Just A Minute (JAM) Sessions.

### **Reading Skills:**

#### Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Identifying the topic sentence
- Understanding discourse features
- Understanding the gist of an argument
- Inferring lexical and contextual meaning
- Recognizing coherence/sequencing of sentences

*The students shall be trained in reading skills using the prescribed text for detailed study. They shall be examined in reading and answering questions using 'unseen' passages which may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.*

### **Writing Skills:**

#### Objectives

1. To develop an awareness in the students the skill to write exact and formal writing
2. To equip them with the components of different forms of writing.

- Writing sentences
- Paragraph writing
- Narration / description
- Formal and informal letter writing
- Use of appropriate vocabulary
- Coherence and cohesiveness
- Note Making
- Editing a passage

### **4. TEXTBOOKS PRESCRIBED:**

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts are prescribed and course content is divided into **Eight Units**,:

*For Detailed study:* **ENJOYING EVERYDAY ENGLISH**, Sangam Books (India) Pvt Ltd  
Hyderabad, 2009

*For Non-detailed study:* **INSPIRING LIVES**, Maruti Publications, Guntur, 2009

#### **Unit -I**

- a. Heaven's Gate from **ENJOYING EVERYDAY ENGLISH**
- b. Mokshagundam Visvesaraya from **INSPIRING LIVES**

#### **Unit -II**

- a. Sir C.V.Raman from **ENJOYING EVERYDAY ENGLISH**
- b. Mother Teresa from **INSPIRING LIVES**

#### **Unit -III**

- a. The Connoisseur from **ENJOYING EVERYDAY ENGLISH**
- b. Dr. Amartya Kumar Sen from **INSPIRING LIVES**

#### **Unit -IV**

- a. The Cuddalore Experience from **ENJOYING EVERYDAY ENGLISH**
- b. Gertrude Elion from **INSPIRING LIVES**

**Unit - V**

- a. Bubbling Well Road from **ENJOYING EVERYDAY ENGLISH**
- b. Vishwanathan Anand from **INSPIRING LIVES**

**Unit-VI**

- a. Odds Against Us from **ENJOYING EVERYDAY ENGLISH**
- b. Charlie Chaplin from **INSPIRING LIVES**

**Unit – VII**

Exercises on

Reading and Writing Skills, Reading Comprehension, Letter writing, Report writing

**Unit – VIII**

Exercises on

Remedial Grammar covering Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses

Vocabulary development covering

Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

**Evaluation:** The question paper shall contain two parts, Part A containing questions from Units I- VI and Part B containing questions from units VII & VIII. The student is required to answer five full questions choosing at least one from Part B.

**REFERENCES:**

1. Technical Communication , Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009
2. Essential Grammar in Use, (with CD) 3<sup>rd</sup> edn, Cambridge University Press, 2009
3. Resumes and Interviews, M.Ashraf Rizvi, Tata – Mcgraw Hill, 2009
4. Everyday Dialogues in English by Robert J. Dixon, Prentice-Hall of India Ltd., 2006.
5. Communication Skills for Technical Students, T.M.Farhathullah, Orient Blackswan, 2008
6. Developing Communication Skills, 2<sup>nd</sup> edn. by Krishna Mohan & Meera Banerji , Macmillan, 2009
7. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
8. Basic Communication Skills For Technology, Andrea J Ruthurford, Pearson Education , Asia.
9. Longman Dictionary of Contemporary English with DVD, Pearson Longman

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B. Pharmacy I Year**

**P      C**  
**3/2    2**

***REMEDIAL BIOLOGY LAB***

About 12-15 experiments/exercises (approx. of 2 hrs duration) may be designed covering the following topics and evenly distributed over the academic calendar.

