Third B.Pharmacy Prospectus No. 2013146
Semester-V Examination - Winter-2012,
Semester-VI Examination - Summer-2013

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

आयुर्विज्ञान विद्याशाखा
(FACULTY OF MEDICINE)

PROSPECTUS
OF
THE DEGREE OF
BACHELOR OF PHARMACY (FOUR YEAR –
EIGHT SEMESTER DEGREE COURSE)
SEMESTER-V EXAMINATION, WINTER-2012
SEMESTER-VI EXAMINATION, SUMMER-2013

2012

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Sant Gadge Baba
Amravati University
Amravati - 444 602

I N D E X

Third B.Pharmacy (Semester-V & VI)

(Prospectus No.2013146)

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 OrdinanceBooklet 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 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 of 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

DIRECTION

No.: 21/2010 Date : 21/06/ 2010

Subject : Examination Leading to the Degree of भेषजी स्नातक (Bachelor of Pharmacy) (Four Year - Eight Semester Degree Course), Direction 2010.

Whereas, the Sub-committee appointed by Board of Studies in Pharmaceutical Sciences have prepared and recommended the Schemes of Teaching and Examinations along with provisions to be incorporated in the Ordinance for B.Pharm. Semester-I to VIII as per Semester Pattern and Credit Based Performance and Assessment System.

AND

Whereas, the Hon'ble Vice-Chancellor has accepted the aforesaid recommendations under sub-section (7) of Section 14 of the Maharashtra Universities, Act, 1994 on behalf of the Board of Studies in Pharmaceutical Sciences and faculty of Medicine on 27.5.2010.

AND

Whereas, the aforesaid recommendations were placed before the Academic Council in its meeting held on 28.5.2010 vide item No.45 and the Council resolved to accept the refer the Schemes/ provisions to be incorporated in the Ordinance to the Ordinance Committee for placing it directly before the Management Council.

AND

Whereas, the making of Ordinance/Regulation for B.Pharm. Semester-I to VIII is a time consuming process.

AND

Whereas, the Academic Session is starting from 14th June 2010 and it is necessary to provide the Schemes of examinations, eligibility criteria along with other details.

Now, therefore, I, Dr. Kamal Singh, Vice Chancellor of Sant Gadge Baba Amravati University, 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 "Examination Leading to the Degree of भेषजी स्नातक (Bachelor of Pharmacy) (Four Year - Eight Semester Degree Course), Direction, 2010".

2) This direction shall come into force from the date of its issuance.

3) There shall be Eight Examinations leading to the Degree of भेषजी स्नातक (Bachelor of pharmacy), namely:

(i) the First B.Pharm Examination consisting of Semester-I & II at the end of the each semester;

(ii) the Second B.Pharm Examination consisting of Semester-III & IV at the end of the each semester;

(iii) the Third B. Pharm. Examination consisting of Semester-V & VI at the end of the each semester;

(iv) the Final B. Pharm Examination consisting of Semester-VII & VIII at the end of the each semester.

4) The duration of each semester shall be of six months.

5) The examinations specified in Paragraph 3 shall be held twice a year at such places and on such dates as may be appointed by the Board of Examination.

6) An applicant for admission to an examination specified in Paragraph 3 shall prosecute a regular course of study in courses prescribed for the examination concerned for not less than one semester in a particular semester in a College affiliated to the University.

7) Subject to his compliance with the provisions of this Direction and of other Ordinances in force from time to time, an applicant for admission to-

(A) The प्रथम भेषजी स्नातक (First B. Pharm- Semester I and II) Examination shall have passed not less than one academic year previously-

(i) The Diploma in Pharmacy Examination from an Institution recognized by the Pharmacy Council of India ; with minimum 40% marks.

or

(ii) The 12th Standard Examination of the Maharashtra State Board of Secondary and Higher Secondary Education with English , Physics , Chemistry and Biology or Mathematics as subjects of study at the 12th Standard; securing minimum 50% marks(45% marks for backward class candidates from Maharashtra) in the said subjects taken together and passed in the same sitting

or

(iii) An Examination recognised as equivalent thereto in such subjects and with such standards of attianments as may be prescribed.

(iv) The norms laid down by the Directorate of Technical Education, Mumbai, Government of Maharashtra from time to time.

(B) The **द्वितीय भेषजी स्नातक** (Second B.Pharm- Semester III and IV) Examination –

Shall have passed not less than one academic year previously the **प्रथम भेषजी स्नातक** (First B. Pharm) Examination of the University or the post H.S.S.C. Diploma in Pharmacy (i.e. according to Education Regulation, 1991 of Pharmacy Council of India) from the Board of Technical Education or equivalent from an institute approved by Pharmacy Council of India in first attempt scoring not less than 600 marks out of 1000 marks at D.Pharm. Part-II Examination, provided that they appear and pass in the theory papers of Mathematics of First year B.Pharm. (Semester-II) examination otherwise, their result of the third year B.Pharm. (Semester-V) examination shall not be declared.

(C) The **तृतीय भेषजी स्नातक** (Second B.Pharm- Semester V and VI) Examination shall have passed the **द्वितीय भेषजी स्नातक** (Second B. Pharm i.e. Semester-III & IV) Examination of the University not less than one Academic year previously.

(D) The **अंत्य भेषजी स्नातक** (Final B.Pharm- Semester VII and VIII) Examination shall have passed the **तृतीय भेषजी स्नातक** (Third B. Pharm i.e. SemesterV & VI) Examination of the University not less than one Academic year previously.

8) Subject to his/her compliance with the provisions of this Direction & other Ordinances pertaining to Examination in force from time to time, the applicant for admission , at the end of the course of study of a particular semester/session, to an Examination specified in column (1) of the table below, shall be eligible to appear if

i) he/she satisfies with the conditions in the table and the provisions thereunder.

ii) he/she complies with the provisions of the ordinance pertaining to the Examination in general from time to time.

iii) he/she has prosecuted a regular course of study in a college affiliated to the University.

iv) he/she has in the opinion of the Principal shown satisfactory progress in his/her studies.

TABLE

Name of the Exam.	The student should have passed the exam. of	The student should have satisfactorily completed the following session/ semester	The student should have passed the following examination
B.Pharm. Semester-I	As mentioned in Para 7 (A)	—	—
B.Pharm. Semester-II	—	B.Pharm. Semester-I	—
B.Pharm. Semester-III	—	B.Pharm. Semester-II	2/3rd Heads of I & II Semester combined together
B.Pharm. Semester-IV	—	B.Pharm. Semester-III	-do-
B.Pharm. Semester-V	B.Pharm.I & II Semester	B.Pharm. Semester-IV Semester-V	2/3rd Heads of III & IV Semester combined together
B.Pharm. Semester-VI	-do-	B.Pharm. Semester-V	-do-
B.Pharm. Semester-VII	B.Pharm. III & VI Semester	B.Pharm. Semester-VI	2/3rd Heads of V & VI Semester combined together
B.Pharm. Semester-VIII	-do-	B.Pharm. Semester-VII	-do-

Explanation :

i) While calculating 2/3 rd heads of passing,fraction if any shall be ignored

ii) For considering the heads of passing, every theory and every practical shall be considered as separate head of passing.

iii) An examinee who has passed 2/3rd heads of passing shall be allowed to keep term in the next higher class.

9) Without prejudice to the other provisions of Ordinance No. 6 relating to the Examination in General , the provisions of Paragraphs 5,7,8,10,27,31 and 32 of the said Ordinance shall apply to every Collegiate candidate.

10) The fee for each examination and practical examination shall be as prescribed by the University, from time to time.

11) 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.

12) The maximum marks allotted to the Sessional Examination in each paper, the written part and the practical part for each of the Four Examinations shall be per **Appendices-I to V** appended with this Direction.

13) The scope of the subjects shall be as indicated in the Syllabus.

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

15) In order to pass an examination an examinee-

(i) Shall obtain not less than 45% of the total marks allotted to each written paper and its respective sessional Examination taken together as shown in the concerned Appendix;

(ii) Shall obtain not less than 50% of the total marks allotted to each practical and its respective sessional taken together as shown in concerned appendix.

16) There shall be no classification of successful examinees at the **प्रथम, द्वितीय व तृतीय भेषजी स्नातक** (First : Sem-I & II , Second: Sem-III & IV and Third B.Pharm : Sem-V & VI) Examinations.

17) Division of Successful examinees at the **अन्त्य भेषजी स्नातक** (Final B.Pharm- Semester VII and VIII) examination shall be determined on the basis of the aggregate marks obtained at the **तृतीय आणि अन्त्य भेषजी स्नातक** (Third and Final B.Pharm- Semester V, VI, VII, and VIII) examinations taken together.

18) Those obtaining 60% or more marks in the aggregate shall be placed in the First Division, and all other successful examinees in the second Division.

19) An examinees who is successful at an examination and obtains not less to 75% of the total marks prescribed in a subject, shall be declared to have pass examination with Distinction in that subject.

20) If a student fails in an examination his 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 marks in the Theory shall be only on the basis of external examination.

21) Improvement of Internal Assessment :-

- If a candidate 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.
- Examination of the subject head "Project and the Seminars" 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 "Project report and seminar," the candidate will not be allowed to reappear for examination in this subject head.

22) Provisions of Ordinance No. 18 of 2001 relating to an 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.18, Ordinance 2001 shall apply to the examinations under this Direction.

23) As soon as possible after the examination, but not later the 30th June next following in case of examinations held in summer and 28th february next following in case of examinations held in winter, the Board of Examination shall publish a list of successful examinees. The list of successful examinees at the **अन्त्य भेषजी स्नातक** (Final B.Pharm.- Semester VII and VIII) Examination shall be arranged in the First and Second Division, as envisaged in Paragraph 17 of this Direction the names of Examinees passing the B.Pharm. Examination as a whole in the minimum prescribed period and obtaining the prescribed number of places in the First or Second Division shall be arranged in order of Merit as provided in the examinations in General Ordinance No. 6.

24) Notwithstanding anything to the contrary in this Direction , the Degree of Bachelor of Pharmacy shall not be conferred upon a person unless:-

He Undergoes a practical training of not less than four weeks after taking the Third year (Semester-V & VI) or Final year (Semester-VII & VIII) B. Pharm. Examination in Pharmaceutical industry/Primary Health Centre/Private Hospitals with 20 bed capacity and Medical shop (Whole sale or Retail) approved by the Head/Principal and unless the Head/ Principal certifies that the person has satisfactorily completed the said practical training as the case may be.

25) Successful examinees at the **प्रथम भेषजी स्नातक , द्वितीय भेषजी स्नातक व तृतीय भेषजी स्नातक** (First B.Pharm,- (Sem. I and II) Second B.

Pharm, (Sem. III and VI) and Third B. Pharm (Sem. V and VI)) Examinations shall be entitled to receive a Certificate signed by the Registrar; and those successful at the अन्त्य भेषजी स्नातक (Final B.Pharm. Sem. VII and VIII Examination) shall, on payment of the prescribed fees, receive a degree, in the prescribed form, signed by the Vice-Chancellor.

Sd/-
(Dr.Kamal Singh)
Vice-Chancellor

Amravati
Dated : 19/06/2010

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*Corrected vide Direction No.8 of 2011.

