M.Pharm.Semester-I to IV
(Pharmacutical Chemistry)

Prospectus No. 20151430

# संत गाडगे बाबा अमरावती विद्यापीठ

**SANT GADGE BABA AMRAVATI UNIVERSITY**

## आयुर्विज्ञान विद्याशाखा

**(FACULTY OF MEDICINE)**

## अभ्यासक्रमिका

## औषधिनिर्माण पदव्युत्तर परीक्षा

**सत्र-१ व ३, हिवाळी-२०१४ व सत्र-२ व ४, उन्हाळी-२०१५**

## PROSPECTUS

OF

MASTER OF PHARMACY (PHARMACEUTICAL CHEMISTRY)
EXAMINATIONS

SEMESTER-I & III, WINTER-2014

SEMESTER-II & IV, SUMMER-2015

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**M.Pharm. (Pharmaceutical Chemistry)**
**Semester-I & IV**
**(Prospectus No.20151430)**


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**SANT GADGE BABA AMRAVATI UNIVERSITY**
**SPECIAL NOTE FOR INFORMATION OF THE STUDENTS**

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects, papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc. refer the University Ordinance Booklet the various conditions/provisions pertaining to examinations as prescribed in the following Ordinances-

| | | |
|---|---|---|
| Ordinance No. 1 | : | Enrolment of Students. |
| Ordinance No.2 | : | Admission of Students |
| Ordinance No. 4 | : | National Cadet Corps |
| Ordinance No. 6 | : | Examination in General (relevant extracts) |
| Ordinance No. 18/2001 | : | An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001. |
| Ordinance No.9 | : | Conduct of Examinations (Relevant extracts) |
| Ordinance No.10 | : | Providing for Exemptions and Compartments |
| Ordinance No. 19 | : | Admission of Candidates to Degrees |



| | | |
|---|---|---|
| Ordinance No.109 | : | Recording of a change of name of a University Student in the records of the University |
| Ordinance No. 6/2008 | : | For improvement of Division/Grade. |
| Ordinance No.19/2001 | : | An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001. |

**Dineshkumar Joshi**
Registrar
Sant Gadge Baba Amravati University

**SANT GADGE BABA AMRAVATI UNIVERSITY**

**DIRECTION**

**NO. 12 / 2013** **Dated : 14/06/2013**

**Subject : Examinations Leading to the Degree of भेषजी पारंगत (Master of Pharmacy) (Two year - Four Semester Degree Course) (Credit Grade Based System), Direction, 2013.**

Whereas, Direction No.22 of 2010 in respect of Examinations Leading to the **भेषजी पारंगत** (Master of Pharmacy) (Two year - Four Semester Degree Course), Direction 2010 is in existence in the University.

AND

Whereas, the above Direction was corrected vide Direction Nos.9/ 2011, 5/2012, 26/2012.

AND

Whereas, the aforesaid Directions are related to semester pattern and credit grade system. The credit grade system is provided in above directions on the base of the marking system.

AND

Whereas, all above Directions are still to be converted into respective Ordinance.

AND

Whereas, the B.O.S. in Pharmaceutical Sciences in its meeting held on 27.8.2012, reviewed the above Directions and recommended the fresh revised draft schemes of teaching and examinations along with other details, and credit system on teaching hours basis with some necessary additions/deletions in the provisions of above direction.

AND

Whereas, while considering the revised schemes and provisions, the B.O.S. recommended that the paper titles and syllabus be kept as it is.

AND

Whereas, the faculty of Medicine in its meeting held on 2.3.2013 has accepted the above recommendations of the B.O.S. and recommended to the Academic Council with some corrections.

AND

Whereas, the Academic Council in its meeting held on 18.4.2013 vide item No.24 3) A) R-3 accepted the recommendations of the faculty of Medicine to be implemented for Summer-2013 examinations of regular students of M.Pharm. Semester-II & IV, and from Academic Session 2013-



14 & onwards for all semesters of M.Pharm. and resolved to refer the Draft Schemes of teaching and examinations alongwith other related provisins, and Draft Ordinance to the Ordinance Committee for framing Ordinance/ Regulation for placing it directly before Management Council.

AND

Whereas, the Summer-2013 examinations are already in process and the Academic Session 2013-14 is commencing from June, 2013.

AND

Whereas, the above revised schemes and provisions are to be implemented instead of the provisions of Direction Nos. 22 of 2010, 9/ 2011, 5/2012 & 26/2012.

AND

Whereas, the above revised schemes and provisions are to be regulated by framing the Ordinance.

AND

Whereas, making of Ordinance is a time consuming process.

Now, therefore, I, Dr.Mohan K.Khedkar, Vice-Chancellor, Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of Section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under-

1. This Direction may be called ñExaminations Leading to the Degree of **भेषजी पारंगत** (Master of Pharmacy) (Two year - four Semester Degree Course) (Credit Grade Based System), Direction, 2013ò.
2. This Direction shall come into force from-
   i) Summer-2013 Examination for M.Pharm. Semester-II & IV.
   ii) Academic Session 2013-14 & onwards for M.Pharm. Semester-I to IV.
3. In this Direction unless the context otherwise requires the expression ñDepartmentò shall mean the Department of Pharmaceutical Sciences and ñCollegeò shall mean affiliated college approved for conducting M.Pharm. course.
4. The several courses leading to the Degree of **भेषजी पारंगत** (Master of Pharmacy) shall be as follows :
   I) Pharmaceutics
   II) Pharmaceutical Chemistry
   III) Pharmacology
   IV) Pharmacognosy & Phytochemistry
   V) Biotechnology
   VI) Quality Assurance
   VII) Industrial Pharmacy
   VIII) Bio pharmaceutics

5. There shall be four examinations leading to the Degree of भेषजी पारंगत (Master of Pharmacy) namely the first semester examination at the end of first semester, second semester examination at the end of second semester, third semester examination at the end of third semester and Final semester examination at the end of fourth semester in each of the courses specified in paragraph 4 above. The duration of the course shall be of two Academic years (consisting of two semesters in each year). The supplementary examination shall be held for all semesters of M.Pharm. examinations for FF grade examinees.

6. The duration of each semester shall be of six months.

7. The Master of Pharmacy First, Third Semester Examination shall be held in winter, and the Second and Fourth semester examination in summer at such places and on such dates as may be fixed by the Borad of Examinations. Subject to the compliance with the provisions of this Direction and of other ordinances in force from time to time, an applicant for admission to -

   A) Semester-I of First M.Pharm. shall have passed not less than one academic year previously the B.Pharm. examination of this University or of any other university recognised as equivalent thereto and shall have prosecuted a regular course of study in the department/college as prescribed in this Direction.

   Provided that, the first Semester examinee shall have passed the final B.Pharm. examination by securing not less than 45% marks or its equivalent grade point in C.G.P.A. for SC/ST category and 50% marks or its equivalent grade point in C.G.P.A. for others.ò

   B) The Final M.Pharm. (Semester-III & IV) Examinee shall have satisfactorily completed Ist and IInd Semester i.e. the First M.Pharm. Examination of this university, and shall have prosecuted a regular course of study in the Department/College as prescribed in this Direction. An applicant for the examination to the Final M.Pharm. (Semester-III & IV) shall not be allowed to take the examination if he/she fails to submit his/her dissertation on or before the 20th December or 31st May of the calendar year in which he/she has to take the examination.

8. A) Without prejudice to the other provisions of Ordinance No.6 relating to the examination in general, the provisions of paragraphs 5,8,10,26 and 31 of the said ordinance shall apply to every collegiate candidate.

   B) An unsuccessful examinee at the First M.Pharm. Examination (Semester-I & II), may be allowed to carry out his research work for dissertation for Final M.Pharm. (Semester-III & IV) Examination and be permitted to appear for the Semester-IV of



M.Pharm. Examination. But his/her result of Semester-IV shall not be declared till he/she clears all lower semester examinations.

9. The fee for each examination shall be as prescribed by the University from time to time.

10. The scheme of teaching and credits to be given with maximum marks allotted to each subject and the sessionals, papers, practicals, dissertation, and viva-voce, and seminars if any, in which a candidate is to be examined, and the minimum marks which an examinee must obtain in order to pass the examination and computation of S.G.P.A. and C.G.P.A., shall be as indicated in the **Annexures-I to IX** appended with this Direction.

11. (i) The scope of the subject shall be as indicated in the syllabus.
    (ii) The medium of instructions and examinations shall be in English.

12. An examinee passing in a subject or a part thereof, shall be exempted from appearing in that subject at all subsequent examinations.

13. An applicant for admission to an examination shall satisfy the Head of the Department /Principal in the Terminal and other Tests conducted during the academic year regarding his suitability to take the examination.

14. The Head/ Principal shall maintain in his office a complete record of marks obtained by the candidate in the sessionals. He shall send it to the Controller of Examinations in a sealed cover the final marks in sessional examination obtained by every applicant.

15. In order to pass an examination, an examinee shall obtain not less than 50% of the total marks allotted to each written paper/practical and its respective sessional examination taken together as shown concerned annexures.

16. If a student fails in an examination his/her marks of Internal/ Sessional Assessment of Theory of the examination shall be carried over for the next examination. However, he can give a declaration to the effect that his Internal/Sessional Assessment marks of the Theory should not be counted and his/her marks in the Theory shall be only on the basis of external examination.

17. Improvement of Internal Assessment :-

- If a **Ex-student** desires for improvement of internal assessment of theory/practical, he may reappear for an examination and fresh marks for internal assessment will be considered. There is only one chance to appear for improvement of internal assessment examination for internal theory/practical subject after fail in the regular examination only.

- Examination of the subject head ñProject and the Seminarsò will be conducted by the institute. The criteria for marks distribution is specified in the scheme of examination. The institute must submit the marks awarded in the Project report and in Seminar to the Controller of Examination along with the periodic test marks (i.e. internal assessment marks). Once the candidate has passed in the subject head ñProject report and seminar,ò the candidate will not be allowed to reappear for examination in this subject head.

18. i) An examinee for the Third and fourth semester of final year M.Pharm. examination shall carry out research for not less than six months under regular faculty guide who shall be the internal examiner. A person from industry or Research Institute possessing Post-Graduate qualification in Pharmaceutical Science in appropriate subject and not less than 5 yrs. experience in an industry or Research Institute in a responsible capacity may also be considered for appointment as Guide/Co-guide/ Internal/Extermal examiner.

ii) The examinee shall submit three copies of his dissertation to the Head of the Department/Principal of the college not later than 30th December or 31st May of the calender year in which he/she has to take the examination, duly certified by the guide that the work has been done satisfactorily under his guidance. The Principal of concerned college shall submit the copies of dissertation within 15 days to the University.

iii) a) The examination based on the dissertation shall be carried out by
   i) The Guide as Internal Examiner and
   ii) One External Examiner out of University area

b) The examiners may after conducting the seminar, dissertation work and viva-voce examination shall award the marks, out of the marks prescribed for dissertation. In case of any dispute, the decision of the External examiner shall be final. The marks shall be sealed under the signature of the External examiner & shall be handed over to the Principal for sending it to the University

c) If the dissertation is not found upto the mark & if the candidate fails in the dissertation, the External examiner shall give his suggestions / recommendations for re-submission / modification in the dissertation to the Principal along with a copy to the Controller of Examination of University for information.



iv) An examinee who fails to submit his/her dissertation within the prescribed date or whose dissertation has not been accepted or fails to present himself for Viva-voce, may subject to other provisions of this Direction be readmitted to the examination at any subsequent examination provided that,
   a) he/she pay the fees as prescribed by the University
   b) his/her application is received by the Registrar not later than one month before the date of commencement of the examination.
   c) he/she submits his dissertation on the same subject two weeks prior to the examination date. Examinee whose dissertation has not been accepted shall resubmit his/her work, with such additional work as may be directed at the next examination. However, an examinee wishing to submit dissertation on a fresh subject shall be required to join the department/college as a regular student.

19. As soon as possible after examinations the Board of Examinations shall publish result of the examinees and the branchwise merit list shall be notified as provided in Ordinance No.6.

20. Examinees who have passed in all the subjects prescribed for the first Year (semester I and semester II) and final M. Pharm. (Semester III and Semester IV) examinations shall be eligible for the award of degree of Master of Pharmacy.

21. Provision of Ordinance no. 18 of 2001 relating to ñAn ordinance to provide grace marks for passing in a Head of passing and improvement of division (Higher Class) and getting distinction in the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute No.18ò shall apply to the examinations under this Direction.

22. An examinee who does not pass or who fails to present himself/herself for the examination shall be eligible for admission to the same examination on payment of a fresh fee and such other fees as may be prescribed.
   i) A candidate who has passed the M. Pharm. Examination in any course specified in paragraph 4 may offer himself/herself in any other course as a candidate for the M. Pharm. Examination. Such a candidate may be exempted from appearing in papers in which he/she has already passed under this Direction at the first semester examination, if there is equivalence in the syllabus. However he/she is required to appear for the Semester-II, III & IV of respective specialization.
   ii) An examinee passing the examination under subparagraph (i) shall not be eligible for inclusion of his name in Merit List.

23. The Ordinance No.6 of 2008 regarding Improvement of Division / Grade shall be applicable to the examinees under this Direction.

24. Notwithstanding anything to the contrary in this Direction, no person shall be admitted to an examination under this Direction if he has already passed the same examination in the course or an equivalent examination of any other statutory University.

25. The Degree in the prescribed form shall be signed by the Vice-Chancellor.

26. The provisions and schemes provided under the Direction Nos. 22/ 2010, 9/2011, 5/2012 & 26/2012 shall stand cancelled after enforcement of this Direction.

Sd/-
(Dr.M.K.Khedkar)
Vice-Chancellor,
Sant Gadge Baba Amravati University,
Amravati

Dated : 13/6/2013

*****

**Annexure-I**

**Sant Gadge Baba Amravati University**

**Scheme of Teaching and Examination as per Semester Pattern for M.PHARM in PHARMACEUTICS (MPH)**

| Semester | Paper code | Title of paper | Scheme of Teaching in Hrs. per Week and Credit system | | Scheme of Internal Examination | | Scheme of External Examination | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lecture (Credits) | Practical (Credits) | Theory | Practical | Theory | | Practical | | Minimum Marks for Passing | | |
| | | | | | | | Hrs. | Marks | Hrs | Marks | Theory | Practical | |
| Semester-I | MC-101 | Research Methodology & Biostatistics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -102 | Biotechnology and Bioinformatics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -103 | Quality Control of Pharmaceutical Products | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -104 | Drug Regulatory Affairs | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC-105 | Product Development and Formulation | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC -106 | Laboratory course -1 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MC -107 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-II | MPH-201 | Novel Drug Delivery Systems | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPH-202 | Biopharmaceutics & Pharmacokinetics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPH-203 | Industrial Pharmacy | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPH-204 | Advanced Pharmaceutics & Cosmetology | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPH-205 | Selected Topics in Pharmaceutics | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPH-206 | Laboratory Course -2 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MPH-207 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-III | MPH-301 | Seminar on Research envisaged for dissertation | 04 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPH-302 | Seminar on recent trends in Pharmaceutical sciences | 04 Credits | | 60 | -- | | 90 | -- | | 75 | | 150 |
| | | **Total** | | | **100** | | | **150** | | | | | |
| Semester-IV | MPH-401 | Dissertation | 10 Credits | | 100 | -- | | 150 | -- | | 125 | | 250 |
| | MPH-402 | Seminar (on dissertation) | 02 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPH-403 | Viva-voce | | | -- | | | 100 | -- | | 50 | | 100 |
| | | **Total** | | | **140** | | | **310** | | | | | |
| GRAND TOTAL | | | | | | | | | | | | | 2000 |

MPH – M.Pharm. in Pharmaceutics

MC- M.Pharm. Common Paper

**Annexure-II**

**Sant Gadge Baba Amravati University**

**Scheme of Teaching and Examination as per Semester Pattern for M.PHARM in PHARMACOLOGY (MPL)**

| Semester | Paper code | Title of paper | Scheme of Teaching in Hrs. per Week and Credit system | | Scheme of Internal Examination | | Scheme of External Examination | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lecture (Credits) | Practical (Credits) | Theory | Practical | Theory | | Practical | | Minimum Marks for Passing | | |
| | | | | | | | Hrs. | Marks | Hrs | Marks | Theory | Practical | |
| Semester-I | MC-101 | Research Methodology & Biostatistics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -102 | Biotechnology and Bioinformatics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -103 | Quality Control of Pharmaceutical Products | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -104 | Drug Regulatory Affairs | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC-105 | Product Development and Formulation | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC -106 | Laboratory course -1 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MC -107 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-II | MPL-201 | Advanced Pharmacology and toxicology | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPL-202 | Advanced Clinical Pharmacokinetics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPL-203 | Topics in Pharmacology | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPL-204 | Biological evaluation Techniques | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPL-205 | Receptor in Pharmacology | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPL-206 | Laboratory Course -2 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MPL-207 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-III | MPL-301 | Seminar on Research envisaged for dissertation | 04 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPL-302 | Seminar on recent trends in Pharmaceutical sciences | 04 Credits | | 60 | -- | | 90 | -- | | 75 | | 150 |
| | | **Total** | | | **100** | | | **150** | | | | | |
| Semester-IV | MPL-401 | Dissertation | 10 Credits | | 100 | -- | | 150 | -- | | 125 | | 250 |
| | MPL-402 | Seminar (on dissertation) | 02 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPL-403 | Viva-voce | | | -- | | | 100 | -- | | 50 | | 100 |
| | | **Total** | | | **140** | | | **310** | | | | | |
| GRAND TOTAL | | | | | | | | | | | | | 2000 |

MPL – M.Pharm. in Pharmacology

MC- M.Pharm. Common Paper

**Annexure-III**

**Sant Gadge Baba Amravati University**

**Scheme of Teaching and Examination as per Semester Pattern for M.PHARM in PHARMACEUTICAL CHEMISTRY (MPC)**

| Semester | Paper code | Title of paper | Scheme of Teaching in Hrs. per Week and Credit system | | Scheme of Internal Examination | | Scheme of External Examination | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lecture (Credits) | Practical (Credits) | Theory | Practical | Theory | | Practical | | Minimum Marks for Passing | | |
| | | | | | | | Hrs. | Marks | Hrs | Marks | Theory | Practical | |
| Semester-I | MC-101 | Research Methodology & Biostatistics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -102 | Biotechnology and Bioinformatics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -103 | Quality Control of Pharmaceutical Products | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -104 | Drug Regulatory Affairs | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC-105 | Product Development and Formulation | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC -106 | Laboratory course -1 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MC -107 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-II | MPC-201 | Advanced Organic chemistry | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPC-202 | Advanced Medicinal chemistry | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPC-203 | Modern Analytical Techniques | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPC-204 | Rational Drug Design | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPC-205 | Chemistry of Natural Product | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPC-206 | Laboratory Course -2 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MPC-207 | Seminar ( 2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | **Total** | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-III | MPC-301 | Seminar on Research envisaged for dissertation | 04 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPC-302 | Seminar on recent trends in Pharmaceutical sciences | 04 Credits | | 60 | -- | | 90 | -- | | 75 | | 150 |
| | | | | | **100** | | | **150** | | | | | |
| Semester-IV | MPC-401 | Dissertation | 10 Credits | | 100 | -- | | 150 | -- | | 125 | | 250 |
| | MPC-402 | Seminar (on dissertation) | 02 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPC-403 | Viva-voce | | | -- | | | 100 | -- | | 50 | | 100 |
| | | **Total** | | | **140** | | | **310** | | | | | |
| GRAND TOTAL | | | | | | | | | | | | | 2000 |

MPC – M.Pharm. in Pharmaceutical Chemistry

MC- M.Pharm. Common Paper

**Annexure-IV**

**Sant Gadge Baba Amravati University**

**Scheme of Teaching and Examination as per Semester Pattern for M.PHARM in PHARMACOGNOSY & PHYTOCHEMISTRY (MPG)**

| Semester | Paper code | Title of paper | Scheme of Teaching in Hrs. per Week and Credit system | | Scheme of Internal Examination | | Scheme of External Examination | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lecture (Credits) | Practical (Credits) | Theory | Practical | Theory | | Practical | | Minimum Marks for Passing | | |
| | | | | | | | Hrs. | Marks | Hrs | Marks | Theory | Practical | |
| Semester-I | MC-101 | Research Methodology & Biostatistics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -102 | Biotechnology and Bioinformatics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -103 | Quality Control of Pharmaceutical Products | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -104 | Drug Regulatory Affairs | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC-105 | Product Development and Formulation | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC -106 | Laboratory course -1 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MC -107 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-II | MPG-201 | Phytotherapeutic Materials | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPG-202 | Herbal Drug Technology | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPG-203 | Cultivation of Medicinal Plants | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MPG-204 | Biogenesis and Chemistry of Natural Products | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPG-205 | Selected Topics in Pharmacognosy | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MPG-206 | Laboratory Course -2 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MPG-207 | Seminar ( 2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-III | MPG-301 | Seminar on Research envisaged for dissertation | 04 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPG-302 | Seminar on recent trends in Pharmaceutical sciences | 04 Credits | | 60 | -- | | 90 | -- | | 75 | | 150 |
| | | **Total** | | | **100** | | | **150** | | | | | |
| Semester-IV | MPG-401 | Dissertation | 10 Credits | | 100 | -- | | 150 | -- | | 125 | | 250 |
| | MPG-402 | Seminar (on dissertation) | 02 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MPG-403 | Viva-voce | | | -- | | | 100 | -- | | 50 | | 100 |
| | | **Total** | | | **140** | | | **310** | | | | | |
| GRAND TOTAL | | | | | | | | | | | | | 2000 |

MPG – M.Pharm. in Pharmacognosy

MC- M.Pharm. Common Paper

**Annexure-V**

**Sant Gadge Baba Amravati University**

**Scheme of Teaching and Examination as per Semester Pattern for M.PHARM in Industrial Pharmacy (MIP)**

| Semester | Paper code | Title of paper | Scheme of Teaching in Hrs. per Week and Credit system | | Scheme of Internal Examination | | Scheme of External Examination | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lecture (Credits) | Practical (Credits) | Theory | Practical | Theory | | Practical | | Minimum Marks for Passing | | |
| | | | | | | | Hrs. | Marks | Hrs | Marks | Theory | Practical | |
| Semester-I | MC-101 | Research Methodology & Biostatistics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -102 | Biotechnology and Bioinformatics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -103 | Quality Control of Pharmaceutical Products | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -104 | Drug Regulatory Affairs | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC-105 | Product Development and Formulation | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC -106 | Laboratory course -1 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MC -107 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-II | MIP-201 | Advanced Industrial Pharmacy-I | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MIP-202 | Advanced Industrial Pharmacy-II | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MIP-203 | Pharmaceutical Process Validations and Product Management | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MIP-204 | Selected Topics in Industrial Pharmacy-I | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MIP-205 | Selected Topics in Industrial Pharmacy-II | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MIP-206 | Laboratory Course -2 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MIP-207 | Seminar ( 2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-III | MIP-301 | Seminar on Research envisaged for dissertation | 04 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MIP-302 | Seminar on recent trends in Pharmaceutical sciences | 04 Credits | | 60 | -- | | 90 | -- | | 75 | | 150 |
| | | **Total** | | | **100** | | | **150** | | | | | |
| Semester-IV | MIP-401 | Dissertation | 10 Credits | | 100 | -- | | 150 | -- | | 125 | | 250 |
| | MIP-402 | Seminar (on dissertation) | 02 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MIP-403 | Viva-voce | | | -- | | | 100 | -- | | 50 | | 100 |
| | | **Total** | | | **140** | | | **310** | | | | | |
| GRAND TOTAL | | | | | | | | | | | | | 2000 |

MIP – M.Pharm. in Industrial Pharmacy

MC- M.Pharm. Common Paper

**Annexure-VI**

**Sant Gadge Baba Amravati University**

**Scheme of Teaching and Examination as per Semester Pattern for M.PHARM in Quality Assurance (MQA)**

| Semester | Paper code | Title of paper | Scheme of Teaching in Hrs. per Week and Credit system | | Scheme of Internal Examination | | Scheme of External Examination | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lecture (Credits) | Practical (Credits) | Theory | Practical | Theory | | Practical | | Minimum Marks for Passing | | |
| | | | | | | | Hrs. | Marks | Hrs | Marks | Theory | Practical | |
| Semester-I | MC-101 | Research Methodology & Biostatistics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -102 | Biotechnology and Bioinformatics | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -103 | Quality Control of Pharmaceutical Products | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MC -104 | Drug Regulatory Affairs | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC-105 | Product Development and Formulation | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MC -106 | Laboratory course -1 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MC -107 | Seminar (2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-II | MQA-201 | Quality Assurance Technique | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MQA-202 | Biological evaluation and standardization | 04 (04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MQA-203 | Advanced Analytical Technique | 04(04) | -- | 30 | -- | 03 | 70 | -- | -- | 50 | -- | 100 |
| | MQA-204 | Packaging technology | 04 (04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MQA-205 | Selected topics in Quality assurance | 04(04) | -- | 30 | -- | 03 | 70 | -- | | 50 | -- | 100 |
| | MQA-206 | Laboratory Course -2 | -- | 08 (04) | | 40 | | | 12 | 60 | -- | 50 | 100 |
| | MQA-207 | Seminar ( 2 per each subject)* | 04 (04) | | | | | | | | 25 | | 50 |
| | | | *Evaluation of seminar shall be based on the communication, representation and skill in oral presentation | | | | | | | | | | |
| Semester-III | MQA-301 | Seminar on Research envisaged for dissertation | 04 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MQA-302 | Seminar on recent trends in Pharmaceutical sciences | 04 Credits | | 60 | -- | | 90 | -- | | 75 | | 150 |
| | | **Total** | | | **100** | | | **150** | | | | | |
| Semester-IV | MQA-401 | Dissertation | 10 Credits | | 100 | -- | | 150 | -- | | 125 | | 250 |
| | MQA-402 | Seminar (on dissertation) | 02 Credits | | 40 | -- | | 60 | -- | | 50 | | 100 |
| | MQA-403 | Viva-voce | | | -- | | | 100 | -- | | 50 | | 100 |
| | | **Total** | | | **140** | | | **310** | | | | | |
| GRAND TOTAL | | | | | | | | | | | | | 2000 |

MQA – M.Pharm. in Quality Assurance

MC- M.Pharm. Common Paper

## Annexure-VII

**DISTRIBUTION OF TOTAL CREDITS SEMESTER WISE :**

| Year | Semester | Total Credits |
|---|---|---|
| First year | Semester-I | 28 |
| | Semester-II | 28 |
| Second year | Semester-III | 08 |
| | Semester IV | 12 |
| | Total Credits | Credits= 76 |

## Annexure-VIII

## SCHEME FOR MARK DISTRIBUTION OF SEMESTER III & IV

### SEMISTER-III

The topic for the **research envisage for dissertation** and **seminar on recent trends in Pharmaceutical science** shall be assigned to him/her by the Guide within one month from the date of the commencement of the third semester.

**A. SEMINAR ON RESEARCH ENVISAGED FOR DISSERTATION**

| Contents | Marks |
|---|---|
| 1. Selection of research topic and their applicability | 25 |
| 2. Introduction and information retrieval systems | 25 |
| 3. Reading research papers | 25 |
| 4. Skill in oral presentation | 25 |
| **Total** | **100** |

**B. SEMINAR ON RECENT TRENDS IN PHARMACEUTICAL SCIENCES**

| Contents | Marks |
|---|---|
| 1. Introduction and information retrieval systems | 25 |
| 2. Organization of material and references | 25 |
| 3. Representation | 25 |
| 4. Skill in oral presentation | 25 |
| 5. Qucstioning and defending | 25 |
| 6. Report | 25 |
| **Total** | **150** |

*The report shall be submitted to the respective guide/Head of Department/ Library/University.