- a. Care and uses of microscope
- b. Gross identification of permanent slides of structure and life cycle of plants/animals mentioned in the theory syllabus.
- c. Morphology of plant parts indicated in theory.
- d. Preparation, Microscopic Examination of stem, root and leaf of mono and dicot leaves.
- e. Structure of human parasites and insects mentioned in the theory with the help of specimen.
- f. Anatomical features of different organs of frog and rabbit using charts.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

### B. Pharmacy I Year

**P**      **C**  
**3**      **4**

#### **DISPENSING & HOSPITAL PHARMACY LAB**

About 18-20 experiments/exercises (approx. of 2 hrs duration) may be designed covering the following 1 to 5 topics and evenly distributed over the academic calendar. Exercises for topic 6 may be conveniently devised

1. Dispensing of prescriptions falling under the categories; Mixtures (Magnesium hydroxide IP), Syrups (Simple syrup, Flavored syrup), solutions (Cresol with soap solution, strong ammonium acetate solution, Lugol's solution), emulsions (Liquid paraffin and castor oil emulsions), creams (cold creams), ointments (sulphur ointment, Zinc oxide ointment), powders (dusting and eutectic powders), lotions (calamine lotion), liniments (terpentine liniment), elixirs (Piperazine citrate elixirs), tincture (iodine tincture), paints (throat paint), gargles (potassium chlorate gargles), gels (Bentonite gel) colloidion (salicylic acid colloidion), mouthwash (antiseptic mouthwash).
2. Identification of various types of incompatibilities in a prescription, correlation thereof and dispensing of such prescriptions.
3. Dispensing procedures involving pharmaceutical calculations, pricing of prescriptions and dosage calculations for paediatric and geriatric patients.
4. Dispensing of prescriptions involving adjustment of tonicity. Preparation of normal saline and dextrose solutions.
5. Preparation of Pharmacopoeial extracts and galenical products utilizing various methods of extraction viz Maceration and percolation.
6. Project report on visit to the community pharmacy for Counseling on the rational use of drugs and aspects of health care.

#### **LIST OF MINIMUM EQUIPMENT REQUIRED**

- A. Adequate number of the following, such that each student gets one set
  1. Mortars and pestles.
  2. Analytical balance and weight box.
  3. Percolators
  4. Dispensing containers.
- B. pH meter.
- C. Electronic balance
- D. Adequate quantities of chemicals and glassware



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B. Pharmacy I Year**

**P      C**  
**3      4**

**PHARMACEUTICAL INORGANIC CHEMISTRY LAB**

**List of experiments:**

**A) Limit tests for the following as per the procedure given in Indian Pharmacopoeia (1996 – including the latest addenda)**

- 1) Chlorides
- 2) Sulphates
- 3) Heavy metals
- 4) Iron
- 5) Arsenic
- 6) Modifications in limit test for chlorides and sulphates in potassium permanganate, sodium bicarbonates, sodium benzoates and sodium salicylates.

**B)**

- 7) Balances and Weighing; Calibration of weights, Pipette and Burette.
- 8) Preparation and standardization of Hydrochloric acid solution (0.1N).
- 9) Preparation and standardization of Potassium permanganate solution (0.1N & 0.1M).
- 10) Preparation of a primary standard solution of 0.1N Potassium hydrogen-phthalate.
- 11) Preparation and standardization of 0.1N EDTA solution.
- 12) Preparation and purification of Boric acid.
- 13) Preparation and purification of Sodium citrate.
- 14) Preparation and purification of Potash alum.
- 15) Preparation and purification of Magnesium stearate.
- 16) Assay of sodium bicarbonate and assay of Boric acid (Neutralization).
- 17) Assay of Calcium gluconate (or) any calcium compounds (Complexometry).
- 18) Assay of Copper sulphate (Redox titration).
- 19) Assay of Sodium acetate (Non-aqueous titration).
- 20) Assay of Ferrous sulphate (Oxidation-reduction / Redox titration).
- 21) Swelling power in bentonite
- 22) Test for purity (Ammonium salts in potash alum, presence of iodates in KI)

**REFERENCES**

1. Indian Pharmacopoeia - 1996.
2. Vogel's Qualitative Analysis

**LIST OF MINIMUM EQUIPMENT REQUIRED**

1. Analytical balances
2. Physical balances
3. Suction pumps
4. Oven

5. Hot plates
6. Water baths
7. Distillation unit
8. Limit test apparatus for arsenic
9. Adequate glasswares

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B. Pharmacy I Year**

**P**      **C**  
**3**      **4**

**PHARMACEUTICAL ORGANIC CHEMISTRY-I LAB**

Introduction to Equipment & Glassware, Recrystallization method, details of M.P, B.P and distillation

**I. Preparation of organic compounds (each involving a specific organic reaction covered in theory)**

- |     |                                |   |                                                                      |
|-----|--------------------------------|---|----------------------------------------------------------------------|
| 1.  | N-Acetylation                  | : | Preparation of Acetanilide from Aniline                              |
| 2.  | O-Acetylation                  | : | Preparation of Aspirin from Salicylic acid                           |
| 3.  | Nuclear Bromination            | : | Preparation of p-Bromoacetanilide from Acetanilide                   |
| 4.  | Hydrolysis                     | : | Preparation of p-Bromoaniline from p-Bromoacetanilide                |
| 5.  | Nuclear Nitration              | : | Preparation of m-Dinitrobenzene from Nitrobenzene                    |
| 6.  | Reduction                      | : | Preparation of m-nitro aniline from m-dinitro benzene.               |
| 7.  | Oxidation                      | : | Preparation of Benzoic acid from Benzyl chloride                     |
| 8.  | Esterification                 | : | Preparation of n-Butylacetate from n-Butylalcohol                    |
| 9.  | Etherification                 | : | Preparation of $\beta$ -Naphthyl methyl ether from $\beta$ -Naphthol |
| 10. | $\alpha$ -Halogenation         | : | Preparation of Iodoform from Oxidation of Acetone / Ethanol          |
| 11. | Extensive Nuclear Substitution | : | Preparation of tribromophenol                                        |
| 12. | Bromination                    | : | Tribromoaniline from Phenol or Aniline                               |
| 13. | Addition / elimination:        |   | Preparation of phenyl hydrazone or oxime from Benzaldehyde           |

**II. Identification of organic compounds belonging to following classes by systematic qualitative organic analysis including preparation of derivatives.**

1. Phenols
2. Amides
3. Carbohydrates
4. Amines
5. Carboxylic acids
6. Aldehydes and Ketones
7. Alcohols

8. Anilides and nitrocompounds
9. Esters

## REFERENCES

1. **Text Book of Practical Organic Chemistry, Vogel's, 5<sup>th</sup> Edition.**
2. Laboratory Manual of Organic Chemistry, R.K. Bansal,.
3. Advanced Practical Organic Chemistry, O.P. Agarwal,
4. Practical Organic Chemistry, F.G.Mann & B.C. Saunders,.

## LIST OF MINIMUM EQUIPMENT REQUIRED

1. Triple beam balances
2. Physical balances
3. Melting point apparatus
4. Suction pumps
5. Oven
6. Hot plates
7. Water baths
8. Distillation unit
9. Refrigerator
10. Adequate glassware

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B. Pharmacy I Year**

**P**  
**3**      **C**  
**4**

**ANATOMY, PHYSIOLOGY HEALTH EDUCATION LAB**

**(21 Experiments)**

- |                                                                                                                                              |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1. Study of human skeleton                                                                                                                   | – 2 Experiments  |
| 2. Study of different systems with the help of charts and models                                                                             | – 2 Experiments. |
| 3. Microscopic study of different tissues                                                                                                    | – 3 Experiments. |
| 4. Estimation of Haemoglobin in blood, Determination of bleeding time, clotting time                                                         | – 3 Experiments. |
| 5. Estimation of R.B.C. count                                                                                                                | – 2 Experiments. |
| 6. Estimation of W.B.C count                                                                                                                 | – 2 Experiments. |
| 7. Estimation of D.L.C.                                                                                                                      | – 2 Experiments. |
| 8. Recording of body temperature, pulse rate and blood pressure, basic understanding of electrocardiogram-PQRST waves and their significance | – 3 Experiments. |
| 9. Determination of vital capacity, experiments on spirometry                                                                                | – 2 Experiments. |
| 10. Study of different family planning appliances                                                                                            |                  |

**REFERENCES**

1. Practical Biochemistry, Plummer,
2. Human Anatomy & Physiology, Elaine N. Marieb,.
3. Human Physiology, A.K. Charatterjee,

**LIST OF MINIMUM EQUIPMENTS REQUIRED**

1. Microscopes
2. Glass slides
3. Hemocytometer with micropipettes
4. Sahli's hemoglobinometer
5. Huchinson's spirometer
6. Sphygmomonometer
7. Stethoscope
8. Permanenet slides for various tissues
9. Models for various organs and system
10. Specimen of various organ and system
11. Skeleton and bones
12. Clinical thermometers
13. ECG graphs.
14. Stop clocks
15. Different contraceptives devices and models.