Appendix-I
Scheme of teaching for B. Pharm (Semester wise)
First to Eight semester

Sub. Code	Subject	Scheme of teaching	
		Theory	Practical
Semester-I			
1.1	Pharmaceutics-I	03	03
1.2	Pharmaceutical Biochemistry-I	03	03
1.3	Anatomy and Physiology-I	03	03
1.4	Pharmacognocy-I	03	03
1.5	Pharmaceutical Engineering-I	03	03
Semester-II			
2.1	Pharmaceutics-II	03	03
2.2	Anatomy and Physiology-II	03	03
2.3	Pharmacognocy-II	03	03
2.4	Pharmaceutical Engineering-II	03	03
2.5	Pharmaceutical Biochemistry-II	03	03
2.6	Mathematics	03	—
Semester-III			
3.1	Physical Pharmaceutics-I	03	03
3.2	Pharmaceutical Microbiology	03	03
3.3	Pharmaceutical Organic chemistry-I	03	03
3.4	Hospital and Community Pharmacy	03	03
3.5	Pharmaceutical Inorganic Chemistry	03	03
3.6	Pathophysiology	03	—
Semester-IV			
4.1	Physical Pharmaceutics-II	03	03
4.2	Pharmaceutical Organic chemistry-II	03	03
4.3	Pharmaceutical Analysis-I	03	03
4.4	Pharmaceutical Biotechnology	03	03
4.5	Pharmacology-I	03	03
4.6	Basic Computer Applications	03	—
Semester-V			
5.1	Pharmaceutics-III	03	03
5.2	Medicinal Chemistry-I	03	03
5.3	Pharmaceutical Organic Chemistry-III	03	03
5.4	Pharmacognocy-III	03	03
5.5	Pharmacology-II	03	03
5.6	Biopharmaceutics-I	03	—

Semester-VI			
6.1	Pharmaceutics-IV	03	03
6.2	Medicinal Chemistry-II	03	03
6.3	Pharmaceutical Analysis-II	03	03
6.4	Pharmacognocy-IV	03	03
6.5	Biopharmaceutics-II	03	03
6.6	Clinical Pharmacy	03	—
6.7	Project*	—	03
Semester-VII			
7.1	Pharmaceutics-V	03	03
7.2	Medicinal Chemistry-III	03	03
7.3	Pharmacology-III	03	03
7.4	Pharmacognocy-V	03	03
7.5	Pharmaceutical Analysis-III	03	03
7.6	Pharmaceutical Jurisprudence	03	—
7.7	Seminar (one per each student)*	03	—
Semester-VIII			
8.1	Pharmaceutics-VI	03	03
8.2	Medicinal Chemistry-IV	03	03
8.3	Pharmaceutical Analysis-IV	03	03
8.4	Pharmacognocy-VI	03	03
8.5	Clinical Pharmacotherapeutics	03	03
8.6	Communication Skills	03	—

Appendix-II

Scheme of Examination for B. Pharm (Semester wise)

First to Eight semester

Sub. Code	Subject	Scheme of Examination						Minimum Marks for passing		Total Marks in theory/ practical (Credits)
		Theory		Practical		Theory Int. Marks	Pract. Int. Marks	Theory	Pra ctie al	
		Hrs	Marks	Hrs	Marks					
Semester-I										
1.1	Pharmaceutics-I	3	60	5	50	20	30	36	40	80 (04) + 80 (04)
1.2	Pharmaceutical Biochemistry-I	3	60	5	50	20	30	36	40	80 (04) + 80 (04)
1.3	Anatomy and Physiology-I	3	60	5	50	20	30	36	40	80 (04) + 80 (04)
1.4	Pharmacognocy-I	3	60	5	50	20	30	36	40	80 (04) + 80 (04)
1.5	Pharmaceutical Engineering-I	3	60	5	50	20	30	36	40	80 (04) + 80 (04)
		Total Marks (credits) for the Semester								800 (Total Credits: 40)
Semester-II										
2.1	Pharmaceutics-II	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
2.2	Anatomy and Physiology-II	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
2.3	Pharmacognocy-II	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
2.4	Pharmaceutical Engineering-II	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
2.5	Pharmaceutical Biochemistry-II	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
2.6	Mathematics	3	60	—	—	20	—	36	—	80 (04)
		Total Marks (credits) for the Semester								880 (Total Credits: 44)
Semester-III										
3.1	Physical Pharmaceu-tics-I	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
3.2	Pharmaceutical Microbiology	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
3.3	Pharmaceutical Organic chemistry-I	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
3.4	Hospital and Community Pharmacy	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
3.5	Pharmaceutical Inorganic chemistry	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
3.6	Pathophy siology	3	60	—	—	20	—	36	—	80 (04)
		Total Marks (credits) for the Semester								880 (Total Credits: 44)
Semester-IV										
4.1	Physical Pharmaceutics-II	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
4.2	Pharmaceutical Organic chemistry-II	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
4.3	Pharmaceutical Analysis-I	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
4.4	Pharmaceutical Biotechnology	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
4.5	Pharmacology-I	3	60	5	50	20	30	36	40	80 (04)+ 80 (04)
4.6	Basic Computer Applications	3	60	—	—	20	—	36	—	80 (04)
		Total Marks (credits) for the Semester								880 (Total Credits: 44)

Semester-V										
5.1	**Pharmaceutics-III**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
5.2	**Medicinal Chemistry-I**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
5.3	**Pharmaceutical Organic Chemistry-III**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
5.4	Pharmacognocy-III	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
5.5	**Pharmacology-II**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
5.6	**Biopharmaceutics-I**	**3**	**60**	—	—	**20**	—	**36**	—	**80 (04)**
		Total Marks (credits) for the Semester								**880 (Total Credits: 44)**
Semester-VI										
6.1	**Pharmaceutics-IV**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
6.2	**Medicinal Chemistry-II**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
6.3	**Pharmaceutical Analysis-II**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
6.4	**Pharmacognocy-IV**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
6.5	Biopharmaceutics-II	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
6.6	**Clinical Pharmacy**	**3**	**60**	—	—	**20**	—	**36**	—	**80 (04)**
6.7	**Project***	—	—	**3**	**80**	—	—	—	—	**80 (04)**
		Total Marks (credits) for the Semester								**960 (Total Credits: 48)**
Semester-VII										
7.1	**Pharmaceutics-V**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
7.2	**Medicinal Chemistry-III**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
7.3	**Pharmacology-III**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
7.4	**Pharmacognocy-V**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
7.5	**Pharmaceutical Analysis-III**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
7.6	**Pharmaceutical Jurisprudence**	**3**	**60**	—	—	**20**	—	**36**	—	**80 (04)**
7.7	**Seminar (one per each student)***	**3**	**80**	—	—	—	—	**36**	—	**80 (04)**
		Total Marks (credits) for the Semester								**960 (Total Credits: 48)**
Semester-VIII										
8.1	**Pharmaceutics-VI**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
8.2	**Medicinal Chemistry-IV**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
8.3	**Pharmaceutical Analysis-IV**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
8.4	**Pharmacognocy-VI**	**3**	**60**	**5**	**50**	**20**	**30**	**36**	**40**	**80 (04)+ 80 (04)**
8.5	**Clinical Pharma cotherapeutics**	**3**	**60**	—	—	**20**	—	**36**	—	**80 (04)**
8.6	**Communication Skills**	**3**	**60**	—	—	**20**	—	**36**	—	**80 (04)**
		Total Marks (credits) for the Semester								**800 (Total Credits: 40)**

Project Report :-

* The topic for the project shall be based on the practical work /theoretical/ review oriented /any topic from current Pharmaceutical development and shall be assigned to him/her by the respective guide from faculty members immediate from the date of the commencement of the sixth semester.

* Report to be submitted in the institute and examination (seminars on the project report) shall be conducted at the college level.

Examination/ Evaluation of the project shall be based on Introduction and information retrieval systems, Organization of material and references in the project report, Representation, Skill in oral presentation, Questioning and defending, and finally on the report.

Seminar :-

* The topic for the seminar shall be assigned to him/her by the faculty members of Seventh semester & topic should be decided from the syllabus of same semester, with immediate from the date of the commencement of the seventh semester.

  Evaluation of seminar shall be based on the communication, representation and skill in oral presentation.

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Appendix-III

Semester-I

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
1.1	Pharmaceutics-I	80 (04)	80 (04)	160 (08)
1.2	Pharmaceutical Biochemistry-I	80 (04)	80 (04)	160 (08)
1.3	Anatomy and Physiology-I	80 (04)	80 (04)	160 (08)
1.4	Pharmacognocy-I	80 (04)	80 (04)	160 (08)
1.5	Pharmaceutical Engineering-I	80 (04)	80 (04)	160 (08)
	Total			800 (40)

Semester-II

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
2.1	Pharmaceutics-II	80 (04)	80 (04)	160 (08)
2.2	Anatomy and Physiology-II	80 (04)	80 (04)	160 (08)
2.3	Pharmacognocy-II	80 (04)	80 (04)	160 (08)
2.4	Pharmaceutical Engineering-II	80 (04)	80 (04)	160 (08)
2.5	Pharmaceutical Biochemistry-II	80 (04)	80 (04)	160 (08)
2.6	Mathematics	80 (04)	—	80 (04)
	Total			880 (44)

Semester-III

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
3.1	Physical Pharmaceutics-I	80 (04)	80 (04)	160 (08)
3.2	Pharmaceutical Microbiology	80 (04)	80 (04)	160 (08)
3.3	Pharmaceutical Organic chemistry-I	80 (04)	80 (04)	160 (08)
3.4	Hospital and Community Pharmacy	80 (04)	80 (04)	160 (08)
3.5	Pharmaceutical Inorganic chemistry	80 (04)	80 (04)	160 (08)
3.6	Pathophysiology	80 (04)	—	80 (04)
	Total			880 (44)

Semester-IV

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
4.1	Physical Pharmaceutics-II	80 (04)	80 (04)	160 (08)
4.2	Pharmaceutical Organic chemistry-II	80 (04)	80 (04)	160 (08)
4.3	Pharmaceutical Analysis-I	80 (04)	80 (04)	160 (08)
4.4	Pharmaceutical Biotechnology	80 (04)	80 (04)	160 (08)
4.5	Pharmacology-I	80 (04)	80 (04)	160 (08)
4.6	Basic Computer Applications	80 (04)	—	80 (04)
	Total			880 (44)

Semester-V

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
5.1	Pharmaceutics-III	80 (04)	80 (04)	160 (08)
5.2	Medicinal Chemistry-I	80 (04)	80 (04)	160 (08)
5.3	Pharmaceutical Organic Chemistry-III	80 (04)	80 (04)	160 (08)
5.4	Pharmacognocy-III	80 (04)	80 (04)	160 (08)
5.5	Pharmacology-II	80 (04)	80 (04)	160 (08)
5.6	Biopharmaceutics-I	80 (04)	—	80 (04)
	Total			880 (44)

Semester-VI

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
6.1	Pharmaceutics-IV	80 (04)	80 (04)	160 (08)
6.2	Medicinal Chemistry-II	80 (04)	80 (04)	160 (08)
6.3	Pharmaceutical Analysis-II	80 (04)	80 (04)	160 (08)
6.4	Pharmacognocy-IV	80 (04)	80 (04)	160 (08)
6.5	Biopharmaceutics-II	80 (04)	80 (04)	160 (08)
6.6	Clinical Pharmacy	80 (04)	—	80 (04)
6.7	Project	80 (04)	—	80 (04)
	Total			960 (48)

Semester-VII

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
7.1	Pharmaceutics-V	80 (04)	80 (04)	160 (08)
7.2	Medicinal Chemistry-III	80 (04)	80 (04)	160 (08)
7.3	Pharmacology-III	80 (04)	80 (04)	160 (08)
7.4	Pharmacognocy-V	80 (04)	80 (04)	160 (08)
7.5	Pharmaceutical Analysis-III	80 (04)	80 (04)	160 (08)
7.6	Pharmaceutical Jurisprudence	80 (04)	—	80 (04)
7.7	Seminar (one per each student)	80 (04)	—	80 (04)
	Total			960 (48)

Semester-VIII

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
8.1	Pharmaceutics-VI	80 (04)	80 (04)	160 (08)
8.2	Medicinal Chemistry-IV	80 (04)	80 (04)	160 (08)
8.3	Pharmaceutical Analysis-IV	80 (04)	80 (04)	160 (08)
8.4	Pharmacognocy-VI	80 (04)	80 (04)	160 (08)
8.5	Clinical Pharmaco-therapeutics	80 (04)	—	80 (04)
8.6	Communication Skill	80 (04)	—	80 (04)
	Total			800 (40)

Appendix-IV

DISTRIBUTION OF TOTAL MARKS/ CREDITS SEMESTER WISE :

Year	Semester	Total Marks/Credits
First year	Semester-I	800(40)
	Semester-II	880 (44)
Second year	Semester-III	880 (44)
	Semester-IV	880 (44)
Third year	Semester-V	880 (44)
	Semester-VI	960 (48)
Fourth year	Semester-VII	960 (48)
	Semester-VIII	800 (40)
	Total Marks/Credits	**7040(credits= 352)**

Appendix-V

Sant Gadge Baba Amravati University, Amravati

B. Pharm Syllabus

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

Features of the Credit System

With effect from June 2010

FEATURES OF THE CREDIT SYSTEM

- Degree course would be of total 352 credits.
- Two credit course of theory will be of two clock hours per week running for 08 weeks.
- Four credit course of theory will be of three clock hours per week running for 12 weeks.
- Two credit courses of practical will consist of three hours of laboratory exercise for 12 weeks.
- Three credit course of practical will consist of three hours of laboratory exercise for 12 weeks.

