First B.Pharmacy
Semester-I Examination - Winter-2010,
Semester-II Examination - Summer-2011

Prospectus No. 2011144

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

आयुर्विज्ञान विद्याशाखा
(FACULTY OF MEDICINE)

PROSPECTUS
OF

SEMESTER-I & II EXAMINATION FOR THE DEGREE OF
BACHELOR OF PHARMACY (FOUR YEAR –
EIGHT SEMESTER DEGREE COURSE)
SEMESTER-I EXAMINATION, WINTER-2010
SEMESTER-II EXAMINATION, SUMMER-2011

2010

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I N D E X

First B.Pharmacy (Semester-I & II)

(Prospectus No.2011144)

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

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.

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	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 to** 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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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. Mks.	Theory	Practical	
		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	Pharmaco gnocy-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 Pharmacotherapeutics	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.

****

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 Pharmacotherapeutics	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.

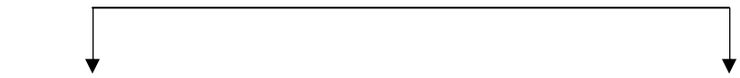
- First year (semester-I and II) = 84 credits
- Second year (semester-III and IV) = 88 credits
- Third year (semester-V and VI) = 92 credits
- Forth year (semester-VII and VIII) = 88 credits

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

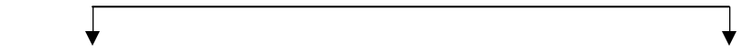


Internal Examination (20 marks) — External Examination (60 marks)

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

Internal Examination (10 marks) — External Examination (30 marks)

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



Internal Examination (30 marks) — External Examination (50 marks)

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

Internal Examination (15 marks) — External Examination (25 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.
- Grades-Marks for each course would be converted to grades as shown in following Table 1.

Table 1: Conversion of marks to grades in credit system

Marks Obtained	Grade	Grade Points
100-90	A+	10
89-80	A	09
79-70	B+	08
69-60	B	07
59-55	C+	06
54-50	C	05
49-45	D	04
44 and Less	FR	0–Failed (Clear course)

- 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, provided the number of courses with FC and FR grades together is 25% or less of the courses of that semester.
- Failing which he/she shall be disqualified for a credit and will have to opt for another credit.
- Student who has failed in the internal tests of a course shall be given FR grade and shall have to [clear] the concerned course.
- Grade points earned in each paper shall be calculated as – Grade points obtained (vide Table 1 above) x Credits for the paper.
- The SPI gives weighted performance index of a semester with reference to the credits of a course. The SPI shall be calculated as-
- SPI = Total earned grade points for the semester / Total credits for the semester.
- Final Result: For the final result of a student Cumulative Performance Index (CPI) based on total earned credits vis-à-vis total earned grade points shall be calculated. The CPI shall be calculated as: Total earned grade points/Total credits i.e. 75
- The student will have to complete 352 compulsory credits for the concerned course.
- The university in consultation with the Dean, Faculty of medicine, and Board of studies in pharmaceutical sciences (faculty of medicine) of SGB Amravati university Amravati can make necessary changes in the syllabus.

CPI	**Final Grade**
9.0 – 10	A+
8.0 – 8.9	A
7.0 – 7.9	B+
6.0 – 6.9	B
5.5 – 5.9	C+
4.5 – 5.4	C
4.0 – 4.4	D
0 – 3.9	F

Degree will be awarded on the basis of the performance of credits from the Semester-V to VIII and the final Mark List will only show the grade and grade points and not the marks.

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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Syllabus Prescribed for B. Pharm. Semester – I
(Introduced from the Academic Session 2010-11)

SEMESTER-I
Subject code Subject

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)

Subject code: 1.1
Subject : Pharmaceutics – I
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Pharmacy Profession**
   Pharmacy as a career, evaluation of pharmacy profession, earlier period, middle to modern ages. Introduction to Pharmacopoeias with special reference to Indian Pharmacopoeia, B.P., U.S.P. and International Pharmacopoeia.
2. **Introduction to Dosage forms**
   Classification of solids, semisolids and liquid dosage forms, conventional and novel delivery systems.
3. **Pharmacopoeial preparations** :
   Principles and methods of preparation of aromatic waters, spirits, elixirs, syrups, glycerin, linctuses, solutions, milks and magmas, mucilage and special preparations like pyroxyllins and flexible collodions.

SECTION-B

4. **Prescriptions**
   Various parts of prescriptions and their functions, handling of prescriptions, sources of errors, care required in dispensing procedures including labeling of dispensed products. Preliminary knowledge of important Latin terms used in prescriptions and their translation into English. glycosides, sulfonamides, local anesthetics, dyes, surface active agents, vitamins. Study of examples of prescriptions containing incompatibilities and their correction and dispensing methods.
5 **Pharmaceutical calculations and metrology**:
   Metric and Imperial systems of weights and measures used in prescriptions Posology, calculations of dosage for infants, children, adults and elderly patients, reducing and enlarging formulae, Percentage solutions, allegation methods, proof spirits, calculations involving alcohol dilutions; pH and buffer solutions, isotonic solutions, displacement value, calculations involving radioisotopes.

Subject code: P-1.1
Subject : Pharmaceutics – I
PRCTICAL **45 Hours (3 hrs. /week)**

1) Preparation of following classes of products involving the use of calculations in metrology
   (at least three products from each category wherever applicable): Aromatic waters, solutions, spirits, syrups, elixirs, linctuses etc.
2) Study of one monograph from the latest edition of Indian Pharmacopoeia.

BOOKS RECOMMENDED:

1) Pharmaceutical dosage and drug delivery systems- Ansel-Popovich and Allen (Williams & Wilkins).
2) Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS publishers, Delhi.
3) Carter S.J., Cooper and Gunn's Tutorial Pharmacy CBS Publishers, Delhi.
4) Lachman-Liberman and Kanig - Industrial Pharmacy (Leci Febiger).
5) Remington : The Science and practice of Pharmacy - Alfonso and Gennaro (Mack Publishing Co.)
6) Bentley's T.B. of Pharmaceutics - Rawlins (ELBS)
7) Dispensing of medications, by Hooper (Mack Publishing).
8) Aulton M.E., Pharmaceutics – The Science of Dosage form Design, ELBS/Churchill Livingstone.
9) Sagarin & Balsam M.S., Cosmetic Science and Technology, Vol-1-3. 2nd ed. John Wiley sons, NY.
10) Stoklosa MJ, Pharmaceutical calculation, Lea and Febiger, Philadelphia.
11) Thomssen S.G., Modern Cosmetics, Universal Publishing Corporation, Bombay.
12) Harry's Cosmeticology.

Subject code: 1.2
Subject : Pharmaceutical Biochemistry-I
THEORY **45 Hours (3 hrs. /week)**

Topic No **SECTION-A**

1 **Introduction to Biochemistry:** Scope of the subject in Pharmaceutical Sciences, Biochemical reactions, Highlights of Prokaryotic and eukaryotic cell metabolism.

2 **Biochemical Morphology:** Prokaryotes, cell structure sub cellular,

3 **Biomembranes:** Structure and composition, model proposed, function and properties of membrane, transport hypothesis: Active and Passive, facilitated transport, Na^+, K^+, H^+ pumps. Glucose transport.

4 **Enzymes:** Introduction, Classification, (according to the reaction catalysis and sources),Nomenclature, active sites Km, Vmax, Double reciprocal plot, effect of active substrates, pH ionic strength, conc., temperature on rate of enzymes reactions. Enzyme inhibition (Competitive, Non-competitive, irreversible). Isozymes, Therapeutic and clinical diagnosis uses of enzymes.

SECTION-B

5 **Carbohydrate Metabolism**: Glycolysis, Glucogenesis, Glycogenolysis, Glycogen formation, Pentose phosphate pathway, Uronic acid pathway, Citric acid cycle and its Significance, Abnormalities of Carbohydrate metabolism.

6 **Bioenergetics:** Introduction, Concept of free energy, role of high energy nucleotide phosphates, production of ATP and its biological significances**.**

7 **Nucleic acid Metabolism:** Purine and pyrimidine metabolism, disorders of Purine metabolism, Purine and pyrimidine biosynthesis, Abnormalities of nucleic acid metabolism

Subject code: P- 1.2
Subject : Pharmaceutical Biochemistry –I
PRACTICAL **45 Hours (3 hrs. /week)**

1. Quantitative estimation of carbohydrate by follin Wu method
2. Quantitative estimation of glucose in urine by Benedict method
3. Determination of ascorbic acid using dye 2, 6 dichlorophenol indophenol.
4. A study of activity of enzyme salivary amylase.
5. Separation of amino acid by paper chromatography.
6. Estimation of Total Proteins in a given plasma/serum sample
7. Estimation of Total Albumin in a given plasma/serum sample
8. Estimation of Total Cholesterol in a given plasma/serum sample
9. Estimation of Triglyceridein a given plasma/serum sample
10. Estimation of LDL in a given plasma/serum sample
11. Estimation of HDL in a given plasma/serum sample
12. Estimation of Bilirubin in a given plasma/serum sample

Recommended Books

1. Lehninger's Principles of Biochemistry by Albert Lehninger, 4/Ed., Palgrave Macmillon.
2. Biochemistry by Lubert Stryer, W.H., Freeman &Company, New York.
3. Harper's Illustrated Biochemistry by R.K. Murray & D.K. Granner, 27/Ed, McGraw Hill.
4. Molecular Biology by J.D. Watson, The Benjamin/Cummings Company Inc.
5. Clinical Biochemistry by Herold Varley, CBS Publishers, New Delhi.
6. Text Book of Biochemistry with Clinical Correlations by Thomas & Devlin, A Wiley Medical Publication.
7. Clinical Chemistry Interpretation and Techniques by Alex Kaplan Lavernel L. & Szebo Kent E. Opheim Published Lea and Febiger.
8. Text Book of Pathology by Harsh Mohan, 5/Ed., Jaypee Brothers Medical Publishers (P) Ltd.
9. Clinical Biochemistry by S. P. Dandekar 2/Ed
10. Pathophysiology of Disease by Mephee & Lingappa, 2/Ed., Appleton & Lane.
11. Pharmaceutical Biochemistry by Sharma P.K & Dandiya P.C, Vallabh Prakashan.
12. Text book of Biochemistry by A. C. Deb
13. Human Biochemistry by Jamam, Orten publisher.
14. Biochemistry by U.Satyanarayan.
15. Varley's Practical Clinical Biochemistry by Harold Varley, 6/Ed., CBS Publishers, New Delhi.
16. Clinical Chemistry Interpretation and Techniques by Alex Kaplan Lavernel L. & Szebo Kent E. Opheim Published Lea and Febiger.
17. Mukherjee K.L. Medical Laboratory Technology. Tata McGraw Hill. New Delhi (Vol. I, II, III)
18. Deb A.C. Viva &Practicals in biochemistry. Central book agency. Calcutta.
19. Plummer D.T. An Introduction to Practical Biochemistry. Tata Mc-Graw Hill, New Delhi.
20. Godkar P.B. Clinical Biochemistry- Principles and Practice. Bhalani Publishing House, Bombay.

Subject code: 1.3
Subject : Anatomy and Physiology-I
THEORY **45 Hours (3 hrs. /week)**

Topic No	SECTION-A
1	Basic terminologies used in anatomy and physiology
2	Structure of cell, its components- Their structures and functions
3	Elementary tissues of human body-epithelial, connective, muscular, and nervous tissues-their characteristics
4	Blood-composition and functions of blood, RBC, WBC, Platelets, Haemopoiesis, blood groups, mechanism of Clotting, anemia,.
5.	Lymphatic system- Lymph (composition, functions, circulation), lymph node (structure and functions), spleen and its functions.
	SECTION-B
6	Cardiovascular system- Blood vessels-anatomy of heart, conducting system, cardiac cycle and heart sounds, blood vessels and circulation (pulmonary coronary, systemic and portal), ECG, Blood pressure (Maintenance and regulation), disorders of cardiovascular system.
7	Sense organs- Anatomy and physiology of ear and eye. Sense of smell and taste.
8	Endocrine system- Anatomy and physiology of hormones of pituitary gland, adrenal gland, thyroid gland, pancreas, gonads (testis and ovary),

.

Subject code: P-1.3
Subject : Anatomy and Physiology-I
PRACTICAL **45 Hours (3 hrs. /week)**

1. Brief introduction to use of Microscope.
2. Study of instruments used in experimental physiology.
3. Determination of Bleeding time of own blood
4. Determination of clotting time of own blood.
5. Determination of percentage and gram percentage of Haemoglobin of own blood.
6. Determination of RBC count of own blood.
7. Determination of total leukocytes count of own blood(TLC)
8. Determination of differential leukocytes count of own blood (DLC).
9. To study effect of osmotic pressure on human RBC.
10. Determination of blood groups.
11. Determination of Erythrocyte sedimentation rate (ESR).
12. Different techniques used in recording of blood pressure.
13. Studies of Gross Anatomy & Physiology of Various Organ Systems by Models/ Charts / Specimens:

- Circulatory System
- Lymphatic System
- Skeletal System
- Eye
- Ear.

14. Histology: Microscopic study of different types of primary tissues and organs from permanent slides.

Recommended Books

1. Chatterjee, C.C., Human Physiology. Medical Allied Agency, Kolkata.
2. Chaudhari, A.R., Textbook of Practical Physiology. Paras Publishers,New Delhi.
3. Chaudhari, A.R., Viva in Physiology. Paras Publishers, New Delhi.
4. DiFiore-Mariano, S.H., Atlas of Human Histology. Lea and Febiger,Philadelphia.
5. Garg, K., Bahel, I. and Kaul, M., A Textbook of Histology. CBS Publishers and Distributors,New Delhi.
6. Goyal, R.K., Patel, N.M. and Shah, S.A., Practical Anatomy, Physiology and Biochemistry. B. S. Shah Prakashan, Ahmedabad.
7. Ranade, V.G., Joshi, P.N. and Pradhan, S., Textbook of Practical Physiology. Pune Vidyarthi Griha Prakashan, Pune.
8. Singh, I., BD Chaurasia's Human Anatomy. CBS Publisher and Distributors, New Delhi.
9. Singh, I., Textbook of Human Histology. Jaypee brothers Medical Publishers, New Delhi.
10. Chaudhari S K. Concise Medical Physiology. New Central Book Agency (P) Ltd., Calcutta.
11. Ganong, W.F., Review of Medical Physiology. Prentice-Hall International, London.
12. Guyton, A.C., Textbook of Medical Physiology. W. B. Saunders Co., Philadelphia, USA. Jain, A.K., Textbook of Physiology. Avichal Publishing Co., New Delhi.
13. Singh, I., BD Chaurasia's Human Anatomy. CBS Publisher and Distributors, New Delhi.
14. Tortora, G.J. and Grabowski, S.R., 2005. Principals of Anatomy and Physiology. Harper Collins College Publishers, New York.
15. Vander, A.J., Sherman, J.H. and Luciano, D.S., Human Physiology. McGraw-Hill Publishing Co., USA.
16. Wagh, A. and Grant, A., Ross and Wilson's Anatomy and Physiology in Health and Illness. Churchill-Livingstone, London.
17. West, J.B., Best and Taylor's Physiological Basis of Medical Practice. Williams and Wilkins, Baltimore, USA.
18. Warwick, R. and Williams, P., Gray's Anatomy. Longman, London.

Subject code: 1.4
Subject : Pharmacognocy-I
THEORY **45 Hours (3 hrs. /week)**

SECTION A

1. Definition, history and scope of Pharmacognosy including indigenous system of medicine.
2. Source of drugs: Biological, marine, mineral and plant tissue cultures as sources of drugs.
3. Plant taxonomy: Various systems of classification of drugs and natural origin.
4. Plant cell and its structure, Study of plant tissues: parenchyma, collenchyma, sclerenchyma, xylem and phloem. Morphology and Histology of root, stem, bark, wood, leaf. flower, fruit and seed.
5. Botanical sources, Names and skeletal structure of chemical constituents and pharmacological actions of Ayurvedic drugs- Amla, Bheda, Kantkari, Gokhru, Nirgudi, Palash, Nagarmotha, Aswagandha, Ashoka, Bramhi, Neem, Haldi, Pipli, Kumari, Shatavari, Tulsi, Bhuiamla, Shankhapuspi, Hirda, Adulsa, Guggul, kalmegh.

SECTION B

6. Microscopy and Micrometry: Use of camera lucida, stage micrometer, Eyepiece micrometer, methods and significant evaluation of Leaf Constants: stomatal number, stomatal index, vein-islet number and vein termination number, palisade ratio, ca-oxalate crystals, starch grains, trichomes, Lycopodium spore method.
7. Detailed study of Cultivation, collection, processing and storage of crude drugs: Detailed study of methods of cultivation, Merits and demerits of cultivation. Exogenous and endogenous factors affecting cultivation, quality of crude drugs & Collection and processing (Garbling, drying, preservation & storage, sterilization & preparation for market).
8. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical application of Carbohydrates, lipids, proteins, alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.
9. Systemic pharmacognostic study of the following crude drugs-
   Carbohydrates: Agar, Isapgulah, Guar gum, Alginate, Honey, Pectin and Starch.
   Lipids: Castor oil, Coca butter, Olive oil, Shark liver oil, wool fat, Spermaceti, Chaulmoogra oil, Neem oil.
   Tannins: Gambier, Black cathechu, Myrobalan
   Proteins: Gelatin, Spiruluna, Collagen and its products.
   Resins: Podophyllum, Cannabis, Balsam of tolu, Turmeric, ginger asafetida, Capsicum

Subject code: 1.4
Subject : Pharmacognocy-I
PRACTICAL **45 Hours (3 hrs. /week)**

1. To study the compound microscope.
2. To understand the techniques of section cutting, staining, mounting and microchemical reagent.
3. To study the morphological characteristics of Carminatives (Ajowan, Blackpepper, Cardamom and Nutmeg) and Laxative (Isapghula and Rhubarb)
4. To study the morphological characteristics of drugs acting on central nervous system (Aconite, Aswagandha, Ephedra) and Antitussive (Tulsi and Vasaka)
5. To study the morphological characteristics of Antitumor (Vinca, Colchicum), Antihypertensive (Rauwolfia) and Diuretic (Gokhru), Antiseptic (Curcuma, Neem), Vitamin (Amla).
6. To study morphological characters of flavorings agents and fibres.
7. To study the morphological characteristics of Garlic, Liquorice, Shankapuspi, Shatawari,Behara, Hirda.
8. To study the morphological and microscopical characteristics of Cinchona bark
9. To study the morphological and microscopical characteristics of Cinnamon bark
10. To study the morphological and microscopical characteristics of Cassia bark
11. To study the morphological and microscopical characteristics of Ephedra stem
12. To study the morphological and microscopical characteristics of Rauwolfia root
13. To study the morphological and microscopical characteristics of Clove buds
14. To study the morphological and microscopical characteristics of Fennel fruit
15. To study the morphological and microscopical characteristics of Coriander fruit
16. Determinations of leaf constants.

Book recommended

1. Kokate C. K. Purohit A. P. and Gokhale S. B. , Pharmacognosy (degree) Nirali Prakashan
2. Kokate C. K. Practical Pharmacognosy, Vallabh Prakashan, Delhi.
3. Atal C. K. and Kapur B. M. Cultivation and utilization of Medicinal plants, RRL, Jammu.
4. Brain K. R. and Turner T. D., The practical Evaluation of phytopharmaceuticals
5. Khandelwal KR, Practical Pharmacognosy, Nirali Prakashan Pune.
6. Chandha K.L. and Gupta R. Advances in Horticulture Vol II- medicinal and aromatic plants,
7. Chopra R. N., Nayar S. L. and Chopra I. C., Glossary of Indian Medicinal plants CSIR, New Delhi.
8. Fahn A, Plant anatomy, 3rd Ed. Pergamon press, Oxford.
9. Iyengar M.A., Study of Crude Drugs, Manipal Power Press, Manipal.
10. Iyengar M.A. , Pharmacognosy Lab Manual. Manipal Power Press, Manipal.
11. Medicinal Plants of India, Zafar R., C.B.S. Publisher, New Delhi.
12. Swain T., Chemical Plant Taxonomy, Academic Press London.

13. Swain T., Comparative Phytochemistry, Academic Press London.
14. The Wealth of India, Raw Marerials (All Volumes), Council of Scientific and Industrial Research,
15. Trease, G.E. and Evans, W.C. Pharmacognosy, 12th Edition, Bailliere Tindall, Eastbourne, U.K.
16. Wallis, T.E. Analytical Microscopy, J.A. Churchill Limited, London.
17. Wallis, T.E. Textbook of Pharmacognosy, J.A. Churchill Limited, London.
18. Whistler R.L., Industrial Gums, Polysaccharides and their derivatives, 2nd Edition,Academic Press,
19. Tyler, V.E., Brady, R., Pharmacognosy
20. Wagner, S.B., Zgainsky, Plant drug Analysis.
21. A.C.Dutta, A Class Book of Botany.
22. V.D.Rangari, Pharmacognosy and Phytochemistry, Volume I & II

Subject code: T-1.5
Subject : Pharmaceutical Engineering-I
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Flow of fluids:**
   Introduction, Manometers, Reynolds Number, Viscosity, its units and measurements, Bernoulli's theorem, fluid head, friction loss, enlargement and contraction losses. Flow meters.
2. **Transportation of fluid:**
   Measurement of fluid flow: Principle, and construction of venturimeter, orifice meter, Pitot tube, weirs, Rota meter and positive displacement meter. Current meter and disc meter.
   Flow controls: Plug cock, globe valves, gate valves, and water hammer, unidirectional valves, automatic regulating valve.
   Pumps: Reciprocating pumps, positive displacement pumps, rotary pumps – volute and centrifugal pumps.
   Blowers-Compressors, evacuators
3. **Flow of heat:**
   Modes of heat transfer; heat transfer coefficient; OHTC Heat flow through a cylinder. Convection- concept of film overall coefficient Surface co-efficient; boiling liquids, condensing vapors. Black body, heaters, heat interchanges, heat insulation.
4. **Corrosion :**
   Corrosion types and its prevention.

SECTION -B

5. **Evaporation:**
   Different types of evaporators, condensers, traps, Entrapment, separators, evaporator capacity, Heat and material balance, Dahring's rule, factors influencing heat transfer coefficient. Rate of scale formation. Principle and operation of a multiple effect evaporator.
6. **Distillation :**
   Vapor-liquid equilibrium, boiling point diagram,Roult's law, Henery's law, constant boiling mixture, equilibrium diagram, equilibrium distillation, differential distillation, rectification, fractionating column, heat and material balance, factors influencing plate efficiency. Application of distillation to solvent purification, mfg. of essential oils &alcohol distillation
7. **Extraction :**
   Extractors, flow sheet of extraction plant, liquid-liquid extraction, extraction towers, solid-liquid extractors, counter current multistage extractors.
8. **Filtration :**
   Theory of filtration, limitations of filters, classification of filters, different types of filtering equipment Factors affecting rate of filtration., filter aids, sterile filters. Theory, classification of centrifuges, principle**,** construction and working of the centrifuges Ex: Perforated basket centrifuge, Horizontal continuous centrifuge, super centrifuge and conical disc centrifuge.

Subject code: P-1.5
Subject : Pharmaceutical Engineering-I
PRACTICAL **45 Hours (3 hrs. /week)**

1. Measurement of flow of fluids and their pressure, determination of Reynold's number and calculation of Frictional losses.
2. Evaluation of filter media, determination of rate of filtration and Study of factors affecting filtration.
3. Experiments to demonstrate applications of centrifugation.
4. Thermometers and Psychrometric charts.

Recommended Books :

1] Introduction to chemical Engineering by Badger & Banchero.
2] Unit operations of Chemical Engineering - McCabe & Smith.
3] Unit operations by Brown.
4] Hand book of Chemical Engineering - Perry
5] Unit operation in Pharmacy - D.Ganderton
6] Theory and practice of Industrial Pharmacy - Leon Lachman
7] Tutorial Pharmacy - Cooper & Gunn.

Syllabus Prescribed for B. Pharm.
Semester – II

Subject code Subject

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)

Subject code: T- 2.1
Subject : Pharmaceutics – II
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Pharmaceutical Additives**
   Diluents, vehicles, bases, solvents, organoleptic additives, preservatives, antioxidants, surfactants, polymers and their applications.
2. **Principles and procedures of dispensing prescriptions:**
   Principles involved and procedures adopted in dispensing of Liquid preparations such as mixtures, solutions, lotions, suspensions, emulsions, liniments, paints, sprays, inhalations,; semisolid preparations such as ointments, creams, pastes, jellies, suppositories; solid dosage forms such as powders, capsules, effervescent powders, tablet in triturates, lozenges and poultices.

SECTION-B

3. **Extraction and Galenicals**
   Extraction processes and study of percolation and maceration and their modifications, their applications in the preparation of tinctures and extracts.
4. **Incompatibilities**:
   Definitions, study of types of incompatibilities- physical, chemical and therapeutic, inorganic incompatibilities involving metals and their salts, non-metal, acids and alkalis : Organic incompatibilities involving specific organic salts, purine bases, alkaloids, pyrrozolone derivatives, amino acids, quaternary ammonium compounds, carbohydrates.

Subject code: P- 2.1
Subject : Pharmaceutics – II
PRACTICAL **45 Hours (3 hrs. /week)**

1) Preparation of following classes of products involving the use of calculations in metrology (at least three products from each category wherever applicable): Liniments, suppositories, tablets, powders and capsules, mixtures, solutions, emulsions, creams, ointments, pastes, jellies, lozenges, lotions, inhalations and paints.etc.
2) Identification of various types of incompatibilities in prescriptions. Correction and dispensing of such prescriptions.
3) Preparation of selected Pharmacopoeial preparations under the category of infusions, tinctures and extracts.

BOOKS RECOMMENDED:

1) Pharmaceutical dosage and drug delivery systems- Ansel-Popovich and Allen (Williams & Wilkins).
2) Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS publishers, Delhi.
3) Carter S.J., Cooper and Gunn's Tutorial Pharmacy CBS Publishers, Delhi.
4) Lachman-Liberman and Kanig - Industrial Pharmacy (Leci Febiger).
5) Remington : The Science and practice of Pharmacy - Alfonso and Gennaro (Mack Publishing Co.)
6) Bentley's T.B. of Pharmaceutics - Rawlins (ELBS)
7) Dispensing of medications, by Hooper (Mack Publishing).
8) Aulton M.E., Pharmaceutics – The Science of Dosage form Design, ELBS/Churchill Livingstone.
9) Sagarin & Balsam M.S., Cosmetic Science and Technology, Vol-1-3. 2nd ed. John Wiley sons, NY.
10) Stoklosa MJ, Pharmaceutical calculation, Lea and Febiger, Philadelphia.
11) Thomssen S.G., Modern Cosmetics, Universal Publishing Corporation, Bombay.
12) Harry's Cosmeticology.

Subject code: T- 2.2
Subject : Anatomy and Physiology – II
THEORY **45 Hours (3 hrs. /week)**

Section-A

1 Respiratory system- Anatomy of respiratory organs and their functions, mechanism and regulation of respiration, physiology of respiration, respiratory volumes, methods of artificial respiration,
2 Digestive system- Anatomy and physiology of organs of digestive system, secretions and functions of (salivary glands, stomach, liver, pancreas, small intestine, large intestine) chemical digestion of food, .
3 Urinary system- Anatomy and physiology of parts of urinary system, structure of nephron, formation of urine, Renin-angiotensin system, Balance (acid base, electrolyte and water).
4 Muscular system- Characteristics and functions of muscle tissue, neuromuscular junction, physiology of muscle contraction.

Section-B

5 Reproductive system- Anatomy and physiology of various parts of male and female reproductive systems, physiology of menstruation, spermatogenesis and oogenesis.
6 Nervous system- Classification of nervous system, Anatomy and physiology of parts of brain (cerebellum, pons, medulla oblongata, thalamus, hypothalamus, and functional areas of cerebrum), extra pyramidal system, limbic system, Spinal cord (Structure and reflexes), cranial nerves (Names and functions), Autonomous nervous system (sympathetic and parasympathetic), fundamentals of neurotransmitters, process of neuroconduction and neurotransmission.
7 Integumentary system: Structure and functions of skin, thermoregulation.

Subject code: P- 2.2
Subject : Anatomy and Physiology – II
PRACTICAL **45 Hours (3 hrs. /week)**

1. Recording of body temperature.
2. Recording of breathing rate.
3. Recording of Electrocardiogram.
4. Study of anatomy and physiology of human skeleton
5. Study of appendicular skeleton.
6. Study of axial skeleton.
7. Study of joints.
8. Study of First Aid Measures
9. Study of Gross Anatomy & Physiology of Various Organ Systems by Models / Charts / Specimens:
- General Viscera
- Digestive System
- Respiratory System
- Urinary System
- Reproductive System
- Central nervous system
- Muscular system

10. Study of different family planning devices.
11. Investigational procedure.
12. Urine Analysis for normal and abnormal urine pH, sugars, proteins, urea, creatinine etc.
13. Histology: microscopic study of different types of primary tissues and organs from permanent slides.

Subject code: T- 2.3
Subject : Pharmacognocy – II
THEORY **45 Hours (3 hrs. /week)**

SECTION A

1. Plant taxonomy: systemic study of some angiosperms with special reference to medicinally important plants of: Apocynaccae, Solanaccae, Rutaccae, Umbelliferae, leguminosae, Rubiaccae. Lilliaccae, Graminae, Labiatae.
2. Genetic manipulation, Polypoloidy, mutation and hybridization with reference to medicinal plants.
3. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.
   a. Laxatives- Aloes, Rhubarb, Castor oil, Ispaghula, Senna.
   b. Cardiotonics- Digitalis, Arjuna.
   c. Carminatives & G.I. regulators- Umbelliferous fruits, Coriander, Fennel, Ajowan, Cardamom, Ginger, Black pepper , Asafoetida, Nutmeg, Cinnamon, Clove.
   d. Astringents- Catecheu.
   e. Drugs acting on nervous system- Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux -vominca.
   f. Antihypertensive- Rauwolfia.
   g. Antitussives- Vasaka, Tolu balsam, Tulsi.
   h. Antirheumatics- Guggal, Colchicum.
   i. Antitumour- Vinca.

j. Antileprotics- Chaulmoogra oil.
k. Antidiabetics- Pterocarpus, Gymnema sylvestro.
l. Diuretics- Gokhru, Punarnava.
m. Antidysenterics- Ipecacuanha.
n. Antiseptics and disinfectants- Benzoin, Myrrh, Neem, Curcuma.
o. Antimalarials- Cinchona.
p. Oxytocics- Ergot.
q. Vitamins- Shark liver oil and Amla.
r. Enzymes- Papaya, Diastase, Yeast.
s. Perfumes and flavoring agents- peppermint oil, Lemon oil, Orange oil, lemon grass oil, sandal wood.

SECTION B

4. **Pharmaceutical aids**-Honey, Arachis oil, starch, pectin, olive oil. Lanolin, Beeswax, Acacia, Tragacanth, sodium Alginate, Agar, Guar gum, Gelatin, Starches and products of Mineral origin.
5. **Collection and preparation** of crude drugs for the market as exemplified by Ergot, opium, Rauwalfia, Digitalis, senna, Cinchona, Aswagandha.
6. **Study of source, preparation and identification** of fibers used in sutures and surgical dressings-cotton, silk, wool and regenerated fibers.
7. Adulteration and drug evaluation: Definition, Types, determination of adulterants by Organoleptic, Microscopic, Physical, Chemical and Biological methods of evaluation.
8. Pest Management and Natural pesticides.

Subject code: P- 2.3
Subject : Pharmacognosy – II
PRACTICAL **45 Hours (3 hrs. /week)**

1. To study the morphological and microscopical characteristics of Datura leaf
2. To study the morphological and microscopical characteristics of Senna leaf.
3. To study the morphological and microscopical characteristics of Ginger rhizome
4. To study the morphological and microscopical characteristics of Ipecacuanha root
5. To study the morphological and microscopical characteristics of Nux-vomica seed.
6. To identify unknown organized drug with the help of physical and chemical tests – Senna, Starch, Turmeric, Cinchona, Ephedra, Ashoka.
7. To identify unknown unorganized drug with the help of physical and chemical tests – Acacia, agar, Honey, Tragacanth, Gelatin, pale and black Catechu, Kaolin, Bees wax.
8. To determine the stomatal Index of senna leaf of Vinca leaf
9. To determine vein islet and vein termination and palisade ratio
10. To determine total ash value of given sample of crude drug.
11. To determine extractive value of given sample of crude drug.
12. To determine the swelling index in given sample of crude drug.
13. To determine the crude fiber in given sample of crude drug.
14. To determine the moisture content in given sample of crude drug.
15. To determine the extractive values of given sample of crude drugs.

Books Recommended

1. Kokate C. K. Purohit A. P. and Gokhale S. B. , Pharmacognosy (degree) Nirali Prakashan
2. Kokate C. K. Practical Pharmacognosy, Vallabh Prakashan, Delhi.
3. Atal C. K. and Kapur B. M. Cultivation and utilization of Medicinal plants, RRL, Jammu.
4. Brain K. R. and Turner T. D., The practical Evaluation of phytopharmaceuticals
5. Khandelwal KR, Practical Pharmacognosy, Nirali Prakashan Pune.
6. Chandha K.L. and Gupta R. Advances in Horticulture Vol II- medicinal and aromatic plants,
7. Chopra R. N., Nayar S. L. and Chopra I. C., Glossary of Indian Medicinal plants CSIR, New Delhi.
8. Fahn A, Plant anatomy, 3rd Ed. Pergamon press, Oxford.
9. Iyengar M.A., Study of Crude Drugs, Manipal Power Press, Manipal.
10. Iyengar M.A. , Pharmacognosy Lab Manual. Manipal Power Press, Manipal.
11. Medicinal Plants of India, Zafar R., C.B.S. Publisher, New Delhi.
12. Swain T., Chemical Plant Taxonomy, Academic Press London.
13. Swain T., Comparative Phytochemistry, Academic Press London.
14. The Wealth of India, Raw Marerials (All Volumes), Council of Scientific and Industrial Research,
15. Trease, G.E. and Evans, W.C. Pharmacognosy, 12th Edition, Bailliere Tindall, Eastbourne, U.K.
16. Wallis, T.E. Analytical Microscopy, J.A. Churchill Limited, London.
17. Wallis, T.E. Textbook of Pharmacognosy, J.A. Churchill Limited, London.
18. Whistler R.L., Industrial Gums, Polysaccharides and their derivatives, 2nd Edition,Academic Press,
19. Tyler, V.E., Brady, R., Pharmacognosy
20. Wagner, S.B., Zgainsky, Plant drug Analysis.
21. A.C.Dutta, A Class Book of Botany.
22. V.D.Rangari, Pharmacognosy and Phytochemistry, Volume I & II

Subject code: T- 2.4
Subject : Pharmaceutical Engineering – II
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Mixing :** Theory of mixing of liquids with liquids, gas with liquids, solids with solids, types of mixing.
2. **Crystallization :** Crystal forms and habits, solubility curves, supersaturation, nucleation, growth, yield and purity -Mier's theory-crystallizers and its limitations, nucleation mechanisms, crystal rowth, study of various types of crystallizer, tanks, agitated batch, Swenson Walker, single vacuum, circulating magma and crystal crystallizer, caking of crystals and its prevention.
3. **Size reduction :** Definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of mills including ball mill, hammer mill, fluid energy mill etc
4. **Size separation:** Screen, standards of screen, screen analysis, types of screening equipment. Size separation by setting, classification and sedimentation.

SECTION-B

5. **Conveying:** Conveyors, belt & parametric elevation.
6. **Drying :**Theory of drying - principles, equilibrium moisture content, rate of drying; classification of dryers - drum dryer, spray dryer; drying of solids - convection type, tray dryer, tunnel dryer, rotary dryer, fluidized bed dryer, vacuum dryer, oven dryer, freeze dryer, radiant heat dryers, Freeze Dryer. Uses of dryers in pharmacy.
7. **Humidity:** Basic concepts and definition, wet bulb and adiabatic saturation temperatures, Psychrometric chart and measurement of humidity, application of humidity measurement in pharmacy, equipments for dehumidification operations. Dehumidification - application and equipment. Refrigeration and air conditioning.
8. **Safety Hazards:** Classification - mechanical, fire, chemical & occupational, their types & prevention, fire & explosion - Chemistry of fire, classification of fire, method of extinguishing accidents - unsafe actions, unsafe conditions, financial losses, costs prevention. Accidents safety training & education.

Subject code: P- 2.4
Subject : Pharmaceutical Engineering – II
PRACTICAL **45 Hours (3 hrs. /week)**

1. Determination of humidity-use of Dry Bulb and Wet Bulb.
2. Elementary Knowledge of Engineering Drawing-Concept of orthographic and isometric views of elevation and third angle projection. Notation and abbreviation used in engineering drawing.
3. Basic Engineering Drawing Practice- Bolts, nuts, rivetted fronts, screws, worm screws as per specification.
4. Drawing of simple pharmaceutical machinery parts.

Recommended Books :
1] Introduction to chemical Engineering by Badger & Banchero.
2] Unit operations of Chemical Engineering - McCabe & Smith.
3] Unit operations by Brown.
4] Hand book of Chemical Engineering - Perry
5] Unit operation in Pharmacy - D.Ganderton
6] Theory and practice of Industrial Pharmacy - Leon Lachman
7] Tutorial Pharmacy - Cooper & Gunn.
8] N.D.Bhatt: Elementary Engineering Drawing.

Subject code: T- 2.5
Subject : Pharmaceutical Biochemistry –II
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1 **Lipid Metabolism**: Oxidation of fatty acids (Beta, Alpha), ketone bodies and their significance, biosynthesis of saturated and unsaturated fatty acids, Phospholipids, Sphingolipids, control of lipid metabolism, Essential fatty acids, biosynthesis of Eicosanoids (prostaglandins, Prostacyclines, thromboxanes and Leukotrienes), Abnormalities of lipid metabolism.
Metabolism of ammonia and nitrogen containing monomer: Nitrogen balance, Biosynthesis and
2 catabolism of amino acids, Assimilation of ammonia, Urea cycle, Metabolic disorders of urea cycle, Metabolism of sulphur containing amino acids, Porphyrins biosynthesis, formation of bile pigments, Porphyrias, hyperbilirubenemia.
3 **Nutrition:** Concept of balanced diet, principle nutrients, nutritional diseases, role of crude fiber, Energy metabolism: BMR.

SECTION-B

4 **Vitamins:** Introduction, vitamins as co-enzymes and their biological role, Metal as co-enzymes.
5 **Acid-base balance and mineral metabolism**: Concept of body fluids, regulation of electrolyte, acid-base balance. Mineral metabolism of calcium, iron and iodine.
6 Biological oxidation and its biochemical importance. Nitrogen and sulphur cycle
7 **Biosignaling:** Applications, Methods, Scope.
8 Enborn error of Metabolism

Subject code: P- 2.5
Subject : Pharmaceutical Biochemistry –II

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

1. Quantitative estimation of carbohydrate by follin Wu method
2. Quantitative estimation of glucose in urine by Benedict method
3. