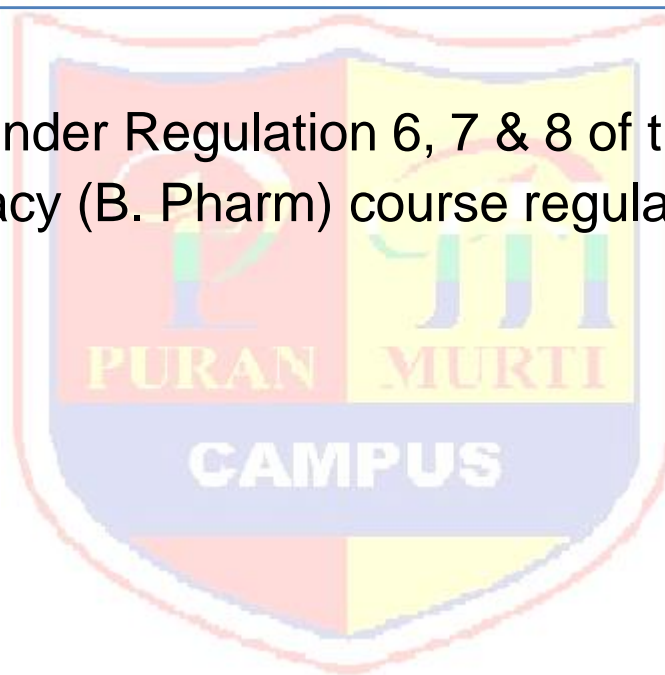


# Pharmacy Council of India New Delhi

## Rules & Syllabus for the Bachelor of Pharmacy (B. Pharm) Course

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[Framed under Regulation 6, 7 & 8 of the Bachelor  
of Pharmacy (B. Pharm) course regulations 2014]



## CHAPTER- I: REGULATIONS

### 1. Short Title and Commencement

These regulations shall be called as "The Revised Regulations for the B. Pharm. Degree Program (CBCS) of the Pharmacy Council of India, New Delhi". They shall come into effect from the Academic Year 2016-17. The regulations framed are subject to modifications from time to time by Pharmacy Council of India.

### 2. Minimum qualification for admission

#### First year B. Pharm:

2.1 Candidate shall have passed 10+2 examination conducted by the respective state/central government authorities recognized as equivalent to 10+2 examination by the Association of Indian Universities (AIU) with English as one of the subjects and Physics, Chemistry, Mathematics (P.C.M) and or Biology (P.C.B / P.C.M.B.) as optional subjects individually. Any other qualification approved by the Pharmacy Council of India as equivalent to any of the above examinations.

2.2. B. Pharm lateral entry (to third semester):

A pass in D. Pharm. course from an institution approved by the Pharmacy Council of India under section 12 of the Pharmacy Act.

### 3. Duration of the program

The course of study for B.Pharm shall extend over a period of eight semesters (four academic years) and six semesters (three academic years) for lateral entry students. The curricula and syllabi for the program shall be prescribed from time to time by Pharmacy Council of India, New Delhi.

### 4. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

### 5. Working days in each semester

Each semester shall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from December/January to May/June in every calendar year.

### 6. Attendance and progress

A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

### 7. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, tutorial hours, practical classes, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly, the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week.

## Credit assignment

### Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of lecture (L) and /or tutorial (T) hours, and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and tutorial hours, and a multiplier of half (1/2) for practical (laboratory) hours. Thus, for example, a theory course having three lectures and one tutorial per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

#### Minimum credit requirements

The minimum credit points required for award of a B. Pharm. degree is 208. These credits are divided into Theory courses, Tutorials, Practical, Practice School and Project over the duration of eight semesters. The credits are distributed semester-wise as shown in Table IX. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.

The lateral entry students shall get 52 credit points transferred from their D. Pharm program. Such students shall take up additional remedial courses of 'Communication Skills' (Theory and Practical) and 'Computer Applications in Pharmacy' (Theory and Practical) equivalent to 3 and 4 credit points respectively, a total of 7 credit points to attain 59 credit points, the maximum of I and II semesters.

### 8. Academic work

A regular record of attendance both in Theory and Practical shall be maintained by the teaching staff of respective courses.

### 9. Course of study

The course of study for B. Pharm shall include Semester Wise Theory & Practical as given in Table – I to VIII. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – I to VIII.

**Table-I: Course of study for Semester I**

| Course code          | Name of the course                                  | No. of hours                            | Tutorial | Credit Points                           |
|----------------------|---|---|----------|---|
| BP101T               | Human Anatomy and Physiology I–Theory               | 3                                       | 1        | 4                                       |
| BP102T               | Pharmaceutical Analysis I – Theory                  | 3                                       | 1        | 4                                       |
| BP103T               | Pharmaceutics I – Theory                            | 3                                       | 1        | 4                                       |
| BP104T               | Pharmaceutical Inorganic Chemistry – Theory         | 3                                       | 1        | 4                                       |
| BP105T               | Communication skills – Theory *                     | 2                                       | -        | 2                                       |
| BP106RBTBP10<br>6RMT | Remedial Biology/<br>Remedial Mathematics – Theory* | 2                                       | -        | 2                                       |
| BP107P               | Human Anatomy and Physiology – Practical            | 4                                       | -        | 2                                       |
| BP108P               | Pharmaceutical Analysis I – Practical               | 4                                       | -        | 2                                       |
| BP109P               | Pharmaceutics I – Practical                         | 4                                       | -        | 2                                       |
| BP110P               | Pharmaceutical Inorganic Chemistry – Practical      | 4                                       | -        | 2                                       |
| BP111P               | Communication skills – Practical*                   | 2                                       | -        | 1                                       |
| BP112RBP             | Remedial Biology – Practical*                       | 2                                       | -        | 1                                       |
| <b>Total</b>         |   | <b>32/34<sup>§</sup>/36<sup>#</sup></b> | <b>4</b> | <b>27/29<sup>§</sup>/30<sup>#</sup></b> |

<sup>§</sup>Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM) course.

\* Non University Examination (NUE)

**Table-II: Semester wise credits distribution**

| Semester                                   | Credit Points                              |
|--|--|
| I  | 27/29 <sup>§</sup> /30 <sup>#</sup>        |
| II   | 29   |
| III  | 26   |
| IV   | 28   |
| V  | 26   |
| VI   | 26   |
| VII  | 24   |
| VIII                                       | 22   |
| Extracurricular/ Co curricular activities  | 01*  |
| <b>Total credit points for the program</b> | <b>209/211<sup>§</sup>/212<sup>#</sup></b> |

\* The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

<sup>§</sup>Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

<sup>#</sup>Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

1. **Program Committee** The B. Pharm. program shall have a Program Committee constituted by the Head of the institution in consultation with all the Heads of the departments.
2. The composition of the Program Committee shall be as follows:  
 A senior teacher shall be the Chairperson; One Teacher from each department handling B.Pharm courses; and four student representatives of the program (one from each academic year), nominated by the Head of the institution.
3. **Duties of the Program Committee:**
  - i. Periodically reviewing the progress of the classes.
  - ii. Discussing the problems concerning curriculum, syllabus and the conduct of classes.
  - iii. Discussing with the course teachers on the nature and scope of assessment for the course and the same shall be announced to the students at the beginning of respective semesters.
  - iv. Communicating its recommendation to the Head of the institution on academic matters.
  - v. The Program Committee shall meet at least thrice in a semester preferably at the end of each Sessional exam (Internal Assessment) and before the endsemester exam.

| COURSE CODE                  | Name of the course                             | INTERNAL ASSESSMENT     |                            |                                 |                            | End Semester Exams                   |  | Total Marks                          |
|------------------------------|--|-------------------------|----------------------------|---------------------------------|----------------------------|--------------------------------------|--|--------------------------------------|
|                              |  | Continu-ous Mode        | Sessional Exams            |                                 | Total                      | Marks                                | Duratio-n                              |                                      |
|                              |  |                         | Marks                      | Durat-ion                       |                            |                                      |  |                                      |
| BP101T                       | Human Anatomy and Physiology I – Theory        | 10                      | 15                         | 1 Hr                            | 25                         | 75                                   | 3 Hrs                                  | 100                                  |
| BP102T                       | Pharmaceutical Analysis I – Theory             | 10                      | 15                         | 1 Hr                            | 25                         | 75                                   | 3 Hrs                                  | 100                                  |
| BP103T                       | Pharmaceutics I – Theory                       | 10                      | 15                         | 1 Hr                            | 25                         | 75                                   | 3 Hrs                                  | 100                                  |
| BP104T                       | Pharmaceutical Inorganic Chemistry – Theory    | 10                      | 15                         | 1 Hr                            | 25                         | 75                                   | 3 Hrs                                  | 100                                  |
| BP105T                       | Communication skills – Theory *                | 5                       | 10                         | 1 Hr                            | 15                         | 35                                   | 1.5 Hrs                                | 50                                   |
| BP106RB<br>T<br>BP106RM<br>T | Remedial Biology/<br>Mathematics – Theory*     | 5                       | 10                         | 1 Hr                            | 15                         | 35                                   | 1.5 Hrs                                | 50                                   |
| BP107P                       | Human Anatomy and Physiology – Practical       | 5                       | 10                         | 4 Hrs                           | 15                         | 35                                   | 4 Hrs                                  | 50                                   |
| BP108P                       | Pharmaceutical Analysis I – Practical          | 5                       | 10                         | 4 Hrs                           | 15                         | 35                                   | 4 Hrs                                  | 50                                   |
| BP109P                       | Pharmaceutics I – Practical                    | 5                       | 10                         | 4 Hrs                           | 15                         | 35                                   | 4 Hrs                                  | 50                                   |
| BP110P                       | Pharmaceutical Inorganic Chemistry – Practical | 5                       | 10                         | 4 Hrs                           | 15                         | 35                                   | 4 Hrs                                  | 50                                   |
| BP111P                       | Communication skills – Practical*              | 5                       | 5                          | 2 Hrs                           | 10                         | 15                                   | 2 Hrs                                  | 25                                   |
| BP112RBP                     | Remedial Biology – Practical*                  | 5                       | 5                          | 2 Hrs                           | 10                         | 15                                   | 2 Hrs                                  | 25                                   |
| <b>Total</b>                 |  | <b>70/75<br/>\$/80#</b> | <b>115/125\$<br/>/130#</b> | <b>23/24\$<br/>/26#<br/>Hrs</b> | <b>185/200\$<br/>/210#</b> | <b>490/<br/>525\$<br/>/<br/>540#</b> | <b>31.5<br/>/33\$<br/>/35#<br/>Hrs</b> | <b>675/<br/>725\$<br/>/<br/>750#</b> |

#\$Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM) course.

\* Non University Examination (NUE)

## 11. Examinations/Assessments

The scheme for internal assessment and end semester examinations is given in Table – III

End semester examinations

The End Semester Examinations for each theory and practical course through semesters I to VIII shall be conducted by the university except for the subjects with asterix symbol (\*) in table I and II for which examinations shall be conducted by the subject experts at college level and the marks/grades shall be submitted to the university.

**Tables-III: Schemes for internal assessments and end semester examinations semester wise Semester I**

| Course code                  | Name of the course                             | Internal Assessment                     |  |   |  | End Semester Exams                         |   | Total Marks                                |
|------------------------------|--|---|--|---|--|--|---|--|
|                              |  | Continuous Mode                         | Sessional Exams                            |   | Total                                      | Marks                                      | Duration  |  |
|                              |  |   | Marks                                      | Duration  |  |  |   |  |
| BP101T                       | Human Anatomy and Physiology I – Theory        | 10                                      | 15   | 1 Hr  | 25   | 75   | 3 Hrs   | 100  |
| BP102T                       | Pharmaceutical Analysis I – Theory             | 10                                      | 15   | 1 Hr  | 25   | 75   | 3 Hrs   | 100  |
| BP103T                       | Pharmaceutics I – Theory                       | 10                                      | 15   | 1 Hr  | 25   | 75   | 3 Hrs   | 100  |
| BP104T                       | Pharmaceutical Inorganic Chemistry – Theory    | 10                                      | 15   | 1 Hr  | 25   | 75   | 3 Hrs   | 100  |
| BP105T                       | Communication skills – Theory *                | 5                                       | 10   | 1 Hr  | 15   | 35   | 1.5 Hrs   | 50   |
| BP106R<br>BT<br>BP106R<br>MT | Remedial Biology/<br>Mathematics – Theory*     | 5                                       | 10   | 1 Hr  | 15   | 35   | 1.5 Hrs   | 50   |
| BP107P                       | Human Anatomy and Physiology – Practical       | 5                                       | 10   | 4 Hrs   | 15   | 35   | 4 Hrs   | 50   |
| BP108P                       | Pharmaceutical Analysis I – Practical          | 5                                       | 10   | 4 Hrs   | 15   | 35   | 4 Hrs   | 50   |
| BP109P                       | Pharmaceutics I – Practical                    | 5                                       | 10   | 4 Hrs   | 15   | 35   | 4 Hrs   | 50   |
| BP110P                       | Pharmaceutical Inorganic Chemistry – Practical | 5                                       | 10   | 4 Hrs   | 15   | 35   | 4 Hrs   | 50   |
| BP111P                       | Communication skills – Practical*              | 5                                       | 5  | 2 Hrs   | 10   | 15   | 2 Hrs   | 25   |
| BP112R<br>BP                 | Remedial Biology – Practical*                  | 5                                       | 5  | 2 Hrs   | 10   | 15   | 2 Hrs   | 25   |
| <b>Total</b>                 |  | <b>70/75<sup>§</sup>/80<sup>#</sup></b> | <b>115/125<sup>§</sup>/130<sup>#</sup></b> | <b>23/24<sup>§</sup>/26<sup>#</sup><br/>Hrs</b> | <b>185/200<sup>§</sup>/210<sup>#</sup></b> | <b>490/525<sup>§</sup>/540<sup>#</sup></b> | <b>31.5/33<sup>§</sup>/35<sup>#</sup><br/>Hrs</b> | <b>675/725<sup>§</sup>/750<sup>#</sup></b> |

<sup>#</sup>Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB)course.

<sup>§</sup>Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

\* Non University Examination (NUE)



### Internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

**Table-V: Scheme for awarding internal assessment: Continuous mode**

| <b>Theory</b>   |                      |          |
|---|----------------------|----------|
| <b>Criteria</b>   | <b>Maximum Marks</b> |          |
| Attendance (Refer Table – VI)   | 4                    | 2        |
| Academic activities (Average of any 3 activities e.g. quiz, assignment, open book test, field work, group discussion and seminar) | 3                    | 1.5      |
| Student – Teacher interaction   | 3                    | 1.5      |
| <b>Total</b>  | <b>10</b>            | <b>5</b> |
| <b>Practical</b>  |                      |          |
| Attendance (Refer Table – VI)   | 2                    |          |
| Based on Practical Records, Regular viva voce, etc.   | 3                    |          |
| <b>Total</b>  | <b>5</b>             |          |

**Table- VI: Guidelines for the allotment of marks for attendance**

| <b>Percentage of Attendance</b> | <b>Theory</b> | <b>Practical</b> |
|---------------------------------|---------------|------------------|
| 95 – 100                        | 4             | 2                |
| 90 – 94                         | 3             | 1.5              |
| 85 – 89                         | 2             | 1                |
| 80 – 84                         | 1             | 0.5              |
| Less than 80                    | 0             | 0                |

#### 11.2.1. Sessional Exams

Two Sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college(s). The scheme of question paper for theory and practical Sessional examinations is given below. The average marks of two Sessional exams shall be computed for internal assessment as per the requirements given in tables – X.