**SEMESTER - IV**

**A. Dissertation Work**

| Contents | Marks |
|---|---|
| 1. Introduction, information retrieval systems | 25 |
| 2. Experimental Work | 100 |
| 3. Scientific Contents | 25 |
| 4. Result/ Conclusion | 50 |
| 5. Organization of scientific material, thesis, dissertation and references | 50 |
| **Total** | **250** |

**B. Seminar**

| Contents | Marks |
|---|---|
| 1. Representation | 50 |
| 2. Skill in oral presentation | 50 |
| **Total** | **100** |

**C. Viva-Voce**

| Contents | Marks |
|---|---|
| 1. Reading research papers and depth of knowledge on work topic | 25 |
| 2. Discussion | 50 |
| 3. Report | 25 |
| **Total** | **100** |



## Annexure-IX

## Sant Gadge Baba Amravati University, Amravati

## M. Pharm Syllabus

## Credit-grade based performance and assessment system (CGPA))

## FEATURES OF THE CREDIT SYSTEM

1) Masterôs degree would be of 76 credits each.
2) One credit course of theory will be of one clock hour per week running for 12 weeks.
3) Two credit course of theory will be of two clock hours per week running for 12 weeks.
4) Four-credit course of theory will be of four clock hours per week running for 12 weeks.
5) One credit course of practicals will consist of 4 hours of laboratory exercise for 6 weeks.
6) Two credit courses of practicals will consist of 4 hours of laboratory exercise for 12 weeks.
7) Four credit course of practical will consist of 8 hours of laboratory exercise for 12 weeks.
8) Every student shall have to complete minimum 57 credits (75%) in first two semester.
9) First year may divide into two semesters (Semester-I & II) and shall have 10 theory courses, 2 practical course and 2 seminar

| | |
|---|---|
| 5 Theory courses x 4 credits | = 40 credits |
| 1 Laboratory courses x 4 credits | = 08 credits |
| 20 Seminar | = 08 credit |
| Total | = 56 credits |

10) Second year may divide into two semesters (Semester-III & IV) i.e.-

Third Semester ï 1) Seminar on Research Envisaged for Dissertation } 08 Credits
2) Seminar on Recent Trends in Pharmaceutical Sciences }

Fourth Semester - 1) Dissertation } 12 Credits
2) Seminar on Dissertation }

11) SCHEME OF SYLLABUS AND CREDIT SYSTEM : The syllabus for the first semester is common to all M. Pharm. Specialization Courses which consist of total five theory paper and one laboratory course and seminar (2 per each subject).
12) Four credits shall be given for conducting the seminars for 04 hrs. in week.

13) Academic calendar showing dates of commencement and end of teaching, internal assessment tests and term end examination shall be duly notified before commencement of each semester every year by the affiliated colleges.
14) The term end examination, however, shall be conducted by the Sant Gadge Baba Amravati University in the allotted centers.
15) The research project shall be compulsory.
16) A student who passes the internal tests but fails in Term End Examination of a course shall be given FF grade.
17) Student with FF grade in a course would be granted credit for that course but not the grade for that course and shall have to clear the concerned course.
18) Grades-Marks for each course would be converted to grades as shown in following Table 1.

**Table 1: Grade point for Theory/ Practical/Laboratory course /Seminar**

| Grade | Range of Marks obtained out of 100 or equivalent fraction | Grade point |
|---|---|---|
| AA | 90-100 | 10 |
| AB | 80-89 | 9 |
| BB | 70-79 | 8 |
| BC | 60-69 | 7 |
| CC | 55-59 | 6 |
| CD | 50-54 | 5 |
| FF | Below 50 | 0 |
| ZZ | Absent in Examination | |

19) Equivalence of the conventional division/class with the CGPA in final semester is in accordance with the following Table-2, Grade Points for SGPA and CGPA of M.Pharm. shall be as per Table-3.

**Table-2: Equivalence of class/Division to CGPA**

| Sr. No. | CGPA | Class/Division |
|---|---|---|
| 1. | 7.5 or more than 7.5 | First Class with Distinction |
| 2. | 6.00 or more but less than or equal to 7.49 | First Class |
| 3. | 5.50 or more but less than or equal to 5.99 | Higher Second Class |
| 4. | 5.00 or more but less than or equal to 5.49 | Second Class |



**Table-3 : Grade Points for SGPA and CGPA of M.Pharm.**

| Grade Point | Final Grade |
|---|---|
| 9 - 10 | AA |
| 8 - 8.99 | AB |
| 7 - 7.99 | BB |
| 6 - 6.99 | BC |
| 5.5 - 5.99 | CC |
| 5 - 5.49 | CD |
| 0 - 4.99 | FF |
| Absent in Examination | ZZ |

20) Based on the grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed as follows.

**Computation of SGPA and CGPA**

Every student is awarded point out of maximum out of 10 point in each subject. (Based on 10 point scale). Based on the Grade point obtained in subject the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) are computed. The computation of SGPA and CGPA is as under.

Semester Grade Point Average (SGPA) is the weightage average of point obtained by a student in a semester and computed as follows.

$$SGPA = \frac{U1xM1 + U2xM2 + \text{é } UnMn}{U1+U2+\text{é é } Un}$$

Where U1, U2,é é é é are subject credit of the respective course and M1, M2,é é .. are the grade point obtained in the respective subject (out of 10).

The Semester Grade Point Average (SGPA) for all the four semester is also mentioned at the end of every semester.

The Cumulative Grade Point Average (CGPA) is used to describe the overall performance of a student in the course and is computed as under. CGPA shall be calculated on final semester of the course (i.e from Semester I-IV).

$$CGPA = \frac{\sum_{n=1}^{n=4} SGPA(n)C(n)}{\sum_{n=1}^{n=4} C(n)}$$

Where SGPA (n) is the nth semester SGPA of the student and $C_n$ is the nth semester total credit. The SGPA and CGPA are rounded off to the second place of decimal.

**ACADEMIC CALENDAR AND TERMS**

The terms and academic activities of the college affiliated to Sant Gadge Baba Amravati University under CGPA shall be as per the dates given below, only the years shall be changed i.e. the dates shall remain same as given below irrespective of the year.

| | |
|---|---|
| Beginning of First Term (Semester I, and III) | : As per University academic calendar |
| Vacation | : As per University academic calendar |
| Beginning of Second Term (Semester II, and IV) | : As per University academic calendar |

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# SANT GADGE BABA AMRAVATI UNIVERSITY

## DIRECTION

**NO. 5 / 2014** **Dated : 03/03/ 2014**

**Subject : Corrigendum to Direction No.12/2013 in respect of Examinations Leading to the Degree of भेषजी पारंगत (Master of Pharmacy) (Two year - four Semester Degree Course) (Credit Grade Based System).**

Whereas, Direction No.12 of 2013 in respect of Examinations Leading to the Degree of भेषजी पारंगत (Master of Pharmacy) (Two year - Four Semester Degree Course) (Credit Grade Based System), Direction, 2013 is in existence in the University.

AND

Whereas, the Academic Council in its meeting held on 17.2.2014 vide item No.22 4) A) R-3 II) accepted the recommendations of the Faculty of Medicine to be implemented from Academic Session 2013-14 & onwards and resolved to refer the matter to Ordinance Committee.

AND

Whereas, the above corrections are to be regulated by framing the Ordinance.

AND

Whereas, making of Ordinance is a time consuming process.

Now, therefore, I, Dr.J.A.Tidke, Vice-Chancellor, Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of Section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under-

1) This Direction may be called ñCorrigendum to Direction No.12/ 2013 in respect of Examinations Leading to the Degree of भेषजी पारंगत (Master of Pharmacy) (Two year - Four Semester Degree Course) (Credit Grade Based System), Direction, 2014.ò.
2) This Direction shall come into force from the Academic Session 2013-14 & onwards for M.Pharm.

3) Following corrections shall be made in Direction No.12/2013 in respect of Examinations Leading to the Degree of भेषजी पारंगत (Master of Pharmacy) (Two year - Four Semester Degree Course) (Credit Grade Based System), Direction 2013 :

i) In para 2. i), the words, ñSemester-II & IVò be substituted by the words ñSemester-I & IIò.

ii) In Semester-I & II of M.Pharm. Examination (All Specializations) under Annexures-I to VI, against the Title of Paper óSeminarô,

(a) the hours, credits ó04(04)ô shown under Scheme of Teaching óLecture (Credits)ôbe deleted and the hours, credits **'08(04)'** be inserted in the column of óPractical (Credits)ô.

(b) the marks ó50ô be added in the column of Scheme of Internal Examination-Practical.

(c) the marks ó25ô be read in the column of Scheme of External Examination-Minimum Marks for Passing-Practical.

iii) In Semester-III of M.Pharm. Examination (All Specializations) under Annexures-I to VI, against the Title of Papers óSeminar on Research Envisaged for Dissertationô and óSeminar on Recent Trends in Pharmaceutical Sciencesô -

(a) the figure & word ó04 Creditsôshown in the column of Scheme of Teaching-Lecture (Credits) be shifted in the column of Practical (Credits).

(b) the marks ó40 & 60ôshown in the column of Scheme of Internal Examination-Theory be shifted in the column of Scheme of Internal Examination-Practical respectively.

(c) the marks ó60 & 90ôshown in the column of Scheme of External Examination-Theory-Marks be shifted in the column of Scheme of External Examination-Practical-Marks respectively.

(d) the marks ó50 & 75ôshown in the column of Scheme of External Examination-Minimum Marks for Passing-Theory be shifted in the column of Scheme of External Examination-Minimum Marks for Passing-Practical respectively.



iv) The Scheme of Teaching, Credits & Examination prescribed for Semester-IV of M.Pharm. Examination (All Specializations) under Annexures-I to VI be substituted by the following scheme.

| Semester | Paper Code | Title of Paper | Scheme of Teaching in Hrs.per week and credit system | | Scheme of Internal Examination | | Scheme of External Examination | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lect. Credits | Pra. Credits | Th. | Pr. | Theory | | Practical | | Minimum marks for passing | | |
| | | | | | | | Hrs. | Marks | Hrs. | Marks | Theory | Pract. | |
| Semester -IV | *- 401 | Dissertation & Viva-voce | -- | 10 Credits | -- | 100 | -- | -- | -- | 250 | -- | 175 | 350 |
| | *- 402 | Seminar (on dissertation) | -- | 02 Credits | -- | 40 | -- | -- | -- | 60 | -- | 50 | 100 |
| | | **Total** | | | | **140** | | | | **310** | | | |

* - of respective specialization

Dated : 01/03/2014

Sd/-
(Dr.J.A.Tidke)
Vice-Chancellor,
Sant Gadge Baba Amravati University,
Amravati

*****

**SYLLABUS PRESCRIBED FOR MASTER OF PHARMACY IN**
**Pharmaceutical Chemistry**
**(Implemented from the Session 2010-11)**

The several courses leading to the Master Degree of Pharmacy covers following subjects namely

1. Pharmaceutics
2. Pharmacology
3. Pharmaceutical chemistry
4. Pharmacognosy
5. Quality assurance
6. Industrial Pharmacy

1. There are four semesters leading to Degree of Master in Pharmacy. **The theory syllabus for first semester shall be compulsory to all above M. Pharm courses.** Second semester syllabus covers in the field of above mention specialization.
2. In third semester examination the research envisage for dissertation and one seminar on recent trends in Pharmaceutical science shall be assigned to him/her by the Guide within one month from the date of the commencement of the third semester.
3. In forth semester examination the dissertation work shall be perform by him/her and at the end student shall deliver the seminar on dissertation work and viva voce examination.

**Seminar**
Each candidate shall deliver 2 seminars per subject covering the current research interest as in journal in the field of pharmaceutical sciences. Evaluation of seminar shall be based on the communication, representation and skill in oral presentation

**M.Pharm. Semester-I**
**COMMON TO ALL M. PHARM COURSES**
**Subject code: MC-101**
**Subject : RESEARCH METHODOLOGY & BIOSTATISTICS**
**THEORY 60 Hours (4 hrs. /week)**

**SECTION-A**

**I. Research**

1. Meaning of research, purpose of research and types of research (clinical experimental, basic, applied and patent and oriented research) objects of research



2. Literature survey:
   Using library, book and journals, MEDLINE- internet getting patents and reprints of articles as sources for literature survey.
3. Selecting a problem and preparing a research proposal for different types of research sources of procurements of grants.
4. Documentation:
   Importance of documentation in case of research record and GMP/ GLC
   - Techniques of documentation in case of research record and GMP and GLC
   - Uses of computer packages in clinical trials
   - Documentation in clinical trails
5. Research report/paper writing/thesis writing / poster presentation:
   Different parts of research report or paper
   - Title-title of project with authors name
   - Abstract-statement of the problem, background list in brief, purpose and scope
   - Key words
   - Methodology-subject, apparatus/instrumentation and procedure
   - Results-tables, graphs, figures and statistical presentation
   - Discussion-support or non-support to hypothesis. Practical and theoretical implications
   - Acknowledgements
   - References
   - Errata
   - Importance of spell check
   - Use of foot notes

**II. Methods and tools used in research:**

- Research design (futures of good design, types of research designs, basic principles of experimental design).
- Qualitative studies, quantitative studies.
- Simple data organization, descriptive data organization.
- Limitations and sources of errors.
- Enquiries in forms of questionnaire, opinionnaire and interviews

**III. Presentation:**

- Importance, types, different skills
- Content of presentation format of model, introduction and endings.
- Posture, gesture, eye contact, facial expression, stage fright.
- Volume, pitch, speed, pauses and languages
- Visual aids and seating arrangements
- Question and answer session

**SECTION- B**

**IV. Cost Analysis of Projects and Clinical Trials**

**V. Biostatistics**

- Statistical analysis of data including variance, standard deviation, Parametric and Non-Parametric statistic test, corelation of data and its interpretation, computer data analysis, bio statistics for clinical trials.
- Scientific method in medicine
- Scientific equations of therapy

**Reference Books**


(1) Research in education ï John W. Best Jems V. Kahn
(2) Research methodology ï C. R. Kothari
(3) Methodology and techniques of social research ï Willkinson and Bhandarkar
(4) Presentation skills ï Michel Halton ï Indian society for institute education
(5) Practical introduction to copyrights ï Gavin Mofariane
(6) Thesis projects in sciences and engineering ï Richard M. Devis
(7) Scientist in legal system ï Ann Labor Science
(8) Thesis and assessment writing ï Janolthon Anderson
(9) Writing a technical paper ï Donald Manzel
(10) Effective business report writing ï Lel and Brown
(11) Protection of industrial property rights ï Purshottam Das and Gokul Das
(12) Spelling for millions ï Edna Furmess
(13) Preparation for publications ï King Edwards hospital foundation for London
(14) Information technology ï The hindu speeks
(15) Documentation ï genesis and development ï 3792.
(16) Ayurveda and modern medicine ï R. D. Lele
(17) How to write and publish a scientific paper ï Robert A. Day Cambridge University Press 4th edition 1994
(18) Lecture notes on patent TIFAC: DOC: 022, TIFAC July 2002.
(19) Introduction to Statistical Methods- C. B. Gupta
(20) A first course in Mathematical Statistics- C. E. Weatherborn
(21) Introduction to Biostatistics-Mahajan




**COMMON TO ALL M. PHARM COURSES**

**Subject code: MC-102**

**Subject : BIOTECHNOLOGY AND BIOINFORMATICS**

**THEORY 60 Hours (4 hrs. /week)**

**SECTION-A**

1. **Genetics:** Structure and function of DNA replication & repair, expression of genetic information, structure and function of RNA, transcription, genetic code, translation, post translational modification.
2. **Recombinant DNA technology:** Constructing recombinant DNA molecules, restriction enzymes, vectors, gene cloning, genomic libraries, polymerase chain reaction based DNA cloning, restriction mapping, blotting technique, DNA sequencing, pharmaceutical applications of recombinant DNA.
3. **Gene therapy:** General introduction, potential target diseases for gene therapy, gene transfer methods, clinical studies, pharmaceutical production and regulation.
4. **Immunology:** Basics of immunology, Monoclonal antibodies & Hybridoma technology and its applications
5. **Vaccines**-conventional vaccines, modern vaccines technologies, genetically improved vaccines, genetically improved subunit vaccines, pharmaceutical considerations

**SECTION- B**

6. **Quality control testing methods of Biotech products:** Determining impurities/contamination (viral, bacterial endotoxins (in-vitro) rabbit Pyrogen, sterility, protein identification, finger prints by electrophoresis, isoelectric focusing immunogenicity, and partial sequential analysis.
7. **Immobilization of enzyme:** different techniques, effect on production of enzymes, applications.
8. **Plant Biotech products:** Substances produced by plant cell culture, Transgenic plants their application, Biotransformation with plant cell culture
9. **Molecular biology of cancer:** Causes of cancer and genetics of cancer, New strategy for combating cancer
10. **Introduction to Bioinformatics:** Biological databases, sequence analysis, protein structure, genetic and physical mapping, application of bioinformatics in pharmaceutical industries and in drug discovery.

**Reference Books**


1. Biotechnology-Applications and research-Paul N. Chermisinol (Technomic publishing co. Inc)
2. Molecular Biochemistry-Therapeutic applications and strategies (Salil D. Patel, John Wiley and sons).
3. Nelson, D.L, and Coy M.M. Lehningerôs Principles of Biochemistryô Worth publishers, NewYork
4. Gene therapy: principle and Application by Thomas Blankenste in Biòðhausef Verlag Basel - Boston . Berlin
5. *Immunogenicity of Biopharmaceuticals by* Marco van de Weert, Eva Horn Møller (Springer )
6. Recombinant DNA technology by Watson and Trooze
7. Molecular biology of cell by Watson
8. Molecular biology of cell by Albert B, Johnson A, Lewin J.
9. Fundamental of Immunology by Paul W.E
10. Molecular biotechnology By Glick B.R and Pasternak J.J (ASM press)
11. Molecular biology and biotechnology by Walker J.M
12. Essential of genetics by Klug W.S. Cummings M.R
13. Bioinformatics by Baxevanis A.D, Frana, Duelette B.F.


**COMMON TO ALL M. PHARM COURSES**

**Subject code: MC-103**

**Subject : QUALITY CONTROL OF PHARMACEUTICAL PRODUCTS**

**THEORY** **60 Hours (4 hrs. /week)**

**SECTION-A**

1. **Good manufacturing practices**: GMP in manufacturing processing and quality control of drugs, control of facility, personal, production and process controls, packaging and labeling controls, documents, WHO GMP guidelines. GMP for ayurvedic products, Good clinical practice (GCP), Good laboratory practice (GLP), Good Pharmacy practice (GPP)
2. **Validation:** Pharmaceutical process validation, equipment validation and sterile products validation.
3. **Quality control of pharmaceutical dosage forms:** Solid and semi-solid dosage forms, disperse systems and parenteral dosage forms.

**SECTION- B**

4. **ICH Stability Guidelines, Schedule M and Schedule Y**
5. **Spectroscopic methods:** Theory and applications of UV, IR, FTIR, NMR, Mass Spectrometry, ESR and Emission spectroscopy, XRD



6. **Separation techniques:** Introduction and applications of Gas-liquid chromatography, HPLC, Gel chromatography, gel electrophoresis, GC-MS, HPTLC, Ion Pair Chromatography.
7. **Safety into the laboratory**

Designing safety into the laboratory: Laboratory accident and First aid for chemical burns and accident, egress, hazard zoning, emergency facilities, Hazards: slippery spill of Hazardous substances and their handling.

Laboratory design-safety aspect: storage of laboratory chemicals, laboratory design;

Principle of chemical storage; inventory control; segregation.

**Reference Books**


1) Automation and Validation of information in Pharmaceutical Processing ï J. F. Despautz, Marcel and Dekker
2) Validation of aseptic pharmaceutical processing ï F. J. Carleton and J. P. Agalloco, Marcel and Dekker
3) Pharmaceutical process validation ï J. R. Berry and R. A. Nash, Marcel and Dekker
4) Good Manufacturing Practices for pharmaceuticals ï S. H. Will and J. R. Stoker, Marcel and Dekker
5) Design of Experiments for process improvement and quality Assurance ï R. F. Brewer
6) Encyclopedia of pharmaceutical technology, Marcel and Dekker
7) Achieving sterility in medical and pharmaceutical products ï N.A.Halls, Marcel and Dekker
8) Impurities Evaluation of Pharmaceuticals- Satinder Ahuja
9) Official and standardized methods of analysis by Colins Watson
10) Handbook of Quality Assuarance for the analytical chemistry Laboratory by Jam Dux
11) Modern Instrumental Analysis, Vol 47(Comprehensive Analytical Chemistry) - Satinder Ahuja , Neil Jespessen
12) Instrumental Methods of Analysisï Willard, Merritt, Dean, CBS-Publishers and Distributors, Delhi
13) Pharmaceutical Analysis Modern Methods-Part A and Part B ï J. W. Munson, Marcel and Dekker
14) Indian Pharmacopoeia-2007
15) Martindale: The complete Drug Reference ï 2007

**COMMON TO ALL M. PHARM COURSES**
**Subject code: MC -104**
**Subject: DRUG REGULATORY AFFAIRS**

**THEORY** **60 Hours (4 hrs. /week)**

**SECTION-A**

1. Aims, objects and salient features of following legislations affecting pharmaceutical industry.
   · Industrial Development and Regulation Act 1951.
   · Consumer Protection Act.
2. Australian TGA guidelines
3. US-FDA, CDER guidelines
4. New Drug Application
5. Pollution and Environmental Control Act

**SECTION- B**

6. Drug Master File

7. Intellectual Property Rights:
   - Protection of patients and trademarks and design and copy rights and patent system in India.
   - Present status of IPR future changes expected in Indian patents.
   - What may be patented
   - Who may apply for patent
   - Preparation of patent proposal
   - Registration of patent in India and foreign countries and vice versa
   - ICH guidelines for clinical trials, therapeutic drugs monitoring drugs and bioequivalence.
   - Exclusive marketing rights
   - Black box
   - IPR and IDMA views on patents
   - Human health and patent laws latent lethality
   - Indian patent act and copyright (Indian act)

**8.** Drug and Cosmetics Act 1940

**9.** Prevention of Food Adulteration Act 1954 (5 hrs)

**10.** Preparation of DMF, Site Master File, Master Formula Record. Procedure for filing of Patent.



**Reference:**

(1) Guidelines of various countries like MCA, TGA, ICH.
(2) Drug and cosmetic act 1940 and rules their under
(3) IPR Lecture notes
(4) GLP regulation by Alen Hirsch Vol 38 Marcel Decker series
(5) GMP for pharmaceuticals forth edition by S. Willing, J. Stocker Marcel Decker series 1997.
(6) I.P., B.P., U.S.P. International Pharmacopoeia
(7) Pharmacokinetics, Regulatory, Industrial, academic prospective by P. G. Willing and F.T.S. Tse.

**COMMON TO ALL M. PHARM COURSES**
**Subject code: MC -105**
**Subject : PRODUCT DEVELOPMENT AND FORMULATION**

**THEORY** **60 Hours (4 hrs. /week)**

**SECTION-A**

**1. INTRODUCTION OF NEW DRUGS**

Steps involved in the development of a new drug, obstacles to its evaluation, limitations of screening procedures, animal toxicity tests. Extrapolation of laboratory data to man, placebo, New drug application as per WHO norms and proforma. Requirement and guidelines on clinical trials for import and manufacture of new drugs in India.

**2. PREFORMULATION STUDIES**

Investigation of physical and chemical problems inherent in the development of new formulations.

**3. PHYSICAL PROPERTIES**

Organoleptic properties, microscopy, intrinsic solubility and dissolution rate; powder flow and compression, properties and physical stability.

**4. CHEMICAL PROPERTIES**

Chemical properties : Purity, physico-chemical parameters affecting absorption, solid state and solution-phase stability and compatibility with excipients. Formulation additives : Studies on all excipients to be incorporated in the development of liquid orals, solid dosage forms. Stability data : Advanced studies on stability and development of stability data on different formulations.

## SECTION- B

**5. PROCESS VALIDATION :**

Development of validation data on different formulations, Quality assurance and GMP : A Detailed study of current good manufacturing practices in manufacturing, processing, packaging and holding of drug.

Product development approach on following formulations :

**6. LIQUID ORALS :**

Cough and multivitamin syrup, antiflatulant and laxative emulsions, antacid and antidiaroheal suspensions.

**7. TOPICALS :**

Antibiotic ointment, analgesic gels.

**8. TABLETS :**

Common cold, multivitamin, chewable antacid, soluble aspirin and dispersible/kid tablets.

**9. STERILE DOSAGE FORMS :**

B-comlex injection, antibiotic eye and ear drops, antihistaminic nasal drops.

**Reference Books:**


1. Gennaro, Remingtons Pharmaceutical Sciences, Mack Publishing Co.
2. Lachman, Theory and practice of Industrial pharmacy, Lea and Febiger.
3. Ansel.,Pharmaceutical Dosage Forms & Drug Delivery Systems, Lea & Febiger.
4. Banker, Modern Pharmaceutics, Marcel Dekker Inc.
5. Racz, Drug Formulation, John Wiley and Sons.
6. Aulton, Pharmaceutics : The Science of Dosage Forms Design, ELBS, London
7. Wells, Pharmaceutical preformulation: The physico-chemical properties of Drug Substance, Ellis Horwood Ltd.
8. Florence, Atwood, physico-chemical Principles of pharmacy, Chapman and Hall NY.
9. Welling and Tuckerman, Good Manufacturing practices : A plan for Total Quality Control, Bhalani Publishing House, Bombay.
10. Connors, Chemical stability of pharmaceuticals : A Handbook for pharmacists, Wiley Inter-Science.
11. Carstensen, Drug Stability : Principles and practices, Marcel Dekker Inc.




**COMMON TO ALL M. PHARM COURSES**

**Subject code : MC-106**

**Subject : Laboratory course -1**

**Practical 8 hrs. /week (Minimum 20 practicals should be conducted)**

**1. Combination Drug Analysis (any two)**

Vitamins, Sulphas, Analysis of Antipyretics and Analgesics, Steroidal anti-inflammatory drugs, Antihistamins.

**2. Illustrations of theoretical principles using assay of drugs form in various pharmacopoeias (any five).**

This should cover titrimetric, gravimetric, spectro-photometric (including flame photometric) methods. HPLC etc. The titrimetric methods should include agrentometric, conductometric, and potentiometric end point determination. The students should be exposed to handling of as many instruments as possible by themselves or under the guidance of a teacher.

Validation of equipments: Autoclave, hot air oven, membrane filter (Minimum two practical).

Validation of an analytical method: Calibration of instruments as per official procedure (UV, FTIR, Conductivity meter, flourimeter, Digital pH meter, Digital balance, Potentiometer, HPLC, Gas chromatography) (Minimum two practical).

3. Interpretation of UV, IR, NMR, $C^{13}$ NMR spectra and Mass Spectroscopy of some chemicals and drugs. (Minimum three combined spectra).

**Reference Books**


(1) Pharmaceutical Analysis ï Modern methods ï Part A and Part B ï J. W. Munson, Marcel ï Dekker

(2) Quantitative Analysis of Drugs in Pharmaceutical formulations ï P. D. Sethi, VBS Publishers, Delhi

(3) Pharmacopoeia of India.

(4) Practical Pharmaceutical Chemistry, Part I and Part II ï A. H. Beckett, J. B. Stenlake, CBS Publishers, Delhi

(5) Colorimetric Methods of Analysis ï F. D. Snell and C. T. Snell, Van Nostrand Reinhold Company, N. Y.

(6) Chemical Applications of Infrared spectroscopy ï C. N. R. Rao, Academic Press N. Y.

(7) Applications of Absorption Spectroscopy of Organic Compound ï J. R. Dyer, Prentice Hall Englewood.

**M. Pharm. (Pharmaceutical Chemistry)**

**Semester – II**

**Subject code : MPC – 201**

**Subject : ADVANCED ORGANIC CHEMISTRY**

**THEORY : 60 Hours (4 hrs. /week)**

**SECTION-A**

**1. STEREOCHEMISTRY**

Molecular dissymmetry, compounds with one, two or more unequal asymmetric carbon atoms and racemic modifications and its resolution, configuration absolute and relative, synthesis of optically active compounds, conformations in cyclic compounds, optical isomerism, shapes of cyclohexanes, five and six-membered heterocyclic rings including methods of preparation and their reaction mechanisms, shapes of rings other than six membered. Stereoselective synthesis, role of inductive, resonance and steric effects in structure and relativity.

**2. MECHANISM, STEREOCHEMISTRY AND APPLICATIONS OF**

Birch reduction, Clemensen reduction, Meerwein-Pondroff reduction, Oppennauer oxidation, Wolf Kishner reduction, Wittig Reaction, Pinacol and related rearrangements, Beckmann rearrangement, Hoffman rearrangement, Claisen rearrangement, Schmidt, Lossen and Curtius rearrangement, Grignard Reagents and hydrides, Aldol condensation Cannizzarroõs reaction, Reformatsky reaction, Perkin reaction, Knoevenagel reaction, Haloform reaction and Mannich reaction, Whitmore-1,2-shift, Baeyer-Villiger oxidation, Benzilic acid rearrangement, Fries rearrangement, Cope rearrangement, Sandmeyer reaction, Gomberg reaction, Phase Transfer Catalysis, Allylic bromination, ozonolysis, free radical reactions, use of diazomethane and peracids in synthesis, Study of some reduction of synthetic importance: Reduction with metallic hydroxides, hydrogenation.

**SECTION- B**

**3. PERICYCLIC REACTIONS**

Basic theory, orbital symmetry rules and their applications, mechanism, types of pericyclic reactions-cycloaddition, electrolytic reaction, and sigmatrophic rearrangement

**4. PHOTOCHEMICAL REACTIONS**

Introductions and basic principles, photochemistry of carbonyl compounds, photo rearrangements, photochemistry of alkenes and dienes.



**5. SYNTHON APPROACH**

a. Definition of terms- disconnection, synthon, functional group interconversions.
b. Basic rules in disconnection.
c. Use of synthon approach in synthesis of following components: Trimethoprim, Ibuprofen, Propranolol, Piroxicam.

**6. Green Chemistry Approach:** Purposes and Application**.**

**Reference Books**


1. Advanced Organic chemistry, Reaction mechanisms and structure, J. March, John Wiley and Sons, N.Y.
2. Mechanism and structures in Organic chemistry, E.S Gold, Hold Richard and Winstone, New York.
3. The Organic chemistry of Drug Design and Action, R.B. Silverman, Academic press In., San Diego, 1992.
4. Asymmetrical Synthesis, R.A Aitkin and S.M. Kilengi, Ed., Blackie Academic and professional London, 1995.
5. Organic chemistry, Clayden, Greeves, Warren and Woihers., Oxford University press 2001.
6. Organic chemistry, Vol I and II. I. L. Finar. ELBUS, Sixth ed., 1995.
7. A guide to mechanisms in Organic chemistry- Peterskyes Orient Longman, New Delhi.
8. Reactive intermediates in Organic chemistry- Tandom and Gowel.
9. Molecular reaction and photochemistry- C.H. Deupuy and O.L. Chapman
10. Drug stereochemistry Wainer Stering 1st Edn. 1996 Marcel Decker.
11. Photochemistry and Pericyclic reactions, Jagdamba Singh, Jaya Singh, 2nd edition, New edge International Publishers.
12. Reaction Mechanism In Organic Chemistry, S. M. Mukherji, S.P.Singh, 3rd edition, Macmillan India Ltd.
13. Comprehensive book of stereochemistry- by Eliel
14. Text Book of Organic chemistry ï by Morrison and Boyd
15. Text Book of Organic chemistry ï by S. K. Ghosh

**Subject code : MPC – 202**

**Subject : ADVANCED MEDICINAL CHEMISTRY**

**THEORY : 60 Hours (4 hrs. /week)**

**SECTION-A**

**1. MEDICINAL CHEMISTRY OF**

a. Antiviral Agents and agents under development of HIV infection.
b. Immunosuppressant and Immunostimulants.
c. Agents used in Neurodegenerative disease Like Alzheimerôs and Parkinsonism.
d. GABAnergic Agonists.
e. Antidiabetic agents like Peroxisome Proliferator Activated Receptors inhibitors, Dipeptidyl Peptidase 4 (DPP 4) Inhibitors like Sitagliptin, Vildagliptin, Protein Tyrosine Phosphatase 1 B (PTP 1 B).
f. Antihypertensives like Direct Renin Inhibitors e.g. Aliskiren

**2. GASTRIC PROTON PUMP INHIBITORS**

Introduction, Gastric acid secretion and its inhibitors, test assay for studying gastric acid inhibitors, irreversible gastric proton pump inhibitors

**3. PROTEINS AND PEPTIDE DRUGS**

Chemistry, structure and stability, Reactivity of proteins and peptides. Different ways to synthesize these Drugs- Study of insulin, Relaxin, Somatostatin, DNAse interferon.

**4. COMBINATORIAL CHEMISTRY**

a. Introduction
b. Combinatorial approaches
c. Chemical peptide and small molecule libraries
d. Applications, methodology
e. Combinatorial Organic Synthesis
f. Assays and screening of combinatorial libraries synthetic methodologies including solid-phase synthesis (SPS) and solution phase chemistry, Library Purification Methodology.

**SECTION- B**

**5. STRATEGIES IN THE SEARCH FOR NEW LEAD COMPOUNDS**

Introduction, improvement of existing drugs, systematic screening including extensive screening, random screening and High-throughput screening, screening of synthetic intermediates, selective optimization of side activities (SOSA) approach, new use for old drugs ï An illustrative study with suitable examples.



**6. CHIRAL TECHNOLOGY**

Introduction to chirality and Techniques used in asymmetric synthesis of Vitamin C, Ampicillin, dextra-propoxyphen, Citrenalol, propanolol.

**7. PRODRUG DESIGN**

Introduction, chemical bond, gastrointestinal absorption, parenteral administration, distribution, transdermal absorption, pharmacokinetics and biopharmaceutical aspects, rational of prodrug design and practical considerations.

**REFERENCES**


1. Burger: Medicinal Chemistry series, John Wiley & Sons N.Y.
2. Foye: Principals of Medicinal Chemistry (Varghese & Co.)
3. Lednicer: Organic drug synthesis Vol.1,2,3,4; John Wiley & Sons N.Y.
4. Ariens: Medicinal Chemistry series.
5. Elies & West: Progress in Medicinal Chemistry series.
6. Wilson & Gisvold: Text book of Medicinal Chemistry, J. B. Lippin
7. Comprehensive Medicinal Chemistry series I-IV, Academic Press.
8. Combinational Chemistry-synthesis and applications- Stephen R. Wilson
9. Recent advances in chiral separations, Ed. Stevenson & Wi, Latest 1990, Plenum Press.
10. Chiral Technology, R. A. Steldon, Marcell Dekker Inc. New York.
11. Combinatorial Chemistry Ed. Fennirl Hicham 2000 Oxford University


**Subject code: MPC -203**

**Subject : MODERN ANALYTICAL TECHNIQUES**

**THEORY : 60 Hours (4 hrs. /week)**

**SECTION-A**

**1 Spectroscopic methods:** Theory, Instrumentation, chemical applications and structural elucidation by UV, IR, FTIR, Near IR (NIR), Raman, $^{1}H$ NMR, $^{13}C$ NMR (2-D NMR, COSY), Mass Spectrometry (MALDI, TOF, Quadrapole Analysers), Electron Spin Resonance and Atomic and Molecular Emission spectroscopy, X ï Ray Crystallography, Refractometry, Circular Dichroism.

**2 Separation Techniques:** Fundamental principles, theory, instrumentation and applications of Gas-liquid chromatography, HPLC, Gel chromatography, GC-MS, HPTLC, normal and reverse phase chromatography, and Ion Pair Chromatography. Counter-current chromatography, droplet counter-current chromatography, solvent system, ion exchange affinity, size exclusion, cation/anion exchange, gel electrophoresis for protein and DNA

**SECTION- B**

3 **Thermal Analysis:** Theory, Instrumentation and applications of Thermogravimetric Analysis (TGA) and Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC).

4 **Immunochemical Techniques:** Immunoelectrophoresis, Immunoprecipitation, ELISA, Radioimmunoassay.

**References:**


(1) Theory and applications of ultraviolet spectroscopy ï M. Orchin and H. H. Jaffe, John Wiley and Sons, N. Y.

(2) Spectrometric identification of organic compounds ï Silverstein, Basseler, Morril, John Wiley and Sons, N. Y.

(3) Instrumental Methods of Analysisï Willard, Merritt, Dean, CBS-Publishers and Distributors, Delhi

(4) Applications of Absorption Spectroscopy of Organic Compounds ï J. R. Dyer, Prentice Hall, London

(5) Chemical Applications of Infra-red spectroscopy ï C. N. R. Rao., Academic Press, N. Y.

(6) Quality assurance of drugs in Pharmaceutical chromatography by P.D.Sethi.

(8) Introduction to High Performance Liquid Chromatography ï R. J. Hamilton, Chapman and Hall, London

(9) Pharmaceutical Analysis Modern Methods-Part A and Part B ï J. W. Munson, Marcel and Dekker

(10) Indian Pharmacopoeia-2007

(11) Martindale: The complete Drug Reference ï 2007

(12) Impurities Evaluation of Pharmaceuticals- Satinder Ahuja

(13) Modern Instrumental Analysis, Vol 47(Comprehensive Analytical Chemistry) - Satinder Ahuja , Neil Jespessen

1. An introduction to thermogravimetry by keattch/Dollimore
2. Jenkins Quantitative Pharmaceutical chemistry,adelbert M.Khevel,Frans Diagangi
3. Thermal analysis: theory and application by R.T.Sane, Jagdish K. Gadge

(14) Practical HPLC Method Development, 2nd Edition- Lloyd R. Snyder, Joseph J. Kirkland, Joseph L. Glajch




**Subject code : MPC – 204**

**Subject : RATIONAL DRUG DESIGN**

**THEORY: 60 Hours (4 hrs. /week)**

**SECTION- A**

**1. DRUG DISCOVERY**

a. Historical Perspective

b. Drug Discovery studies in Direct Drug Design( Structure based) ND Indirect Drug Design

c. Target Selection and Lead Identification

i) Natural Product Sources

ii) Fermentation/ microbial sources

iii) Synthetic

d. Introduction to Pharmacogenomics.

**2. APPROACHES TO THE RATIONAL DESIGN OF ENZYME INHIBITORS**

**a. Introduction**

i) Enzyme inhibitors in Medicine

ii) Enzyme inhibitors in basic Research

iii) Drug Design based on Antagonism and Enzyme Inhibition

**b. Rational design of non covalently & covalently binding enzyme inhibitors**

Rapid reversible inhibitors, slow & tight binding inhibitors, Transition state analogs, multisubstrate inhibitors.

**3. QUANTITATIVE STRUCTURE ACTIVITY RELATIONSHIP**

a. History and development of QSAR

b. Drug-Receptor Interactions

c. Quantitative model parameters: lipophilicity, electronic and steric factors

d. Hansch Analysis, Free Wilson analysis, relationship between them and their application.

e. Statistical methods-regression analysis, partial-least square analysis (PLS) and other multivariate statistical methods

f. 2D, 3D, 4D QSAR & CoMFA and CoMSIA approaches.

**SECTION- B**

**4. MOLECULAR MODELING**

a. Introduction to Molecular Modeling- concepts and methods

b. Molecular mechanics-Force field (potential energy function)

c. Quantum Mechanics- Calculation of affinity, unknown receptors, Pharmacophore models

d. Known receptor sites

e. Searching for similarity, molecular comparison and finding common pattern

f. Energy Minimization methods- Steepest, desent, conjugate gradients, Newton methods (Non mathematical)

g. Conformational Analysis
   i) Systematic search
   ii) Monte Carlo Simulations
   iii) Molecular Dynamics Simulations

h. Ligand design based on 3D structure

5. Introduction to recent advances in drug design
   Quantitative structure pharmacokinetic relationship (QSPR), Bioinformatics, Genomic & Proteomics

6. Study of software for QSAR, Docking, Molecular modeling and protein sequencing.

**Reference Books**


1. QSAR & Strategies in the design of Bioactive Compound J. K. Seydel Latest after 1984 Deuts che Bibliofech.
2. Nucleic acid targeted Drug Design Propst & Thomas 1997 Marcel Decker.
3. Structure based Drug Design Pandi veera Pandian 1997 Merck Decker
4. A Guide to chemical Basis of Drug Design Burger Alfred 1997 Wiley interscience.
5. Computer aided Drug Design Perun 1st 1989 / Latest Marcel Decker
6. Computational Medicinal Chemistry for Drug Design Patrick Bultinck 1st 2004 Marcel Decker.
7. Nucleic acid targeted Drug Design Propst & Thomas 1997 Marcel Decker
8. Principles of Drug Design by Smith
9. Strategy of Drug Design by Brucell
10. The organic chemistry of the Drug Design and Drug action by Richard B. Silverman
11. Introduction to Quantitative Drug Design by Y.C.Martin
12. Drug Design volumes by Ariens
13. QSAR: Hansch Analysis and Related Approaches by Hugo Kubinyi
14. Textbook of Drug Design and Discovery, Third Edition, Larsen, Liljeors and Madsen




**Subject code : MPC – 205**

**Subject : CHEMISTRY OF NATURAL PRODUCTS**

**THEORY : 60 Hours (4 hrs. /week)**

**SECTION- A**

**1. NATURAL PRODUCTS AS LEAD FOR NEW PHARMACEUTICALS**

a. Introduction

b. Primary and secondary metabolites in plants

c. Study of natural products as leads like cannabinoids, etoposide, teniposide, khellin, artemisin etc.

**2. ALKALOIDS**

a. Detailed chemistry and properties of alkaloids

b. Isolation, purification and structural elucidation of morphine, vincristine, reserpine, ephedrine, atropine, â-Carotene, Digitoxin, Digoxin.

**3. STEROIDS**

a. General introduction

b. Stereochemistry, nomenclature and structural elucidation of sterols (cholesterol), sapogenin (diosgenin), and solasodine.

**4. FLAVONOIDS**

Detailed chemistry and properties of Flavonoids and chemical account of rutin & quercetin

**SECTION- B**

**5. ANTIBIOTICS**

a. ß- Lactum Antibiotics
   Mechanism of action, penicillins, cephalosporins, nocardicilins and monobactums, carbopenams and penams, ß-Lactamaseinhibitors and other ß -Lactum agents

b. Non ß –Lactum Antibiotics
   Aminogycosides, macrolides, linomycins & polypeptide antibiotics

**6. ROLE OF RECOMBINANT DNA TECHNOLOGY AND DRUG DISCOVERY**

Cloning DNA, expression of clonal DNA, manipulation of DNA sequence information new biological targets for drug developments, novel biotechnology derived pharmaceutical products. Antibody, antisense oligonucleotide therapy and gene therepy.

**7. Advances of the active constituents of some drugs used in the following indigenous system of medicines**

1. Diabetic Therepy- Gymnes sylvestre, salacia reticulate, pterocarpus marsupiam, swertia, chirata, trigonella, foenum-graccum

2. Liver Disfunction- phyllanthus niruri
3. Antitumor- curcuma longa linn, taxol, teniposide, etoposide.

**Reference Books**


1. Natural product chemistry by Nakanishi Goggolo
2. Modern methods of plant analysis ï Peech and M. V. Tracey
3. Phytochemistry Vol I & II by Miller, Jan, Nostrant, Rein Hid
4. Recent advances in Phytochemistry Vol. I & IV ï Scilicet, Runeckles
5. Natural Product Chemistry ñA laboratory guideò by Rapheal Ikan.
6. The alkaloid chemistry and physiology by THF Manske
7. Introduction to molecular Phytochemistry ï CH Wells, Chapmannstall
8. Organic chemistry of natural products Vol I & II by Gurudeep Chatwal
9. Organic chemistry of natural products Vol I & II by O. P. Agarawal
10. Organic chemistry Vol I & II by I. L. Finar
11. Elements of Biotechnology by P. K. Gupta
12. Pharmaceutical Biotechnology by S. P. Vyas and V. K. Dixit
13. Biotechnology by Purohit and Mathoor
14. Phytochemical methods by Harborne


**Subject code : MPC-206**

**Subject : LABORATORY COURSE-2**

**Practical 8 hrs. /week (Minimum 20 practical should be conducted)**

1. Mixture analysis of 2/3 organic compounds (At least 6)
2. Synthesis of drugs using 3/4 steps, and/ OR Synthon approach and their structure confirmation molecular distillation, fractional crystallization and purification by column chromatography, preparative TLC and structural confirmation by spectroscopic methods. (At least 4)
3. Isolation, characterization like melting point, mixed melting point, molecular weight determination, functional group analysis co chromatographic techniques for identification of isolated compounds and interpretation of UV&IR data of following (Any 3)

   Eugenol from Clove, Curcumin from Turmeric, Sennosides from Senna, Hesperidine from Orange peel, Embelin from embela Ribes, Glycyrrhizin from glycyrrhiza glabra, Plumbigin from Plumbago Rosea, Solarin from potato, Naringen from grape fruit peel, Trimystin and Myristin from Nutmeg, Azylic acid from Castor oil, Pectin from Orange peel, Lycopene from Tomato peel, Epicatechin from Cashew kernel, outer kernel, Piperin from Black pepper
4. To perform the following reaction of synthetic importance (Any 8)

   Birch reaction, Clemmensons reduction, Meerwin-Pondroff,s



reduction, Grignard reaction, Oppeneaur oxidation, Benzylic acid rearrangement, Beckmann rearrangement, Friedal Craft Acylation and Alkylation, Claisen condensation etc.

**REFERENCES**


1. Organic synthesis: Fisher and William Son (CBA Publisher)
2. Mann and Saunders, ôPractical Organic chemistryô (Orient Longman)
3. A.I.Vogel, ôPractical Qualitative and Quantitative Organic Chemistry, (Orient Longman)
4. Systematic Identification of Org. Compounds Shriner & Herman 1998, John Wiley & sons
5. Reaction Synthesis in Organic Chemistry Laboratory Tiezel/ Ether 1989, University Science.


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