FIRST YEAR MAY DEVIDE INTO TOTAL TWO SEMESTERS (SEMESTER-I AND SEMESTER-II) AND SHALL HAVE TOTAL 11 THEORY COURSES, 10 PRACTICAL COURSE.

- 11 Theory courses x 4 credits = 44 credits
- 10 Laboratory courses x 4 credits = 40 credits

Total = 84 credits

SECOND YEAR MAY DEVIDE INTO TOTAL TWO SEMESTERS (SEMESTER-III AND SEMESTER-IV) AND SHALL HAVE TOTAL 12 THEORY COURSES, 10 PRACTICAL COURSE.

- 12 Theory courses x 4 credits = 48 credits
- 10 Laboratory courses x 4 credits = 40 credits

Total = 88 credits

THIRD YEAR MAY DEVIDE INTO TOTAL TWO SEMESTERS (SEMESTER-V AND SEMESTER-VI) AND SHALL HAVE TOTAL 12 THEORY COURSES, 11 PRACTICAL COURSE AND 1 PROJECT

- 12 Theory courses x 4 credits = 48 credits
- 10 Laboratory courses x 4 credits = 40 credits
- 1 Project x 4 credits = 04 credit

Total = 92 credits

FORTH YEAR MAY DEVIDE INTO TOTAL TWO SEMESTERS (SEMESTER-VII AND SEMESTER-VIII) AND SHALL HAVE TOTAL 12 THEORY COURSES, 8 PRACTICAL COURSE AND 1 SEMINAR

- 12 Theory courses x 4 credits = 48 credits
- 9 Laboratory courses x 4 credits = 36 credits
- 1 SEMINAR x 4 credits = 04 credit

Total = 88 credits

EVERY STUDENT SHALL COMPLETE MINIMUM 262 CREDITS IN EIGHT SEMESTERS.

1. First year have two semesters and will consist of 84 credits.
2. Second year have two semesters and will consist of 88 credits.
3. Third year have two semesters and will consist of 92 credits.
4. Forth year have two semesters and will consist of 88 credits.

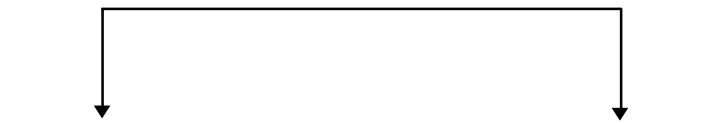
- First year (semester-I and II) = 84 credits
- Second year (semester-III and IV) = 88 credits
- Third year (semester-V and VI) = 92 credits
- Forth year (semester-VII and VIII) = 88 credits

Eight semesters total credits = 352 credits

SCHEME OF SYLLABUS AND CREDIT SYSTEM

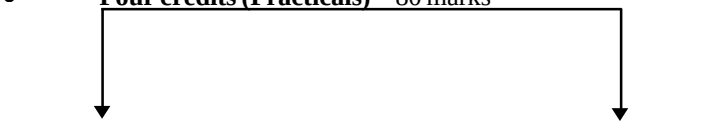
Two credits = 40 marks, three credits= 60 marks and four credits = 80 marks.

- **Four credits (theory)** = 80 marks



- Two credits (theory) **= 40 marks**

- **Four credits (Practicals)** = 80 marks



- **Two credits (Practicals)** = 40 marks

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 school.

- Credit system offers more options to students and has more flexibility.
- Students can get requisite credits from the concerned school where he is mutually permitted on terms mutually agreed to complete the same and be eligible to appear for term end examination.
- Seminar and the project shall be compulsory to each student at the end semester of third and final year.

- Paper setting and assessment for a particular course would be the responsibility of the course In-charge.
- A student who passes the internal tests but fails in Term End Examination of a course shall be given FC grade.
- Student with FC 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 within 1.5 year from appearing for first time in the concerned paper.
- The evaluation is based on average weightage system. Every subject has credit point based system. Every student is awarded grade point out of maximum 10 points in each subject (based on 10 point scale).
- Grades-Marks for each course would be converted to grades as shown in following Table 1 for theory and table 2 for practical.

Table 1: Final Grade point for SGPA and CGPA for Theory

Final grade	Range of Marks obtained out of 100 or equivalent fraction	Grade point
A+	90-100	10
A	80-89	9
B+	70-79	8
B	60-69	7
C+	50-59	6
C	50-54	5
D	40-49	4
F	Below 40	0

Table 2: Final Grade point for SGPA and CGPA for Practical

Final grade	Range of Marks obtained out of 100 or equivalent fraction	Grade point
A+	90-100	10
A	80-89	9
B+	70-79	8
B	60-69	7
C+	55-59	6
C	50-54	5
D	Below 50	0

- Equivalence of the conventional division/class with the CGPA in final semester is in accordance with the following table 3.

Table-3: 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 not less than or equal to 7.49	First Class
3.	5.50 or more but not less than or equal to 5.99	Higher Second Class
4.	5.00 or more but not less than or equal to 5.49	Second Class

- Based on the grade point 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.

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

Where U1, U2,…… are subject credit of the respective course and M1, M2,…….. 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 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 semester V, VI, VII & VIII.

$$CGPA = \frac{\sum_{n-1}^{n} SGPA(n)\ Cn}{\sum^{n} Cn}$$

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.

- Degree will be awarded on the basis of the performance of credits from the Semester-V to VIII.

ACADEMIC CALENDAR AND TERMS

The terms and academic activities of the Sant Gadge Baba Amravati University, Amravati 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, III, V and VII) : As Per University Academic Calendar

Beginning of Second Term (Semester II, IV, VI and VIII) : As Per University Academic Calendar

Vacation : As Per University Academic Calendar

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SANT GADGE BABA AMRAVATI UNIVERSITY
DIRECTION

No.: 68 / 2010 Date : 11/11/ 2010

Subject : Consideration of equivalence of D.Pharm. passed students admitted in B.Pharm. 1st year semester pattern, Direction 2010.

Whereas, Direction No. 21/2010 in respect of Examination Leading to the Degree of भेषजी स्नातक (Bachelor of Pharmacy) (Four Year - Eight Semester Degree Course) is in existence from the Academic Session 2010-11.

AND

Whereas, in the aforesaid direction the equivalence for D.Pharm. passed students admitted in the first year B.Pharm. semester pattern is not provided.

AND

Whereas, the Board of Studies in Pharmaceutical Science in its emergent meeting held on 21.10.2010 vide item No.60 have resolved to recommend provisions for aforesaid students.

AND

Whereas, the Hon'ble Vice-Chancellor has accepted the above recommendation of B.O.S. in Pharmaceutical Sciences on behalf of faculty of Medicine and Academic Council on 25.10.2010.

AND

Whereas, the aforesaid recommendations are to be regularized by framing the concerned Ordinance & making of the Ordinance may likely to take some time and the above provision is to be implemented from the current session.

Now, therefore, I, Pravin Pardesi, Vice Chancellor of Sant Gadge Baba Amravati University, 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 "Consideration of equivalence of D.Pharm. passed students admitted in B.Pharm. 1st year semester pattern, Direction, 2010".

2) This direction shall come into force from the date of its issuance.

3) Exempted to the candidates from appearing in all the subjects excluding the subject Mathematics of First Year B.Pharm. Ist &

IInd semester those who are admitted on the basis of D.Pharm. Such candidates have to pass in the theory paper of Mathematics of first year B.Pharm. second semester otherwise his/her result of third year B.Pharm. Semester-V examination will not be declared.

Sd/-
Amravati (Pravin Pardesi)
Dated : 09/11/2010 Vice-Chancellor

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SANT GADGE BABA AMRAVATI UNIVERSITY
DIRECTION

No.: 4 / 2012 Date : 22/02/ 2012

Subject : Corrigendum to Direction No.21/2010 & 8 of 2011 in respect of Examination Leading to the Degree of भेषजी स्नातक (Bachelor of Pharmacy) (Four Year - Eight Semester Degree Course).

Whereas, Direction No.21/2010 in respect of Examination Leading to the Degree of भेषजी स्नातक (Bachelor of Pharmacy) (Four Year - Eight Semester Degree Course) is in existence in the University.

AND

Whereas, the aforesaid Direction is corrected by issuing corrigendum to Direction No.21 of 2010 vide Direction No.8/2011.

AND

Whereas, the Academic Council in its meeting held on 13.1.2012 vide item No.14 7) A) R-2, R-3 & R-4 has accepted the recommendations of the faculty of Medicine (including Pharmaceutical Sciences, Dentistry & Homoeopathy) regarding corrections in the aforesaid Directions from the Academic Session 2011-12.

AND

Whereas, the Hon'ble Vice-Chancellor has approved the corrections recommended by the Dean, faculty of Medicine (including Pharmaceutical Sciences, Dentistry & Homoeopathy) on behalf B.O.S. in Pharmaceutical Sciences, faculty of Medicine and Academic Council on 9.2.2012 to be implemented from the Academic Session 2011-12.

AND

Whereas, the said matter is required to be regulated by framing an Ordinance/Regulation.

AND

Whereas, conversion of above said Directions into respective Ordinance/Regulation is before the Ordinance Committee for making Draft Ordinance/Regulation and onward submission to higher authorities.

AND

Whereas, making of Ordinance/Regulation may likely to take some time.

AND

Whereas, the Academic Session 2011-12 is already started and hence it is necessary to issue corrigendum to above directions in this regard.

Now, therefore, I, Dr. Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, 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 "Corrigendum to Direction No.21/2010 & 8 of 2011 in respect of Examination Leading to the Degree of भेषजी स्नातक (Bachelor of Pharmacy) (Four Year - Eight Semester Degree Course)".
2) This direction shall come into force from the date of its issuance.
3) the following corrections be made in Direction No.8 of 2011 for rectifying the Direction which are to be implemented from the Academic Session 2011-12 as follows-

   i) the present tables i.e. Table-1 & Table-2 be substituted by the following tables as Table-1 & Table-2 :

Table 1: Grade point for Theory

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	45-54	5
FF	Below 45	0
ZZ	Absent in Examination	

Table 2: Grade point for Practical

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	

ii) In Table 3 "Equivalence of Class/Division to CGPA", in Sr.No.2, 3, & 4, the word 'not' appearing in the column CGPA be deleted.

iii) The following additional Table for 'Grade Points for SGPA & CGPA' of B.Pharm. be inserted.

Table-4 : Grade Points for SGPA and CGPA of B.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
4.5 - 5.49	CD
0 - 4.49	FF
Absent in Examination	ZZ

iv) The formula for CGPA be corrected as-

$$CGPA = \frac{\sum_{n=5}^{n=8} SGPA(n)C(n)}{\sum_{n=5}^{n=8} C(n)}$$

v) Grade for failure students should be 'FF' instead of 'FC'.

vi) The words and figure "within 1.5 year from appearing for first time in the concerned paper" appearing in aforesaid Direction at Sr.No. 3), in line 9 & 10, be deleted.

vii) In Direction No.8 of 2011, the following provision be inserted in Sr.No.3), after the contents of first bullet (i.e. ●).
"The students who passed D.Pharm. examinations and admitted to B.Pharm. Ist year Ist / IInd semester should be exempted for award of "FF" Grade in B.Pharm. first year, IInd Semester Examination."

4) i) In Direction No.21 of 2010, the following provision be inserted.
"There should be 5 incentive marks for each semester of B.Pharm. examinations."

ii) The word "Candidate" appearing in the first line of Para 21 of the Direction No.21 of 2010 be substituted by the word "Ex-student".

iii) In Direction No.21 of 2010, the words, "The post H.S.S.C. Diploma in Pharmacy (i.e. according to Education Regulation, 1991 of Pharmacy Council of India) from the Board of Technical Education or Equivalent from an institute approved by Pharmacy Council of India in first attempt scoring not less than 600 marks out of 1000 marks at D.Pharm.Part-II examination." appearing in Para 7 (B) be substituted by the words "The norms laid down by the Directorate of Technical Education, Mumbai, Government of Maharashtra from time to time."

Sd/-
Amravati (Dr.M.K.Khedkar)
Dated : 21/02/2012 Vice-Chancellor

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SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
% ORDINANCE NO. 42 OF 2005

Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005

Whereas it is expedient to frame an Ordinance relating to Examination in Environmental Studies leading to Bachelor Degree level, hereinafter appearing, the Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called "Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005."

2. This Ordinance shall come into force from the Academic session 2005-06.

3. In this Ordinance and in other ordinances relating to the examination, unless there is anything repugnant in the subject or context :-

(i) "Academic session" means a session commencing on such date and ending with such date of the year following as may be appointed by the Management Council.
(ii) "Admission to an examination" means the issuance of an admission card to a candidate in token of his having complied with all the conditions laid down in the relevant ordinance, by a competant officer of the University.
(iii) "Applicant" means a person who has submitted an application to the University in the form prescribed for admission to an examination.
(iv) "Candidate" means a person who has been admitted to an examination by the University.
(v) "Regular Candidate" means an applicant who has applied for admission to a Univeristy examination through an affiliated college, Department or Institute in which he/she has prosecuting a regular course of study.
(vi) "Examinee" means a person who present himself/herself for an examination to which he/she has been admitted.
(vii) "Examination" means an examination prescribed by the University under the relevant Ordinance.
(viii) "External Candidate" means a candidate who is allowed to take a University examination in accordance with the provision of Original Ordinance No. 151.
(ix) " Non-Collegiate Candidate" means a candidate who is not a collegiate candidate.
(x) An "Ex-student" is a person who having once been admitted to an examination of this University, is again required to take the same examination by reason of his failure or absence thereat and shall

include a student who may have joined a college, Department or Institute again in the same class.

(xi) "Bachelor Degree Examination" means a examination leading to Bachelor Degree of the University.

(xii) "Previous Year" means a year following by final year of Bachelor Degree.

4. Save as otherwise specifically provided, the conditions prescribed for admission to the examination under this Ordinance shall apply to all persons who wish to take the examination to the Degrees of the University mentioned in para 5 below.

5. The conditions prescribed for admission to examination under this Ordinance shall apply to following degrees of the University :-

1) Bachelor of Arts
2) Bachelor of Performing Arts
3) Bachelor of Fine Arts
4) Bachelor of Mass Communication
5) Bachelor of Social Work
6) Bachelor of Commerce
7) Bachelor of Business Administration
8) Bachelor of Science
9) Bachelor of Computer Science
10) Bachelor of Computer Applications
11) Bachelor of Pharmacy
12) Bachelor of Science (Home Science)
13) Bachelor of Technology (Cosmetics)
14) Bachelor of Engineering
15) Bachelor of Engineering (Part Time) (Civil)
16) Bachelor of Textile
17) Bachelor of Technology (Chemical Technology)
18) Bachelor of Technology (Chemical Engg.)
19) Bachelor of Architecture, and
20) Bachelor of Laws (Five Year Course)

6 i) Environmental Studies shall be a compulsory subject for a previous year examination of the following Bachelor Degrees of the University,

1) Bachelor of Arts
2) Bachelor of Performing Arts
3) Bachelor of Fine Arts
4) Bachelor of Mass Communication

5) Bachelor of Social Work
6) Bachelor of Commerce
7) Bachelor of Business Administration
8) Bachelor of Science
9) Bachelor of Computer Science
10) Bachelor of Computer Applications
11) Bachelor of Pharmacy
12) Bachelor of Science (Home Science)
13) Bachelor of Technology (Cosmetics)
14) Bachelor of Engineering (Part Time) (Civil)

ii) Environmental Studies shall be a compulsory subject for IIIrd & IVth Semester of the following Bachelor Degrees of the University,

1) Bachelor of Engineering
2) Bachelor of Textile
3) Bachelor of Technology (Chemical Technology)
4) Bachelor of Technology (Chemical Engineering)
5) Bachelor of Architecture, and

iii) Environmental Studies shall be a compulsory subject for Vth & VIth Semester of the Degree of Bachelor of Laws (Five Year Course)

iv) Students admitted to Second Year/Third Year/IVth Semester Vth Semester of various degree examination courses in different faculties n the academic session 2005-06 or thereafter shall have to appear for examination in the subject Environmental studies.

7. The main Examination leading to Environmental Studies shall be held in Summer and Supplementary examination in Winter every year, at such places and on such date as may be appointed by the Board of Examinations.

Explanation :- Examination shall be conducted on the basis of one common question paper for all Bachelor Degree examination courses irrespective of annual or semester pattern.

8. Scope of the subject for annual pattern examination and or semester pattern examination shall be as provided under the syllabus.

9. Common question paper for all courses covered under this Ordinance alongwith answer books shall be supplied by the University to the Colleges, Departments and Institutes for conducting the examination of the subject.

10. Valuation of the answer books relating to this subject shall be done at College/Department/Institution level only. Remuneration for valuation of answer books shall not be paid by the University.
Provided that prescribed evaluation fee for evaluation of each answer Book/s of an external examinee/s appeared from the examination centre shall be paid to each examination centre.
11. It shall be obligatory on the part of the College/Department/Institute to submit candidate wise following information to the University on or before the date as may be prescribed by the University :-

Sr. No.	Grade/Category	Marks secured
1.	"A"	- 60 and above
2.	"B"	- 45 to 59
3.	"C"	- 35 to 44
4.	"D"	- 25 to 34
5.	"Fail"	- 24 and below
6.	"Absent"	

12. For the purposes of teaching, learing and examination, the Committee consisting of three teachers shall be appointed by the Principal/ Head of the Department/Head of the Institution under his/her Chairmanship/ Chairpersonship. While appointing three teachers on the said committee, the Principal shall take care that the teachers to be appointed on the committee, if necessary, shall be from different faculty.

13. i) Duration of theory examination of this subject shall be three hour.
ii) For all Bachelor Degree examinations, common question paper of 100 marks shall be provided by the University.
iii) Distribution of these 100 marks shall be as follows :-

a) Part-A, Short Answer Pattern	-25 Marks
b) Part-B, Essay type with inbuilt choice	-50 Marks
c) Part-C, Essay on Field Work	-25 Marks

14. Medium of instruction shall be English or Marathi or Hindi. Question paper shall be supplied in English and Marathi and Hindi. A candidate shall have option to write answers in English or Marathi or Hindi.

15. Examination for the subject Environmental Studies shall be compulsory for external candidates appearing as a fresh candidate at Winter and/or Summer examination.

16. For teaching of the subject, there shall be atleast two hour per week.
For teaching the subject to the regular candidates, a full time approved teacher of the University and or a person having Postgraduate Degree in any faculty with second class shall be considered elligible.

17. For teaching of the subject, additional fee to be charged to regular candidate shall be as prescribed by the University.

18. Every College/University Teaching Department shall Charge addtional fee of Rs. 100/- to every student of the subject Environmental Studies. Out of this Rs.100/-, the College/University Teaching Department shall have to pay Rs.25/- to the University as an examination fee of each candidate for the subject Environmental Studies.
19. The Grade secured by an examinee in the examination of this subject shall not be considered for providing the facility of A.T.K.T. in next higher class.

20. The provisions of Ordinance No. 18/2001 shall not be applicable for securing a grade or higher grade in the examination of this subject.

21. Result of the Final Year of the respective Degree shall not be declared of an examinee unless he/she secures any one of the grade in the examination of subject.
Provided an examinee admitted to Five Year LL.B. course desiring not to continue his/her education beyond Sixth Semester of the said course shall have to secure any one of the grade in the examination of the subject otherwise his/her result of Sixth Semester for awarding B.A. degree shall not be declared.

22. Certificates shall be issued, to the successful examinees in the subject Environmental Studies, after the examination.

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Syllabus Prescribed for B. Pharm. Semester –V
(Introduced from the Academic Session 2012-13)

SEMESTER-V

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
5.1.	Pharmaceutics-III	80 (04)	80 (04)	160 (08)
5.2.	Medicinal Chemistry-I	80 (04)	80 (04)	160 (08)
5.3.	Pharmaceutical Organic Chemistry-III	80 (04)	80 (04)	160 (08)
5.4.	Pharmacognosy-III	80 (04)	80 (04)	160 (08)
5.5.	Pharmacology-II	80 (04)	80 (04)	160 (08)
5.6.	Biopharmaceutics-I	80 (04)	—	80 (04)
	Total			880 (44)

\Subject code: T-5.1

Subject : Pharmaceutics – III

THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. Preformulation studies:

a) Study of physical properties of drugs like physical form, particle size, shape, density, wetting, dielectric constant, solubility, dissolution, organoleptic property and their effect on formulation, stability and bioavailability.

b) Study of chemical properties of drugs like hydrolysis, oxidation, reduction racemisation, polymerisation etc. and their influence on formulation and stability of products.

c) Stabilization and stability testing protocol for various pharmaceutical products.

2. **Drug Regulatory affairs & NDA.**

3. **Liquid dosage forms :** Introduction Types of additives used in formulations, vehicles,stabilizers,preservatives, suspendingagents, emulsigying agents, solubilizers, colors, flavors, manufacturing, packaging and evaluation of clear liquids, suspension and emulsion.

SECTION-B

4. **Semisolid dosage forms :** Types, mechanism of drug penetration, factors influencing penetration, semisolid bases and their selection; general formulations of semisolids and gels manufacturing procedure, evaluation and packaging.

5. **Pharmaceutical aerosols :** Various propellants and valves, general formulations. manufacturing, packaging and evaluation methods, pharmaceutical applications.

6. **Ophthalmic preparations:** Requirements, formulations, methods of preparation, containers, evaluation.

Subject code: P-5.1

Subject : Pharmaceutics – III

PRACTICAL **45 Hours (3 hrs. /week)**

1. Preformulation studies including drug-excipient compatibility studies, effect of stabilizers, preservatives etc. in dosage form design.
2. Preparation, evaluation and packaging of liquid orals like solutions, Syrups, suspensions and emulsions, ointments, creams, suppositories, eye drops, eye ointments etc.

Recommended Books:

1) Ansel H.C., Introduction to Pharmaceutical Dosage Forms, K M Varghese & Co., Bombay.
2) Aulton M E Pharmaceutics - The Science of Dosage Form Design, ELBS/Churchill Livingstone.
3) Avis K E, Lachman L and Lieberman H A, Marcel Dekker Inc. Pharmaceutical Dosage Forms; Parenteral Medications, Vols. 1 & 2, NY.
4) Lachman L, Liberman H.A. & Kanig J.L., "The Theory & Practice of Industrial Pharmacy", Lea & Febiger, Philadelphia.
5) Banker G S and Rhode C T Modern Pharmaceutics, Marcel Dekker Inc., NY.
6) Bean H S, Beckett A H, and Carless A H Advances in Pharmaceutical Sciences, Vol 1-4 Academic Press, London.
7) Carter S J, Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS Publishers, Delhi.
8) Carter S J, Cooper and Gunn's Tutorial Pharmacy CBS Publishers, Delhi.
9) Remington's, the science and Practice of Pharmacy, Mack Publishing Co. Easton, Pernsybrania.

Subject code: T-5.2

Subject : Medicinal Chemistry-I

THEORY **45 Hours (3 hrs. /week)**

Section A

1. Basic principles of medicinal chemistry:

Physico-chemical aspects (optical, geometric and bioisosterism) of drug molecules and biological action. Drug-receptor interaction including transduction mechanism

2. Drug metabolism:

Phase I and phase II reactions, biological factors affecting drug metabolism, inducers and inhibitors of drug metabolism, significance of drug metabolism in medicinal chemistry, principles of prodrug design

Section B

3. History, development, classification, recent development, mode of action (biochemical and molecular basis wherever applicable), SAR, IUPAC and synthesis of drugs of following classes

Sympathomimetic agents including biosynthesis and metabolism of adrenergic neurotransmitters, adrenoreceptor blockers, cholinergic agents, cholinesterase inhibitors, anticholinergic agents including antispasmodics, ganglionic stimulants and blockers, neuromuscular blockers

Subject code: P-5.2

Subject : Medicinal Chemistry –I

PRACTICAL **45 Hours (3 hrs. /week)**

1) Laboratory scale preparation by conventional / microwave synthesis of selected drugs from course content and characterization by melting point / boiling point / thin layer chromatography / ultra-violet spectroscopy / IR spectroscopy
2) Establishing the pharmaceutical standards of drug synthesized

Books Recommended

1. J. N. Delagado and W. A. R. Remers, Eds, Wilson and Giswold's Textbook of Organic, Medicinal and Pharmaceutical Chemistry, J. Lipponcott Co. Philadephia.
2. W. C. Foye, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.

3. H. E. Wolff, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York Oxford University Press, Oxford.
4. Daniel Lednicer, Strategies for Organic Drug Synthesis & Design, John Wiley & sons, USA.
5. B. N. Ladu, H. G. Mandel & E. L. Way, Fundamental of Drug Metabolisum & Disposition, William & Wilkins co., Baltimore.
6. I. L. Finar, Organic Chemistry, Vol. I & II, ELBS/ Longman, London.
7. Vogel's Text book of Practical Organic Chemistry, ELBS/ Longman, London
8. Mann & Saunder, Practical Organic Chemistry, Orient Longman, London.
9. Shriner, Hermann, Morrill, Curtin & Fuson, The Syntematic Identification of Organic Compounds, John Wiley & Sons. USA.
10. R. M. Silverstein, G. Claytron Bassel's, T. C. Movvill, Spectormetric identification of Organic compounds, John Wiley & Sons, USA

Subject code: T-5.3

Subject : Pharmaceutical Organic chemistry – III

THEORY **45 Hours (3 hrs. /week)**

Section-A

1. Chemistry of Heterocyclic Compounds

Structures & numbering & corresponding drugs of the following Heterocyclic compounds: Furan, Thiophene, Pyrrole, Pyrazole, thiazole, imidazole, oxazole, isoxazole, hydantoin, pyridine, pyridazine, pyrimidine, indole, benzyl furan, benzylthiazole, benzimidazole, benzoxazole, quinoline, isoquinoline, quinazoline, cinnoline, purine, xanthine, pteridine, Coumarin; Synthesis and Reaction of following compounds: furan, thiophene, pyrrole, indole imidazole, thiazole, pyridine, quinoline and isoquinoline.

2. **Organic Synthesis by Retro Synthesis**

Introduction to common terms. Disconnections involving one and two functional groups, Rules of disconnection, The retro-synthesis of following drugs be covered: Ibuprofen, Propranolol, Losartan, Ciprofloxacin and Sulfamethoxazole.

3. **Introduction to Combinatorial Chemistry**

History, Multiple Parallel Synthesis, Chemistry and equipments, Mixture synthesis Strategies including solid supported synthesis, Deconvolution methods.

Section-B

4. Chemistry of Carbohydrates

Introduction, Classification and reactions of C5 and C6 sugars and cyclic structures/glycosides. Mutarotation, Establishment of structures of monosaccharides, disaccharides and starch by chemical methods.

5. **Chemistry of Proteins & Amino Acid**

Methods of peptide synthesis- solution and solid phase peptide synthesis (up to pentapeptide), Structure of natural amino acids, isoelectric point. Methods of preparation of amino acids. Peptide bonds, structures of some biologically and medicinally important simple peptides. Proteins, Classification and function. Denaturation, structure of proteins, conjugated proteins, secondary structure of proteins.

6. **Molecular Rearrangements- Mechanism, Stereochemistry & Example (at least two examples)**

a) Rearrangement of electron deficient systems

General Theory. Whitmore-1, 2-shift, Wagner-Meerwein rearrangement, Piancol rearrangement, Wolf rearrangement, Beckmann rearrangement, Hofmann rearrangement, Lossen rearrangement, Curtius rearrangement, Schmidt rearrangement, Baeyer-Villiger Oxidation.

b) Electron-rich rearrangements

Stevens rearrangement, Wittig rearrangement, Neber reaction, Benzillic acid rearrangement, Dakin oxidation, Sommelet rearrangement, Favourskii rearrangement.

c) Migration of Aromatic rings

Fries rearrangement, Claisen rearrangement, Willgerodt reaction, N-Halormide rearrangement.

d) Migration involving double and triple bonds

Cope rearrangement.

7. **Mechanism of following name reaction with example (at least two examples)**

Aldol Condensation, Allan-Robinson reaction, Arndt-Eistert Synthesis, Algar-Flynn-Oyamada Reaction, Birch Reduction, Cannizzarro Reaction, Chichibabin Reaction, Claisen Condensation, Diels-Alder Reaction, Mannich Reaction, MPV Reduction, Michael Reaction, Oppenauer Oxidation, Reformatsky Reaction, Woiff-Kishner Reduction, Wurtz Reaction.

Subject code: P-5.3

Subject : Pharmaceutical Organic Chemistry –III

PRACTICAL **45 Hours (3 hrs. /week)**

1. Synthesis of some heterocyclic compounds
2. Quantitative determination of reactive groups, nitro, hydroxyl, primary and secondary amines, esters, amides and carbonyl.
3. Synthesis of some organic compounds based on name reactions.
4. Synthesis of some organic compounds using green chemistry approach.

Recommended Books

1. Advanced Organic Chemistry by E.S. Gould, 4/Ed. Wiley Eastern Edition.
2. Principles of Organic Synthesis by Norman, 3/Ed., Nelson Thorns Publication.
3. Organic Chemistry by Morrison & Boyd, 7/Ed, Pearson Education.
4. Heterocyclic Chemistry by Joule and Mill, 4/Ed., Blackwell Publishing Oxford.
5. Organic Chemistry by Fieser & Fieser, Vol. I-X, 1/Ed. Asia Publishing House.
6. Modern Hetrocylic Chemistry By Leao Payrettee.
7. Organic Synthesis- The disconnection approach by Stuart Warren, John Wiley & Sons.
8. Vogel's Textbook of Practical Organic Chemistry by A. I. Vogel, 5/Ed., Pearson Education.
9. Handbook of Organic Analysis (Qualitative and Quantitative) by H. T. Clarke, 1/Ed. Arnold-Heinemann.
10. Textbook of Practical Heterocyclic Chemistry by Fitten and Smalley.
11. Synthesis of Drugs-Synthone approach Vol. 1, by Radhakrishnan Ayer, J. R. Rao,
12. M. S. Degani, S. A. Ghone, K. Mohanraj, 2/Ed, 2008, Sevak Publication Pvt. Ltd.
13. Quantitative organic Analysis by Siggsa & Honna, 4/Ed., A Wiley Interscience Publication. John Wiley & Sons.
14. Organic Synthesis, Vol. I to X, John Wiley & Sons Ins. New York.

Subject code: T-5.4
Subject : Pharmacognocy-III
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. Microscopy: Study of plant cell inclusions, reactions of cell walls, cell contents, clearing agent, macerating reagents. Plant tissues. Micromerty, Leaf constants, trichomes, powdered microscopy. Quantitative microscopy as applied drugs evaluation and procedures of microtome sectioning procedure, preparations of biological materials for examination by electronic microscope.
2. Common Poisonous Plants of India
3. Marine Pharmacognsy: Novel medicinal Agents from marine sources.
4. Detailed study of plant Biochemistry, Study of techniques employed in the elucidation of Biosynthetic pathways and the study of important Biosynthetic pathways of plants like photosynthesis, Carbohydrate utilization, Aromatic Biosynthesis, shikimic acid pathway, Isoprenoid pathway, Biosynthesis of tropane, quinoline, hopane, quinidine, opium and indole alkaloids. Biosynthesis of steroidal and antraquinone glycosides.

SECTION-B

5. Glycosides: Definition, general characters and classification, occurrence, general method of isolation and estimation. Study of the biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests for identification of following drugs containing glycosides:
   a) Saponins: Liquorice, ginseng, dioscorea, sarsaparilla and senega.
   b) Cardioactive sterols: Digitalis, squill, strophanthus and thevetia.
   c) Anthraquinone cathartics: Aloe, senna, rhubarb and cascara.
   d) Others: Psoralea, Ammi majus, Ammi visnaga, gentian, saffron, chirata, quassia, citrus bioflavonoids (Lemon and Orange peels), Solanaceous species aswagandha.
6. Introduction, classification and study of different chromatographic methods and their applications in evaluation of herbal drugs.

Subject code: P-5.4
Subject : Pharmacognocy-III
PRACTICAL **45 Hours (3 hrs. /week)**

1. Morphological, Histological, Microchemical and chemical study of-Cinnamon.
2. Morphological, Histological, Microchemical and chemical study of-Clove.

3. Morphological, Histological, Microchemical and chemical study of-Ephedra.
4. Morphological, Histological, Microchemical and chemical study of-Fennel
5. Morphological, Histological, Microchemical and chemical study of-Ginger
6. Morphological, Histological, Microchemical and chemical study of-Ipecac
7. Morphological, Histological, Microchemical and chemical study of-Nux-vomica
8. Morphological, Histological, Microchemical and chemical study of-Quassia
9. Morphological, Histological, Microchemical and chemical study of-Senna.
10. Morphological, Histological, Microchemical and chemical study of-Coriander
11. Morphological, Histological, Microchemical and chemical study of-Vinca leaf
12. Identification of powdered crude drugs and their combinations with the help of organoleptic, microscopic, micro-chemical and chemical methods. (Minimum 5 Expt.).
13. Few exercises on isolation of active principles from crude drugs.
14. Establishment of thin layer chromatographic profiles of some volatile oils and extracts containing alkaloids and glycosides.
15. Spotting of crude drugs mentioned in theory
16. Successive extraction and qualitative test for different extract.
17. Thin layer chromatographic study of different natural products.

Recommended Books

1. Pharmacognosy by G.E. Trease, W.C. Evans, ELBS.
2. Pharmacognosy by Varro E.Tyler, Lynn. R.Brady, James E.Robbers.
3. Text Book of Pharmacognosy by T.E. Wallis, CBS Pub. Delhi.
4. Plant Physiology of Frank B.Salisburry, Cleon. W.Ross, CBS Pub. Delhi
5. Diosgenin and other steroid drug precursors by Asolkar,CSIR.
6. Antibiotics,Isolation&Seperationby Weinsted.M.I.Wagman,G.H.
7. Hormone Chemistry by W.R.Butt.
8. Quantitative analysis & Steroids by Gorog.S.
9. Steroids by Feiry & Feisher.
10. Alkaloids Chemical & Biological by S.W.Pelletier.
11. Biotechnology of Industrial antibiotics by E.vardemme.
12. Chromatography of Alkaloids by Vapoorte, Swendson.
13. Elements of chromatography by P.K.Lala.
14. Introduction to chromatography theory & Practicals by V.K. Srivastava, K.Kishore.

15. Principles of Biotechnology by Leininger.
16. Jenkins Quantitative Pharmacuetical Chemistry by A.N.Knevell.
17. Handbook of vitamins by L.J.Machlein.
18. Clerk's Isolation & Identification of drugs by A.C.Mottal.
19. Selected Topics in Exp-Pharmacology by Seth.V.K.
20. Burger's Medicinal Chemistry by wolff.M.I.
21. Wilson & Gisvolds Text Book of organic Medicinal and Pharmacuetical Chemistry by Deorge.R.F.
22. Phytochemical methods of chemical analysis by Harbone.
23. Organic chemistry vol.II by I.L.Finar.
24. The Essential oil by Gunther.E.
25. The use of Pharmacological techniques for the evaluation of natural products by B.N.DhavanR.C.Srimal. CDRI, Lucknow.
26. Physical methods in organic chemistry by J.C.P.Schwartz.
27. Techniques in organic chemistry by Weiss Creger.
28. Practical Pharmacognosy by Dr.C.K. Kokate.
29. Practical Pharmacognosy by Dr.P.K.Lala.
30. Herbal medicines – Janne Barnes, Linda. A.Anderson.
31. Chinese materia medica – Yaru – PingZhu.
32. Natural products from plants – Peter.B.Kanfman.
33. Selection, Preparation and pharmacological evaluation of plant material, M.Williamson, DT.Okpako.

Subject code: T-5.5

Subject : Pharmacology-II

THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Pharmacology of Autacoids and their antagonists:** Histamine and antihistamines, 5-hyrroxytryptamine and its antagonists, drug therapy for migraine, Prostaglandins, leukotrienes (eicosanoids), platelet activating factors, Plasma Kinins, Angiotensin.
2. **Chemotherapy:** Introduction- Molecular basis of Chemotherapy and drug resistance. General classification of drugs, mechanism of action, Pharmacokinetics, adverse reactions, drug interaction, pharmacological uses of Sulfonamides and Co –trimoxazole, Penicillins and Cephalosporins, Tetracycline and Chloramphenicol, Macrolides, Amino glycosides, Polyenes and Polypeptide antibiotics, Quinolones and Fluoroquinolones, Chemotherapy of Tuberculosis and Leprosy Antifungal antibiotics, Anthelmentics drugs, Chemotherapy of Protozoal infections- Malaria, Amoebiasis, Girdiasis etc. Chemotherapy of Cancer (Neoplasms), Antiviral agents and Treatment of AIDS.

SECTION-B

3. **Hormones and related drugs**: Introduction to endocrine pharmacology, Pituitary hormones , Thyroid and antithyroid drugs, Hormones of Pancreas and hypoglycemic agents, Adrenal corticosteroids and corticosteroids, Gonadal hormones and their inhibitors, Oral contraceptives, drugs regulating Calcium Homeostasis.
4. **Pharmacology of drugs acting on Respiratory system:** Mucolytics, Expectorants, Antitussives, Asthma.
5. Opiods, NSAIDS, and Antipyretics-Analgesic. Drug for rheumatoid arthritis and gout.

Subject code: P-5.5

Subject : Pharmacology-II

PRACTICAL **45 Hours (3 hrs. /week)**

1. To demonstrate the CRC of suitable drugs (Ach/Histmine) on tissue preparation of animals
2. To perform the Interpolation bioassay of suitable drugs (Ach/ Histamine) on tissue preparation of animals
3. To perform the Matching type bioassay of suitable drugs (Ach/ Histamine) on tissue preparation of animals
4. To perform the multiple point bioassay of suitable drugs (Ach/ Histamine) on tissue preparation of animals
5. To study the drug induced catatonia in animals (Any one animal model-like baclofen/ clonidine/haloperidol/Pentazocine induced).
6. To study the effects of drugs on locomotor activity using Actophotometer.
7. To study the Analgesic activity using suitable method. (Hot Plate, Tail Flick/Caudal Immersion, Acetic Acid/Formalin-Induced**). Perform any three**
8. To study the anti-inflammatory activity property of Indomethacin.
9. To study Anticonvulsant activity using MES/ PTZ.
10. To study the drug induced catatonia (extrapyramidal side effect) in rats.
11. To study the effect of hepatic microsomal enzyme induction on the duration of action of phenobarbital sodium.

Note

- Suitable animal preparation- Any experiment suitable to demonstrate the concept- It could be either in-vivo or in-vitro, The animal selected may be mice, rat, rabbit, guinea pig as

admissible as per prevailing Government/CPCSEA guidelines. In case of in-vitro preparations- any tissue preparation from above animals or various tissues from goat may be obtained from slaughter house/ abattoir /butcher shop.

- Agonist- Any agonist that can exhibit activity using the given preparation as reported in standard books/journals may be selected e.g.-Adrenaline and other catecholamines, Acetyl Choline, Histamine, Serotonin, oxytocin etc.
- Antagonist- Any antagonist that can exhibit blocking activity of above mentioned agonists in the given preparation as reported in standard books/journals may be selected.

Recommended Books

1. Goodman Gilman, The Pharmacological basis of therapeutics. Mc-graw Hill New Delhi.
2. Foster R.W. Basic Pharmacology, Arnold, New Delhi.
3. Stahl S. M.. Essential Psychopharmacology Cambridge University Press New Delhi.
4. Dipiro J.L. Pharmacotherapy Handbook. Tata McGraw Hill New Delhi.
5. Official books - Indian Pharmacopoeia, British Pharmacopoeia, United States Pharmacopoeia.
6. Tripathi K.D. Essentials of medical Pharmacology Jaypee New Delhi.
7. Barar F.S.K. Essentials of Pharmacotherapeutics, S. Chand & Company Ltd. New Delhi.
8. Rang H.P., Dale M.M. et. al. Pharmacology. Churchill L Ivingstone, New Delhi.
9. Katzung B.G .Basic & Clinical Pharmacology Mc-graw Hill, New Delhi.
10. Lewis's Pharmacology. Churchill Livingstone London.
11. Harvey R.A., Champe P.C. Lippincott's Illustrated Reviews-Pharmacology. Lippincott Williams & Wilkins, Pennsylvania.
12. Ghosh M.N. Fundamentals of Experimental pharmacology. Hilton & Company Kolkata.
13. Vogel G.H. Drug discovery and evaluation. Springer Germany.
14. Goyal R.K. Practicals in pharmacology. B.S. Shah Prakashan Ahmedabad.
15. Kulkarni S.K. Handbook of Experimental Pharmacology. Vallabh Prakashan. New Delhi.
16. Pillai, K. K. Experimental Pharmacology. CBS Publishers New Delhi.

17. Grover, J.K. Experiments in Pharmacy and Pharmacology Vol-II.CBS publishers New Delhi.
18. Perry W. L. M. Pharmacological Experiments on Isolated preparations. E.&S.Livingstone, London.
19. Kasture S.B.Text book of Experimental Pharmacology, Career Publication Nashik.
20. Official books - Indian Pharmacopoeia, British Pharmacopoeia, and United States Pharmacopoeia.
21. Related research papers from various journals.

Subject code: T-5.6
Subject : Biopharmaceutics-I
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1) **Introduction to Biopharmaceutics:**

Concept of Bio-pharmaceutics scope and its importance various terms used and their role in related discipline.

2) **Absorption:**

GI absorption of drug, cell membrane structure and physiology Mechanism of drug absorption. Routs of drug administration (oral & non oral) Factors influencing drug absorption & bioavailability.

3) **Distribution :**

Factors influencing distribution of drugs. Volume of distribution. Plasma protein binding and its clinical significance. Tissue protein binding of drug.

SECTION-B

4) **Elimination:**

Mechanism of bio-transformation. Hepatic metabolism - chemical pathway & factors affecting it. Renal excretion Non-renal excretion

5) **Bioavailability and bioequivalence**

Definition, Objectives of bioavailability, parameters of bioavailability. Determination of AUC Methods of enhancement of bioavailability (solubilization, pro-drugs and enhancement of dissolution characteristics & bioavailability enhancers) Drug dissolution rate & bioavailability Theories of dissolution. In vitro drug dissolution testing models. In-vitro in-vivo correction. Various invitro and in vivo models.

Bioequivalence - Pharmaceutical equivalents, biological equivalents, therapeutic equivalents. Selection of animal.

Recommended Books

1. Biopharmaceutics and pharmacokinetics - Milo Gibaldi; Lea and Febiger book publication.
2. Biopharmaceutics and pharmacokinetics - An introduction - Robert E. Notary.
3. Biopharmaceutics - Swarbrick, Lea & Febiger book publications.
4. Remington Pharmaceutical Sciences.
5. Applied Biopharmaceutics and pharmacokinetics - Leon Shargel
6. Biopharmaceutics and pharmacokinetics - A treatise D.M.- Brahmankar & S.B. Jaiswal.
7. Clinical pharmacokinetics – concept & application- Malcohm Rowland C., Thomas N. Tozer, Lea & Febiger Book.
8. Applied bio-pharmaceutics & pharmacokinetics – Leon Shargel 3. Bio-pharmaceutics & pharmacokinetics – Milo Gibaldi.
9. Bio-pharmaceutics & pharmacokinetics – An introduction – Rober E. Notary.
10. Pharmacokinetics Milo Gibaldi & Donald Perrier.
11. Bio-pharmaceutics & pharmacokinetics – P.L. Madan
12. Handbook of clinical pharmacokinetics – Gibaldi & Pancot.

Syllabus Prescribed for B. Pharm. Semester –VI
(Introduced from the Academic Session 2012-13)

SEMESTER-VI

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
6.1	Pharmaceutics-IV	80 (04)	80 (04)	160 (08)
6.2	Medicinal Chemistry-II	80 (04)	80 (04)	160 (08)
6.3	Pharmaceutical Analysis-II	80 (04)	80 (04)	160 (08)
6.4	Pharmacognosy-IV	80 (04)	80 (04)	160 (08)
6.5	Biopharmaceutics-II	80 (04)	80 (04)	160 (08)
6.6	Clinical Pharmacy	80 (04)	—	80 (04)
6.7	Project	80 (04)		80 (04)
	Total			960 (48)

Subject code: 6.1
Subject : Pharmaceutics – IV
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Cosmetology and cosmetic preparations:** Fundamental of cosmetic science, structure and functions of skin and hair, formulation, packing and evaluation of the following class of cosmetics.
2. **Hair products :** Shampoos, Hair creams, Hair dyes.
3. **Skin products :** Moisturizing, cleansing, vanishing creams, Face powder,
4. **Dentrifries products :** Tooth paste, tooth powder.

SECTION-B

1. **Manicure products :** Lipsticks, nail polish.
2. **Surgical products :** Primary wound dressing, absorbents, surgical cotton, surgical gauzes etc., bandages, adhesive tape, protective cellulosics, hemostastics, official dressings, absorbable and nonabsorbable sutures, ligatures and catgut's, medical prosthetic and organ replacement materials.
3. **Blood products and Glandular products :** Collection, processing and storage of Whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin-foam, plasma substitutes - ideal requirements, pvp, dextrans. Glandular products like Insulin, pancreatin, thyroid and adrenal products.

Subject code: P-6.1
Subject : Pharmaceutics – IV
PRACTICAL **45 Hours (3 hrs. /week)**

1. Collection, processing storage and fractionation of blood.
2. Formulation and Evaluation of various types of cosmetics for skin, hair, dentifrice and manicure preparations.
3. Evaluation (quality test) of surgical dressings, (cotton, gauge, bandage and Adhesive tapes).

Recommended Books:

1. Avis K E, Lachman L and Lieberman H A, Marcel Dekker Inc. Pharmaceutical Dosage Forms; Parenteral Medications, Vols. 1 & 2, NY.
2. Bean H S, Beckett A H, and Carless A H Advances in Pharmaceutical Sciences, Vol 1-4 Academic Press, London.

3. Carter S J, Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS Publishers, Delhi.
4. Carter S J, Cooper and Gunn's Tutorial Pharmacy CBS Publishers, Delhi.
5. Remington's, the science and Practice of Pharmacy, Mack Publishing Co. Easton, Pernsybrania.
6. Sagarin & Balsam M.S., Cosmetic Science and Technology, Vol-1-3. 2nd ed. John Wiley sons, NY.
7. Stoklosa MJ, Pharmaceutical calculation, Lea and Febiger, Philadelphia.
8. Thomssen S.G., Modern Cosmetics, Universal Publishing Corporation, Bombay.
9. Harry's Cosmeticology.

Subject code: T-6.2
Subject : Medicinal Chemistry-II
THEORY **45 Hours (3 hrs. /week)**

Section A

1. **Basic principles of medicinal chemistry:** Physico-chemical aspects (optical, geometric and bioisosterism) of drug molecules and biological action. Drug-receptor interaction including transduction mechanism
2. **Drug metabolism:** Phase I and phase II reactions, biological factors affecting drug metabolism, inducers and inhibitors of drug metabolism, significance of drug metabolism in medicinal chemistry, principles of prodrug design

Section B

1. **History, development, classification, recent development, mode of action (biochemical and molecular basis wherever applicable), SAR, IUPAC and synthesis of drugs of following classes**
   Sympathomimetic agents including biosynthesis and metabolism of adrenergic neurotransmitters, adrenoreceptor blockers, cholinergic agents, cholinesterase inhibitors, anticholinergic agents including antispasmodics, ganglionic stimulants and blockers, neuromuscular blockers

Subject code: P-6.2
Subject : Medicinal Chemistry –II
PRACTICAL **45 Hours (3 hrs. /week)**

1) Laboratory scale preparation by conventional / microwave synthesis of selected drugs from course content and characterization by melting point / boiling point / thin layer chromatography / ultra-violet spectroscopy / IR spectroscopy.
2) Establishing the pharmaceutical standards of drug synthesized

Books Recommended

1. J. N. Delagado and W. A. R. Remers, Eds, Wilson and Giswold's Textbook of Organic, Medicinal and Pharmaceutical Chemistry, J. Lipponcott Co. Philadephia.
2. W. C. Foye, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
3. H. E. Wolff, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York Oxford University Press, Oxford.
4. Daniel Lednicer, Strategies for Organic Drug Synthesis & Design, John Wiley & sons, USA.
5. B. N. Ladu, H. G. Mandel & E. L. Way, Fundamental of Drug Metabolisum & Disposition, William & Wilkins co., Baltimore.
6. I. L. Finar, Organic Chemistry, Vol. I & II, ELBS/ Longman, London.
7. Vogel's Text book of Practical Organic Chemistry, ELBS/ Longman, London
8. Mann & Saunder, Practical Organic Chemistry, Orient Longman, London.
9. Shriner, Hermann, Morrill, Curtin & Fuson, The Syntematic Identification of Organic Compounds, John Wiley & Sons. USA.
10. R.M. Silverstein, G. Claytron Bassel's, T. C. Movvill, Spectormetric identification of Organic compounds, John Wiley & Sons, USA

Subject code: T-6.3
Subject : Pharmaceutical Analysis – II
THEORY **45 Hours (3 hrs. /week)**

Section-A

1. **Gravimetric Analysis**
   Basic concepts, precipitation techniques, co-precipitation, post-precipitation.Various steps involved in gravimetric analysis. Application to I.P. product: Assay of sodium sulphate, assay of aluminiumin alum by oxime reagent.
2. **Introduction to Solvent Extraction and its application**
   Principles of solvent extraction, Distribution ratio, efficiency of extraction, separation factor
   Practical aspects of solvent extraction (factor affecting liquid-liquid extraction)
   Selection criterion of solvent extraction, Method of extraction: Batch, counter-current, continuous extraction, stripping extraction and pH effect, soxhlet extraction method, salting out effect.
3. **Basic concept in spectroscopy**
   Introduction- Electromagnetic radiation, wavelength, wave number, frequency, atomic spectra, molecular spectra. Classification of

analytical methods, selecting an analytical method, classification of instrumental methods.

Instrumentation- Light Sources (IR, Visible, UV), Monochromators (Filters, Gratings), Cells (silicia, glass, quartz, cells for IR spectrophotometers), Detectors (Photo tubes, Photo diodes, read out system), Spectrophotometers (Single Beam, Double Beam).

UV-Visible Absorption Spectroscopy

Introduction, origin and theory of UV spectra, Bathochromic and Hypsochromic shift, choice of solvent, Beer-Lamberts Law, optimum conditions for spectrophotometric measurements, single component analysis, use of standard absorptivity value, use of calibration graph, multiple component analysis (simultaneous equation method, difference spectroscopy, derivative spectroscopy, chemical derivatization (colorimetric) reactions – diazotization, condensation, acid dye, oxidation). Determination of lamada max. by Woodward-Fischer rule.

Section-B

1. **Fluorescence and Phosphorescence Spectroscopy**

   Molecular luminescence, measurement of fluorescence, factor affecting fluorescence, quantitative aspects of fluorescence, Excitation and emission spectra, Instrumentation, advantages and disadvantages, applications and synchronous fluorescence.

2. **Atomic Emission and Atomic Absorption Spectroscopy**

   Principle, difference between atomic absorption spectroscopy and flame emission spectroscopy, advantages of AAS over Flame emission spectroscopy, limitation, instrumentation of atomic emission and atomic absorption spectroscopy, single and double beam spectrophotometer, pharmaceutical application of atomic emission and atomic absorption spectroscopy

3. **Miscellaneous methods of Analysis:-** Kjeldahl's method of nitrogen estimation. Oxygen flask combustion techniques.

Subject code: P-6.3
Subject : Pharmaceutical Analysis –II
PRACTICAL **45 Hours (3 hrs. /week)**

List of Experiments :

1. **Gravimetric analysis :-**Determination of alum by oxime reagent, Determination of sodium sulphate.
2. Calibration of UV-VIS spectrophotometer as per I.P.
3. Determination of lamda max of drug.
4. To determine isosbestic point of an indicator.
5. UV spectrophotometric estimations of drug and from their formulations.

6. Assay by fluorimetry of a given drug. (e.g. Quinine Sulphate)
7. Determination of $Na^+$and K^+ by flame photometry after preparation of calibration curve.
8. **Miscellaneous Method** Nitrogen determination by Kjeldhal's method.

Recommended Books

1. D.A.Skoog, D.M.West, F.J.Holler, S.R.Crouch, Fundamentals of Analytical Chemistry, 8th edition, 2004, Thomson Asia Pvt. Ltd.
2. Kenneth A. Connors, A textbook of Pharmaceutical Analysis, 3rd edition, 2002, John Wiley & Sons, New York, USA.
3. F.W.Fifield, D.Kealey, Principles and Practice of Analytical Chemistry, 5th edition, 2000, Blackwell Science, Oxford, U.K.
4. Gary D. Christian, Analytical Chemistry, 6th edition, 2004, John Wiley & Sons, New York, USA.
5. R.A.Day, Jr, A.L.Underwood, Quantitative Analysis, 6th edition, 2001, Prentice Hall of India.
6. Practical Pharmaceutical Chemistry Vol. – I & II – 4th Edition – 1986 – A.H.Beckett & J.B.Stenlake – CBS Publishers, New Delhi.
7. A. R. Gennaro, Remington: The Science and Practice of Pharmacy Vol. I & II – 20th Edition – 2001 – Lippincott, Williams & Wilkins, New York, USA.
8. The Indian Pharmacopoeia, Latest Edition, the Controller of Publications, Government of India, New Delhi
9. S.Ahuja, S.Scypinski, Handbook of Modern Pharmaceutical Analysis, 2001, Academic Press, New York, USA.
10. A.V.Kasture, K.R.Mahadik, S.G. Wadodkar, H.N.More, A Textbook of Pharmaceutical Analysis, Vol. I, 6th edition, 2002, Nirali Pprakashan, New Delhi.
11. D.C.Lee, M.L.Webb, Pharmaceutical Analysis, 2003, Blackwell Science, Oxford, U.K.
12. T.Higuchi, E.Brochmann-Hanssen, Pharmaceutical Analysis, 2002, CBS Publishers, New Delhi.
13. Lena Ohannesian, A.J.Streeter, Handbook of Pharmaceutical Analysis, 2002, Marcel Dekker, Inc. New York, USA.
14. P.Parimoo, Pharmaceutical Analysis, 2nd edition, 1991 CRC Press, New York.
15. The Indian Pharmacopoeia, Latest edition, the Controller of Publications, Government of India, New Delhi.
16. The British Pharmacopoeia.
17. The United State Pharmacopoeia.
18. J. Mendham, R.C.Denney, J.D.Barnes, M.Thomas, Vogel's Textbook of Quantitative Chemical Analysis, 6th edition, 2002, Pearson Education Asia Ltd.
19. D.A. Skoog, F.J. Holler,T.A. Neiman, Principles of Instrumental Analysis, 5th edition, 2003, Thomson Asia Pvt. Ltd.

Subject code: T-6.4
Subject : Pharmacognocy-IV
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Alkaloids:** Definition, general properties, chemical tests, general method of isolation of alkaloids, sources, diagnostic characters, chemistry, uses, substitute, adultrants and identification test of-
   a) Pyridine – piperidine: Tobacco, Areca and Lobelia.
   b) Tropane : Belladonna, Hyoscyamus, Datura, Duboisia, Coca and Withania.
   c) Quinoline and isoquinoline: Cinchona, Ipecac, Opium.
   d) Indole: Ergot, Rauwolfia, Catharanthus, Nux-vomica and Physostigma.
   e) Imidazole: Pilocarpus.
   f) Steroidal: Veratrum and Kurchi.
   g) Alkaloidal amine: Ephedra and Colchicum.
   h) Glycoalkaloid: Solanum.
   i) Purines: Coffee, Tea and Cola.

2. **Essential oils:** Introduction, Definition, general properties, chemical nature, chemical tests and classification. General methods of isolation and analysis of volatile oils. Sources diagnostic characters, chemical constitutents and uses of oil of Mentha, coriander, cinnamon, cassia, lemon peel, orange peel, lemon grass, citronella, caraway, dill, spearmint, clove, fennel, nutmeg, eucalyptus, chenopodium, cardamom, valerian, musk, palmrosa, gaultheria, sandal wood.

SECTION-B

3. **Phytochemical screening :** Selection of method (Preparation of an extract), Screening for alkaloids, polycyclic compounds, saponnis, sterols, cardenolides and bufadienolide, flavonoids and leucoanthocydins, tannins and poly phenols, anthraquinones.

4. Natural antioxidants and Neutraceuticals, Aromatherapy.

5. The historic concept of drugs administration in traditional system of medicines, studies of traditional drugs, common vernacular names, botanical sources, morphology, chemical nature of chief constituents, pharmacology, categories and common uses and marketed formulations of following indigenous drugs- amla, kantkari, shatavari, guduchi, bhilwa, kaligiri, bach, rasana, punarnawa, shitrak, apamarga, gokhuru, shankhapushpi, brahmi, adulsa, arjuna, ashoka, jyotishmati, methi, lashun, palash, guggul, gymnema, shilajit, nagarmotha and neem.

Subject code: P-6.4
Subject : Pharmacognocy-IV
PRACTICAL **45 Hours (3 hrs. /week)**

1. Morphological, Histological, Microchemical and chemical study of- Datura leaf
2. Morphological, Histological, Microchemical and chemical study of- Cinchona
3. Morphological, Histological, Microchemical and chemical study of- Rauwolfia
4. Morphological, Histological, Microchemical and chemical study of- Vasaka
5. Morphological, Histological, Microchemical and chemical study of- Isapgol seed
6. Morphological, Histological, Microchemical and chemical study of- Caraway fruit
7. Morphological, Histological, Microchemical and chemical study of- Cassia bark
8. Morphological, Histological, Microchemical and chemical study of- Kurchi bark
9. Morphological, Histological, Microchemical and chemical study of- Aswagandha
10. Morphological, Histological, Microchemical and chemical study of- Liquorice
11. Identification of powdered crude drugs and their combinations with the help of organoleptic, microscopic, micro-chemical and chemical methods. (Minimum 5 Expt.).
12. Few exercises on isolation of active principles from crude drugs.
13. Establishment of thin layer chromatographic profiles of some volatile oils and extracts containing alkaloids and glycosides.
14. Spotting of crude drugs mentioned in theory
15. Successive extraction and qualitative test for different extract.
16. Thin layer chromatographic study of different natural products.

Recommended Books :

1. Pharmacognosy by G.E. Trease, W.C. Evans, ELBS.
2. Pharmacognosy by Varro E.Tyler, Lynn. R.Brady, James E.Robbers.
3. Text Book of Pharmacognosy by T.E. Wallis, CBS Pub. Delhi.
4. Plant Physiology of Frank B.Salisburry, Cleon. W.Ross, CBS Pub. Delhi
5. Diosgenin and other steroid drug precursors by Asolkar,CSIR.
6. Antibiotics,Isolation&Seperationby Weinsted.M.I.Wagman,G.H.
7. Hormone Chemistry by W.R.Butt.
8. Quantitative analysis & Steroids by Gorog.S.
9. Steroids by Feiry & Feisher.
10. Alkaloids Chemical & Biological by S.W.Pelletier.

11. Biotechnology of Industrial antibiotics by E.vardemme.
12. Chromatography of Alkaloids by Vapoorte, Swendson.
13. Elements of chromatography by P.K.Lala.
14. Introduction to chromatography theory & Practicals by V.K. Srivastava, K.Kishore.
15. Principles of Biotechnology by Leininger.
16. Jenkins Quantitative Pharmacuetical Chemistry by A.N.Knevell.
17. Handbook of vitamins by L.J.Machlein.
18. Clerk's Isolation & Identification of drugs by A.C.Mottal.
19. Selected Topics in Exp-Pharmacology by Seth.V.K.
20. Burger's Medicinal Chemistry by wolff.M.I.
21. Wilson & Gisvolds Text Book of organic Medicinal and Pharmacuetical Chemistry by Deorge.R.F.
22. Phytochemical methods of chemical analysis by Harbone.
23. Organic chemistry vol.II by I.L.Finar.
24. The Essential oil by Gunther.E.
25. The use of Pharmacological techniques for the evaluation of natural products by B.N.DhavanR.C.Srimal. CDRI, Lucknow.
26. Physical methods in organic chemistry by J.C.P.Schwartz.
27. Techniques in organic chemistry by Weiss Creger.
28. Practical Pharmacognosy by Dr.C.K. Kokate.
29. Practical Pharmacognosy by Dr.P.K.Lala.
30. Herbal medicines – Janne Barnes, Linda. A.Anderson.
31. Chinese materia medica – Yaru – PingZhu.
32. Natural products from plants – Peter.B.Kanfman.
33. Selection, Preparation and pharmacological evaluation of plant material, M.Williamson, DT.Okpako.
34. Indian Pharmacopoeia 2007
35. Herbal Pharmacopoeia.

Subject code: T-6.5
Subject : Biopharmaceutics-II
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Introduction to pharmacokinetics**.
   Basic concept, Definition & introduction to absorption rate constant, bio-availability, volume of distribution, elimination half life, elimination rate constant, clearance, extraction ratio, area under curve, protein binding and tissue binding – Calculation of parameters from plasma and urine data.
2. **Therapeutic regimens**
   - Therapeutic response and toxicity.
   - Constant rate regimens.
   - Multiple dose regimens.

3. **Compartment modeling**
   - Concept of compartment modeling, open and closed models.
   - One compartment open model- IV bolus, IV infusion extra vascular administration
   - Multi compartment modeling – 2 compartment and 3 compartments models, determination of compartment models.
4. **Non linear pharmacokinetics**
   - Saturable enzymatic elimination process, drug elimination by capacity limited pharmacokinetics, mixed drug elimination, time dependent pharmacokinetics, bio-availability of drug that follow nonlinear pharmacokinetics, non-linear pharmacokinetics due to protein binding (eq. Phenytoin)

SECTION-B

1. **Pharmacokinetics basis of variability in clinical response** :-
   Genetics Age and weight, Disease altering / affecting pharmacokinetic parameter. (special reference to hepatic and renal disease)
2. **Drug interactions:-**
   Classification altered absorption and distribution, therapeutic implication causes of drug interaction, alteration in drug metabolism
3. Assessment of AUC, estimation of elimination half life from urine data, estimation of absorption kinetics from plasma concentration data, mean residence time, amount of drug in body on accumulation to plateau, distribution of drugs extensively bound to plasma proteins, blood plasma concentration ratio. Estimation of creatinine clearance under non-steady conditions.
4. **Problems based on all above chapters**.

Subject code: P-6.5
Subject : Biopharmaceutics-II
PRACTICAL **45 Hours (3 hrs. /week)**

1. Experiments for determination of pharmacokinetics parameters & bioavailability based on salivary & urinary excretion of drug formulations using human volunteers.
2. To study the influence of simulated gastric & intestinal pH on stability & hydrolysis of drugs.
3. Establishment of standard curve of a drug substance.
4. Influence of vehicle on drug availability from topical dosage forms in-vitro.
5. Comparative in-vitro release rate studies of marketed formulations.
6. Determination of bioavailability of marketed formulations by plasma concentration method.
7. Determination of bioavailability of marketed formulations by urinary excretion method.

8. Effect of protein binding by egg albumin; dialysis method.
9. Determination of pharmacokinetic parameters, determination and evaluation of bioavailability of drug administered by IV, IM and P.O. Practice numericals based on the portions covered under theory syllabus.

Recommended Books

1. Biopharmaceutics and pharmacokinetics - Milo Gibaldi; Lea and Febiger book publication.
2. Biopharmaceutics and pharmacokinetics - An introduction - Robert E. Notary.
3. Biopharmaceutics - Swarbrick, Lea & Febiger book publications.
4. Remington Pharmaceutical Sciences.
5. Applied Biopharmaceutics and pharmacokinetics - Leon Shargel
6. Biopharmaceutics and pharmacokinetics - A treatise D.M.- Brahmankar & S.B. Jaiswal.
7. Clinical pharmacokinetics – concept & application- Malcohm Rowland C., Thomas N. Tozer, Lea & Febiger Book.
8. Applied bio-pharmaceutics & pharmacokinetics – Leon Shargel 3. Bio-pharmaceutics & pharmacokinetics – Milo Gibaldi.
9. Bio-pharmaceutics & pharmacokinetics – An introduction – Rober E. Notary.
10. Pharmacokinetics Milo Gibaldi & Donald Perrier.
11. Bio-pharmaceutics & pharmacokinetics – P.L. Madan
12. Handbook of clinical pharmacokinetics – Gibaldi & Pancot.

Subject code: T-6.6

Subject : Clinical Pharmacy

THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. Definition, scope, history and development of clinical pharmacy.
2. **Introduction to daily activities of a clinical pharmacist:** Drug therapy monitoring (medication chart review, clinical review, pharmacist intervention), Ward round participation, Medication history, Patient counseling).
3. **Patient data analysis:** Clinical laboratory tests used in evaluation and interpretation of disease state like: Haematological, Liver function, Renal function, Thyroid function test.
4. **Prescribing guidelines for** Paediatric patients, Geriatric patients, Pregnancy and breast feeding.
5. **Drug and poison information:** Introduction to drug information resource available, Systemic approach in answering drug information queries, Critical evaluation of drug information and literature, Preparation of return and verbal reports, establishing a drug information centre.

   Poison informations –organisation and information resources.

SECTION-B

6. **Clinical pharmacokinetics:** Physiological pharmacokinetics models, determination of drug clearance and volume of distribution, Renal and non-Renal clearance, Organ extraction and models of hepatic clearance, Estimation and determination of bioavailability, Multiple dosing, Calculation of loading and maintenance dose, Dose adjustment in renal failure, Hepatic dysfunction patient.
7. **Designing and conducting of clinical trials:** Guidelines for good clinical research practice and Ethical requirements, various phases of clinical trials, Monitoring and auditing of clinical trials.
8. **Monitoring of drug therapy:** Therapeutic, Pharmacokinetic and pharmacodynamic monitoring of drug therapy.
9. **Adverse reactions to drug:** Incidence, classifications, and surveillance methods of adverse reactions to drugs.
10 **Pharmacogenetics:** Pharmacokinetic and Pharmacodynamic aspects of pharmacogenetics.
11. **Drug interaction:** Different types of interactions with drugs and their incidence, Clinical aspects of Pharmacokinetic and pharmacodynamic drug interaction.

Recommended Books

1. Bennett P.N, Brown M.J. Clinical Pharmacology Churchill living stone New Delhi.
2. Melmon & Morrelli's Clinical Pharmacology. Mc-Graw Hill. New Delhi.
3. Raymond J.M. Niesink, John de vries. Hollinger M.A. Toxicology-Principle and applications, CRC, Florida
4. Remington's Pharmaceutical Science and practice pharmacy. Lippincott Williams and Wilkins, New Delhi.
5. Clinical Pharmacy & Therapeutics- Eric T Hefindal. Williams & Wilkins Publications.
6. Clinical Pharmacokinetics- Rowland and Tozer, Williams and Wilkins Publications.
7. Biopharmaceuticals and Applied Pharmacokinetics- Leon Shargel, Prentice and Hall publications.
8. Parrthsarthi G, Hansen Kavin Nytort & Nahata Milap C. A Textbook of Clinical Practice: Essential Concepts & skills, Orient Longman.
9. Roger walker, Clive Edwards, Clinical Pharmacy & therapeutics, 3rd International Edition, Churchill Livingstone.
10. Dr. Tipnis H. P, Dr. Bajaj Amrita, Clinical Pharmacy, Career Publication.
11. Grahame-Smith D.G. & Aronson J.K. Oxford textbook of clinical Pharmacology and drug therapy. Oxford University press London

Subject code: P-6.7

Subject : Project

45 Hours (3 hrs. /week)

Project

The topic for the **project shall be based on the practical work /theoretical/ review oriented /any topic from current Pharmaceutical development** and shall be assigned to him/her by the respective guide from faculty members immediate from the date of the commencement of the sixth semester.

Evaluation of the project should be based on Introduction and information retrieval systems, Organization of material and references in the project report, Representation, Skill in oral presentation, Questioning and defending, and finally on the report. The report shall be submitted in hard bound to the respective guide/Head of Department/ Library.

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ENVIRONMENTAL STUDIES

Total Marks : 100

PART-A

SHORT ANSWER PATTERN 25 Marks

1. The Multidisciplinary nature of environmental studies

. Definition, scope and importance.

. Need for public awareness. (2 lecture hours)

2. Social Issues and the Environment

. From Unsustainable to Sustainable development

. Urban problems related to energy

. Water conservation, rain water harvesting, watershed management

. Resettlement and rehabilitation of people; its problems and concerns.
Case studies.

. Envionmental ethics : Issues and possible solutions.

. Climate change, global warming, acid rain, ozone layer depletion, nuclear
accidents and holocaust. Case studies.

. Wasteland reclamation.

. Consumerism and waste products.

. Environment Protection Act.

. Air (Prevention and Control of Pollution) Act.

. Water (Prevention and Control of Pollution) Act.

. Wildlife Protection Act.

. Forest Conservation Act.

. Issues involved in enforcement of environmental lesislation.

. Public awareness. (7 lecture hours)

3. Human Population and the Environment

. Population growth, variation among nations.

. Population explosion - Family Welfare Programme.

. Environment and human health.

. Human Rights.

. Value Education.

. HIV / AIDS.

. Women and Child Welfare.

. Role of Information Technology in Environment and human health.

. Case Studies. (6 lecture hours)

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PART-B
ESSAY TYPE WITH INBUILT CHOICE

50 Marks

4. Natural resources :

. **Renewable and non-renewable resources :**

. Natural resources and associated problems.

- Forest resources : Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer - pesticide problems, water logging, salinity, case studies.
- Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
- Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

. Role of an individual in conservation of natural resources.

. Equitable use of resources for sustainable lifestyles.

(8 lecture hours)

5. Ecosystems

. Concept of an ecosystem.

. Structure and function of an ecosystem.

. Producers, consumers and decomposers.

. Energy flow in the ecosystem.

. Ecological succession.

. Food chains, food webs and ecological pyramids.

. Introduction, types, characteristic features, structure and function of the following ecosystem :-

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem

- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lecture hours)

6. Biodiversity and its conservation

. Introduction - Definition : genetic, species and ecosystem diversity.

. Biogeographical classification of India.

. Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.

. Biodiversity at global, National and local levels.

. India as a mega-diversity nation.

. Hot-spots of biodiversity.

. Threats to biodiversity : habitat loss, poaching of wildlife, manwildlife conflicts.

. Endangered and endemic species of India.

. Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lecture hours)

7. Environmental Pollution

. **Definition**

. Causes, effects and control measures of :-

- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

. Solid Waste Management : Causes, effects and control measures of

. Role of an individual in prevention of pollution.

. Pollution case studies.

. Diaster management : floods, earthquake, cyclone and landslides. (8 lecture hours)

PART-C

ESSAY ON FIELD WORK

25 Marks

8. Field work

. Visit to a local area to document environmental assets - river / forest / grass land / hill / mountain

. Visit to a local polluted site - Urban / Rural / Industrial / Agricultural

. Study of common plants, insects, birds.

. Study of simple ecosystems - pond, river, hill slopes, etc.

(5 lecture hours)

(**Notes :** i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.

ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and

iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

LIST OF REFERENCES :-

1) Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.

2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013, India, Email : mapin@icenet.net **(R)**

3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.

4) Clark R.S., Marine Pollution, Clanderson Press Oxford **(TB)**

5) Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

6) De A.K., Environmental Chemistry, Wiley Eastern Ltd.

7) Down to Earth, Certre for Science and Environment **(R)**

8) Gleick, H.P. 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press. 473p.

9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural Histroy Society, Mumbai **(R)**

10) Heywood, V.H. & Watson, R.T. 1995, Global Biodiversity Assessment, Ca mbridge Univ. Press 1140p

11) Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi. 284 p.

12) Mckinney, M.L. & Schoch, R.M. 1996, Environmental Science Systems & Solutions, Web Enhanced Edition. 639 p.

13) Mhaskar A.K., Matter Hazardous, Techno-Science Publications **(TB)**

14) Miller T.G.. Jr., Environmental Science, Wadsworth Publishing Co. **(TB)**

15) Odum, E.P., 1971, Fundamentals of Ecology, W.B.Saunders Co., U.S.A., 574p.

16) Rao M.N. & Datta A.K.,1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345 p.

17) Sharma B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.

18) Survey of the Environment, The Hindu **(M)**

19) Townsend C., Harper J., and Michael Begon, Essentials of Ecology, Blackwell Science **(TB)**

20) Dr. Deshpande A.P., Dr. Chudiwale A.D., Dr.Joshi P.P. & Dr. Lad A.B. : Environmental Studies, Pimpalapure & Company Pub., Nagpur.

21) डॉ. विठ्ठल घारपुरे : पर्यावरणशास्त्र, पिंपळापुरे ॲन्ड कंपनी पब्लिशर्स, नागपूर .

22) Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media **(R)**

23) Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications **(TB)**

24) Wagner K.D., 1998, Environmental Management, W.B.Saunders Co., Philadelphia, USA 499p.

(M) Magazine

(R) Reference

(TB) Textbook

25) Environmental Studies : R.Rajgopalan, Oxford Uni. Press, New Delhi, 2005

26) Environmental Chemistry and Pollution Control, Dasganu Prakashan, Nagpur : Dr.N.W.Ingole, Dr. D.M.Dharmadhikari, Dr.S.S.Patil.

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