Sessional exam shall be conducted for 30 marks for theory and shall be computed for 15 marks. Similarly Sessional exam for practical shall be conducted for 40 marks and shall be computed for 10 marks.

### Question paper pattern for theory Sessional examinations for subjects having University examination

|   |          |                 |
|---|----------|-----------------|
| I. Multiple Choice Questions (MCQs) OR                      | =        | 10 x 1 = 10     |
| Objective Type Questions (5 x 2) (Answer all the questions) | =        | 05 x 2 = 10     |
| I. Long Answers (Answer 1 out of 2)                         | =        | 1 x 10 = 10     |
| II. Short Answers (Answer 2 out of 3)                       | =        | 2 x 5 = 10      |
|   |          | -----           |
| <b>Total</b>  | <b>=</b> | <b>30 marks</b> |

### For subjects having Non University Examination

|                                       |          |                 |
|---------------------------------------|----------|-----------------|
| I. Long Answers (Answer 1 out of 2)   | =        | 1 x 10 = 10     |
| II. Short Answers (Answer 4 out of 6) | =        | 4 x 5 = 20      |
|                                       |          | -----           |
| <b>Total</b>                          | <b>=</b> | <b>30 marks</b> |
|                                       |          | -----           |

### Question paper pattern for practical sessional examinations

|                 |          |                 |
|-----------------|----------|-----------------|
| I. Synopsis     | =        | 10              |
| II. Experiments | =        | 25              |
| III. Viva voce  | =        | 05              |
|                 |          | -----           |
| <b>Total</b>    | <b>=</b> | <b>40 marks</b> |
|                 |          | -----           |

### 1. Promotion and award of grades

A student shall be declared PASS and eligible for getting grade in a course of B.Pharm. program if he/she secures at least 50% marks in that particular course including internal assessment. For example, to be declared as PASS and to get grade, the student has to secure a minimum of 50 marks for the total of 100 including continuous mode of assessment and end semester theory examination and has to secure a minimum of 25 marks for the total 50 including internal assessment and end semester practical examination.

### 2. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified in 12, then he/she shall reappear for the end semester examination of that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/her on passing.

### 3. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.



#### 4. Re-examination of end semester examinations

Reexamination of end semester examination shall be conducted as per the schedule given in table VII. The exact dates of examinations shall be notified from time to time.

**Table-VII: Tentative schedule of end semester examinations**

| Semester            | For Regular Candidates | For Failed Candidates |
|---------------------|------------------------|-----------------------|
| I, III, V and VII   | November / December    | May / June            |
| II, IV, VI and VIII | May / June             | November / December   |

#### Question paper pattern for end semester theory

##### examinations For 75 marks paper

|  |   |        |    |            |
|--|---|--------|----|------------|
| I. Multiple Choice Questions (MCQs)    | = | 20 x 1 | =  | 20         |
| OR                                     |   |        | OR |            |
| Objective Type Questions (10 x 2)      | = | 10 x 2 | =  | 20         |
| (Answer all the questions)             |   |        |    |            |
| II. Long Answers (Answer 2 out of 3)   | = | 2 x 10 | =  | 20         |
| III. Short Answers (Answer 7 out of 9) | = | 7 x 5  | =  | 35         |
| Total                                  |   |        |    | = 75 marks |

##### For 50 marks paper

|                                       |   |        |   |            |
|---------------------------------------|---|--------|---|------------|
| I. Long Answers (Answer 2 out of 3)   | = | 2 x 10 | = | 20         |
| II. Short Answers (Answer 6 out of 8) | = | 6 x 5  | = | 30         |
| Total                                 |   |        |   | = 50 marks |

##### For 35 marks paper

|                                       |   |        |   |            |
|---------------------------------------|---|--------|---|------------|
| I. Long Answers (Answer 1 out of 2)   | = | 1 x 10 | = | 10         |
| II. Short Answers (Answer 5 out of 7) | = | 5 x 5  | = | 25         |
| Total                                 |   |        |   | = 35 marks |

#### Question paper pattern for end semester practical examinations

|                 |   |    |
|-----------------|---|----|
| I. Synopsis     | = | 5  |
| II. Experiments | = | 25 |
| III. Viva voce  | = | 5  |

Total = 35 marks

## 10. Academic Progression:

No student shall be admitted to any examination unless he/she fulfills the norms given in 6. Academic progression rules are applicable as follows:

A student shall be eligible to carry forward all the courses of I, II and III semesters till the IV semester examinations. However, he/she shall not be eligible to attend the courses of V semester until all the courses of I and II semesters are successfully completed.

A student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of I, II, III and IV semesters are successfully completed.

A student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of I, II, III, IV, V and VI semesters are successfully completed.

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to VIII semesters within the stipulated time period as per the norms specified in 26.

A lateral entry student shall be eligible to carry forward all the courses of III, IV and V semesters till the VI semester examinations. However, he/she shall not be eligible to attend the courses of VII semester until all the courses of III and IV semesters are successfully completed.

A lateral entry student shall be eligible to carry forward all the courses of V, VI and VII semesters till the VIII semester examinations. However, he/she shall not be eligible to get the course completion certificate until all the courses of III, IV, V and VI semesters are successfully completed.

A lateral entry student shall be eligible to get his/her CGPA upon successful completion of the courses of III to VIII semesters within the stipulated time period as per the norms specified in 26.

Any student who has given more than 4 chances for successful completion of I / III semester courses and more than 3 chances for successful completion of II / IV semester courses shall be permitted to attend V / VII semester classes ONLY during the subsequent academic year as the case may be. In simpler terms there shall NOT be any ODD BATCH for any semester.

Note: Grade AB should be considered as failed and treated as one head for deciding academic progression. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

## 17. Grading of performances

### Letter grades and grade points allocations:

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table – VIII.

**Table – VIII: Letter grades and grade points equivalent to Percentage of marks and performances**

| Percentage of Marks Obtained | Letter Grade | Grade Point | Performance |
|------------------------------|--------------|-------------|-------------|
| 90.00 – 100                  | O            | 10          | Outstanding |
| 80.00 – 89.99                | A            | 9           | Excellent   |
| 70.00 – 79.99                | B            | 8           | Good        |
| 60.00 – 69.99                | C            | 7           | Fair        |
| 50.00 – 59.99                | D            | 6           | Average     |
| Less than 50                 | F            | 0           | Fail        |
| Absent                       | AB           | 0           | Fail        |

A learner who remains absent for any end semester examination shall be assigned a letter grade of A Band a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

### 18. The Semester grade point average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses(Theory/Practical) in a semester with credits C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>, C<sub>4</sub> and C<sub>5</sub> and the student's grade points in these courses are G<sub>1</sub>, G<sub>2</sub>, G<sub>3</sub>, G<sub>4</sub> and G<sub>5</sub>, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$SGPA = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * ZERO + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

### 17. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VIII semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VIII semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4 + C_5S_5 + C_6S_6 + C_7S_7 + C_8S_8}{C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8}$$

where  $C_1, C_2, C_3, \dots$  is the total number of credits for semester I, II, III,  $\dots$  and  $S_1, S_2, S_3, \dots$  is the SGPA of semester I, II, III,  $\dots$

### 19. Declaration of class

The class shall be awarded on the basis of CGPA as follows: First

|                        |                          |
|------------------------|--------------------------|
| Class with Distinction | = CGPA of 7.50 and above |
| First Class            | = CGPA of 6.00 to 7.49   |
| Second Class           | = CGPA of 5.00 to 5.99   |

### 20. Project work

All the students shall undertake a project under the supervision of a teacher and submit a report.

The area of the project shall directly relate any one of the elective subject opted by the student in semester VIII. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of five students). The projects shall be evaluated as per the criteria given below.

#### Evaluation of Dissertation Book:

|                               |          |
|-------------------------------|----------|
| Objective(s) of the work done | 15 Marks |
| Methodology adopted           | 20 Marks |
| Results and Discussions       | 20 Marks |
| Conclusions and Outcomes      | 20 Marks |

Total 75 Marks

#### Evaluation of Presentation:

|                            |          |
|----------------------------|----------|
| Presentation of work       | 25 Marks |
| Communication skills       | 20 Marks |
| Question and answer skills | 30 Marks |

Total 75 Marks

*Explanation:* The 75 marks assigned to the dissertation book shall be same for all the students in a group. However, the 75 marks assigned for presentation shall be awarded based on the performance of individual students in the given criteria.

## **21. Industrial training (Desirable)**

Every candidate shall be required to work for at least 150 hours spread over four weeks in a Pharmaceutical Industry/Hospital. It includes Production unit, Quality Control department, Quality Assurance department, Analytical laboratory, Chemical manufacturing unit, Pharmaceutical R&D, Hospital (Clinical Pharmacy), Clinical Research Organization, Community Pharmacy, etc. After the Semester – VI and before the commencement of Semester – VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

## **22. Practice School**

In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time.

At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college level and grade point shall be awarded.

## **23. Award of Ranks**

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more courses during the B.Pharm program shall not be eligible for award of ranks. Moreover, the candidates should have completed the B. Pharm program in minimum prescribed number of years, (four years) for the award of Ranks.

## **24. Award of degree**

Candidates who fulfill the requirements mentioned above shall be eligible for award of degree during the ensuing convocation.

## **25. Duration for completion of the program of study**

The duration for the completion of the program shall be fixed as double the actual duration of the program and the students have to pass within the said period, otherwise they have to get fresh Registration.

## **26. Re-admission after break of study**

Candidate who seeks re-admission to the program after break of study has to get the approval from the university by paying a condonation fee.

No condonation is allowed for the candidate who has more than 2 years of break upper period and he/she has to rejoin the program by paying the required fees.



## CHAPTER - II: SYLLABUS

### Semester I

#### BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

45 Hours

**Scope:** This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

**Objectives:** Upon completion of this course the student should be able to

1. Explain the gross morphology, structure and functions of various organs of the humanbody.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

#### Course Content:

##### Unit I

10 hours

- **Introduction to human body**

Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

- **Cellular level of organization**

Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

- **Tissue level of organization**

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

##### Unit II

10 hours

- **Integumentary system**

Structure and functions of skin

- **Skeletal system**

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system

Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

- **Joints**



Structural and functional classification, types of joints movements and its articulation

**Unit III**

**10 hours**

- **Body fluids and blood**

- Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.

- **Lymphatic system**

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

**Unit IV**

**08 hours**

**Peripheral nervous system:**

Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.

Origin and functions of spinal and cranial nerves.

- **Special senses**

Structure and functions of eye, ear, nose and tongue and their disorders.

**Unit V**

**07 hours**

- **Cardiovascular system**

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

**BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)****4 Hours/week**

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

**Recommended Books (Latest Editions)**

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brother's medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA
4. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
  - i) Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
6. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
7. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

**Reference Books (Latest Editions)**

1. Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg,

**BP102T. PHARMACEUTICAL ANALYSIS (Theory)****45 Hours**

**Scope:** This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

**Objectives:** Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations
- develop analytical skills

**Course Content:****UNIT-I****10 Hours**

- (a) **Pharmaceutical analysis-** Definition and scope
- i) Different techniques of analysis
  - ii) Methods of expressing concentration
  - iii) Primary and secondary standards.
  - iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate
- (b) **Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures
- (c) **Pharmacopoeia,** Sources of impurities in medicinal agents, limit tests.

**UNIT-II****10 Hours**

- **Acid base titration:** Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
- **Non aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

**UNIT-III****10 Hours**

- **Precipitation titrations:** Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.
- **Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.
- **Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.
- Basic Principles, methods and application of diazotisation titration.

## UNIT-IV

08 Hours

### Redox titrations

- (a) Concepts of oxidation and reduction
- (b) Types of redox titrations (Principles and applications)

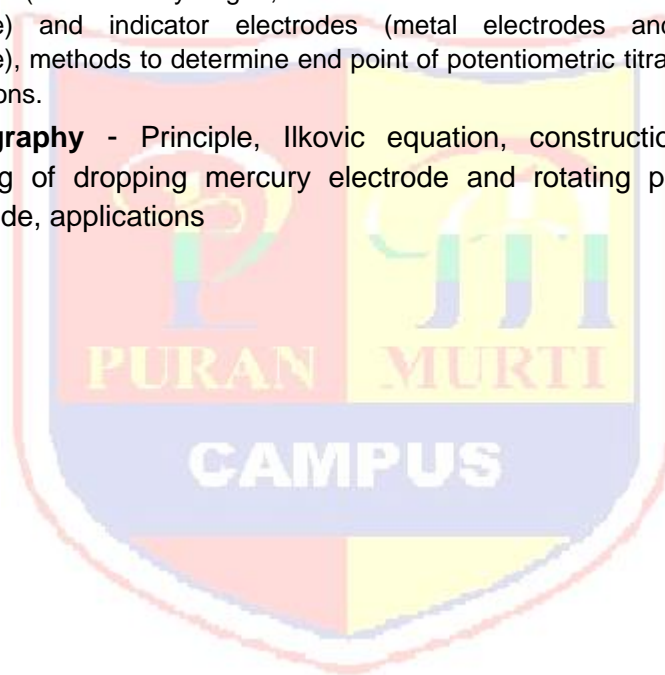
Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

## UNIT-V

07 Hours

- **Electrochemical methods of analysis**

- **Conductometry**- Introduction, Conductivity cell, Conductometric titrations, applications.
- **Potentiometry** - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.
- **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications



## BP108P. PHARMACEUTICAL ANALYSIS (Practical)

4 Hours / Week

- I Limit Test of the following
- (1) Chloride
  - (2) Sulphate
  - (3) Iron
  - (4) Arsenic
- II Preparation and standardization of
- (1) Sodium hydroxide
  - (2) Sulphuric acid
  - (3) Sodium thiosulfate
  - (4) Potassium permanganate
  - (5) Ceric ammonium sulphate
- III Assay of the following compounds along with Standardization of Titrant
- (1) Ammonium chloride by acid base titration
  - (2) Ferrous sulphate by Cerimetry
  - (3) Copper sulphate by Iodometry
  - (4) Calcium gluconate by complexometry
  - (5) Hydrogen peroxide by Permanganometry
  - (6) Sodium benzoate by non-aqueous titration
  - (7) Sodium Chloride by precipitation titration
- IV Determination of Normality by electro-analytical methods
- (1) Conductometric titration of strong acid against strong base
  - (2) Conductometric titration of strong acid and weak acid against strong base
  - (3) Potentiometric titration of strong acid against strong base

### Recommended Books: (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia.

## BP103T. PHARMACEUTICS- I (Theory)

45 Hours

**Scope:** This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

**Objectives:** Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

### Course Content:

#### UNIT – I

10 Hours

- **Historical background and development of profession of pharmacy:** History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.
- **Dosage forms:** Introduction to dosage forms, classification and definitions
- **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.
- **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

#### UNIT – II

10 Hours

- **Pharmaceutical calculations:** Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.
- **Powders:** Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.
- **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

#### UNIT – III

08 Hours

- **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- Biphasic liquids:
- **Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.



- **Emulsions:** Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

#### UNIT – IV

**08 Hours**

- **Suppositories:** Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
- **Pharmaceutical incompatibilities:** Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

#### UNIV – V

**07 Hours**

- **Semisolid dosage forms:** Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms



## **BP109P. PHARMACEUTICSI (Practical)**

### **1. Syrups**

**3Hours / week**

- a) Syrup IP'66
- b) Compound syrup of Ferrous Phosphate BPC'68

### **2.Elixirs**

- a) Piperazine citrate elixir
- b) Paracetamol pediatric elixir

### **3.Linctus**

- a) Terpin Hydrate Linctus IP'66
- b) Iodine Throat Paint (Mandles Paint)

### **4. Solutions**

- a) Strong solution of ammonium acetate
- b) Cresol with soap solution
- c) Lugol's solution

### **5. Suspensions**

- a) Calamine lotion
- b) Magnesium Hydroxide mixture
- c) Aluminium Hydroxide gel

### **6. Emulsions**

- a) Turpentine Liniment
- b) Liquid paraffin emulsion

### **7. Powders and Granules**

- a) ORS powder (WHO)
- b) Effervescent granules
- c) Dusting powder
- d) Divided powders

### **8. Suppositories**

- a) Glycero gelatin suppository
- b) Cocoa butter suppository
- c) Zinc Oxide suppository

### **9. Semisolids**

- a) Sulphur ointment
- b) Non staining-iodine ointment with methyl salicylate
- c) Carbopal gel

## 10. Gargles and Mouthwashes

- a) Iodine gargle
- b) Chlorhexidine mouthwash

### Recommended Books: (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, LippincottWilliams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy, Lea & Febiger Publisher, the University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, LippincottWilliams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Françoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

**BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)****45 Hours****Scope:** This subject deals with the monographs of inorganic drugs and pharmaceuticals.**Objectives:** Upon completion of course student shall be able to

- know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
- understand the medicinal and pharmaceutical importance of inorganic compounds

**Course Content:****UNIT I****10 Hours**

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate

**General methods of preparation**, assay for the compounds superscripted with **asterisk (\*)**, properties and medicinal uses of inorganic compounds belonging to the following classes

**UNIT II****10 Hours**

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride\*, Potassium chloride, Calcium gluconate\* and Oral Rehydration Salt (ORS), Physiological acid base balance.
- **Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

**UNIT III****10 Hours**

- **Gastrointestinal agents**
  - Acidifiers:** Ammonium chloride\* and Dil. HCl
  - Antacid:** Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate\*, Aluminum hydroxide gel, Magnesium hydroxide mixture
  - Cathartics:** Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite
  - Antimicrobials:** Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide\*, Chlorinated lime\*, Iodine and its preparations

## UNIT IV

08 Hours

- **Miscellaneous compounds**

**Expectorants:** Potassium iodide, Ammonium chloride\*

**.Emetics:** Copper sulphate\*, Sodium potassium tartarate

**Haematinics:** Ferrous sulphate\*, Ferrous gluconate

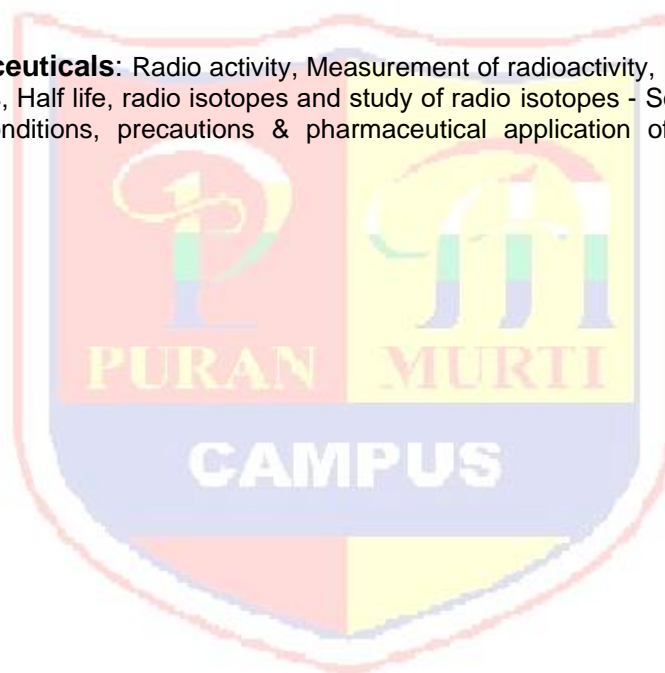
**Poison and Antidote:** Sodium thiosulphate\*, Activated charcoal, Sodium nitrite<sup>333</sup>

**Astringents:** Zinc Sulphate, Potash Alum

## UNIT V

07 Hours

- **Radiopharmaceuticals:** Radio activity, Measurement of radioactivity, Properties of  $\alpha$ ,  $\beta$ ,  $\gamma$  radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide  $I^{131}$ , Storage conditions, precautions & pharmaceutical application of radioactive substances.



## BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)

4 Hours / Week

### I Limit tests for following ions

Limit test for Chlorides and Sulphates Modified  
limit test for Chlorides and Sulphates  
Limit test for Iron  
Limit test for Heavy metals  
Limit test for Lead  
Limit test for arsenic

### II Identification test

Magnesium hydroxide  
Ferrous sulphate  
Sodium bicarbonate  
Calcium gluconate  
Copper sulphate

### III Test for purity

Swelling power of Bentonite  
Neutralizing capacity of aluminum hydroxide gel  
Determination of potassium iodate and iodine in potassium  
Iodide  
IV Preparation of inorganic pharmaceuticals  
Boric acid Potash  
alum Ferrous  
sulphate

### Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4<sup>th</sup> edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3<sup>rd</sup> Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia



**BP105T.COMMUNICATION SKILLS (Theory)****30 Hours**

**Scope:** This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

**Objectives:**

Upon completion of the course the student shall be able to

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

**Course content:****UNIT – I****07 Hours**

- **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
- **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers
- **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

**UNIT – II****07 Hours**

- **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication
- **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

### UNIT – III

**07 Hours**

- **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
- **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
- **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

### UNIT – IV

**05 Hours**

- **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview
- **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

### UNIT – V

**04 Hours**

- **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion



## **BP111P.COMMUNICATION SKILLS (Practical)**

**2 Hours / week**

The following learning modules are to be conducted using Wordsworth® English language lab software

### **Basic communication covering the following topics**

Meeting People

Asking Questions

Making Friends

What did you do?

Do's and Don't's

### **Pronunciations covering the following**

**topics** Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

### **Advanced Learning**

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette

Presentation Skills

### **Recommended Books: (Latest Edition)**

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2<sup>nd</sup> Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1<sup>st</sup> Edition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1<sup>st</sup> Edition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1<sup>st</sup> Edition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, GopalaSwamy

- Ramesh, 5<sup>th</sup>Edition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Greenhall, 1st Edition Universe of Learning LTD, 2010
  7. Communication skills for professionals, Konar nira, 2<sup>nd</sup>Edition, New arrivals – PHI, 2011
  8. Personality development and soft skills, Barun K Mitra, 1<sup>st</sup>Edition, Oxford Press,2011
  9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd,2011
  10. Soft skills and professional communication, Francis Peters SJ, 1<sup>st</sup>Edition, Mc GrawHill Education, 2011
  11. Effective communication, John Adair, 4<sup>th</sup>Edition, Pan Mac Millan,2009
  12. Bringing out the best in people, Aubrey Daniels, 2<sup>nd</sup>Edition, Mc Graw Hill, 1999



## BP 106RBT.REMEDIAL BIOLOGY (Theory)

**30 Hours**

**Scope:** To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

**Objectives:** Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human

### UNIT I

**07 Hours**

#### Living world:

- Definition and characters of living organisms
- Diversity in the living world
- Binomial nomenclature
- Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,

#### Morphology of Flowering plants

- Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
- General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledones.

### UNIT II

**07 Hours**

#### Body fluids and circulation

- Composition of blood, blood groups, coagulation of blood
- Composition and functions of lymph
- Human circulatory system
- Structure of human heart and blood vessels
- Cardiac cycle, cardiac output and ECG

#### Digestion and Absorption

- Human alimentary canal and digestive glands
- Role of digestive enzymes
- Digestion, absorption and assimilation of digested food

#### Breathing and respiration

- Human respiratory system
- Mechanism of breathing and its regulation
- Exchange of gases, transport of gases and regulation of respiration
- Respiratory volumes

### UNIT III

07 Hours

#### Excretory products and their elimination

- Modes of excretion
- Human excretory system- structure and function
- Urine formation
- Rennin angiotensin system

#### Neural control and coordination

- Definition and classification of nervous system
- Structure of a neuron
- Generation and conduction of nerve impulse
- Structure of brain and spinal cord
- Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

#### Chemical coordination and regulation

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

#### Human reproduction

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

### UNIT IV

05 Hours

#### Plants and mineral nutrition:

- Essential mineral, macro and micronutrients
- Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

#### Photosynthesis

- Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

### UNIT V

04 Hours

#### Plant respiration: Respiration, glycolysis, fermentation (anaerobic).

#### Plant growth and development

- Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators

#### Cell - The unit of life

- Structure and functions of cell and cell organelles. Cell division

#### Tissues

- Definition, types of tissues, location and functions.

#### Text Books

- a. Text book of Biology by S. B. Gokhale
- b. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

#### Reference Books

- a. A Text book of Biology by B.V. Sreenivasa Naidu
- b. A Text book of Biology by Naidu and Murthy



- c. Botany for Degree students By A.C.Dutta.
- d. Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthkrishnan.
- e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

### **BP112RBP.REMEDIAL BIOLOGY (Practical)**

**30 hrs**

1. Introduction to experiments in biology
  - a) Study of Microscope
  - b) Section cutting techniques
  - c) Mounting and staining
  - d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root, Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

#### **Reference Books**

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum .Biology forum of Karnataka. Prof .M.J.H.Shafi

## BP 106 RMT.REMEDIAL MATHEMATICS (Theory)

**30 Hours**

**Scope:** This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

**Objectives:** Upon completion of the course the student shall be able to:-

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

### Course Content:

#### UNIT – I

**06 Hours**

- **Partial fraction**

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

- **Logarithms**

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

- **Function:**

Real Valued function, Classification of real valued functions,

- **Limits and continuity :**

Introduction, Limit of a function, Definition of limit of a function

#### UNIT –II

**06 Hours**

- **Matrices and Determinant:**

Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants, Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix, Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations

#### UNIT – III

**06 Hours**

- **Calculus**

**Differentiation :** Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of  $x^n$  w.r.t.x, where  $n$  is any rational number,

Derivative of  $e^x$ , Derivative of  $\log_e x$ , Derivative of  $a^x$ , Derivative of trigonometric functions from first principles (**without Proof**), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

**UNIT – IV****06 Hours****• Analytical Geometry**

**Introduction:** Signs of the Coordinates, Distance formula,

**Straight Line :** Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

**Integration:**

Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

**UNIT-V****06 Hours**

- **Differential Equations :** Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**
- **Laplace Transform :** Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

**Recommended Books (Latest Edition)**

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa G and D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S.Grewal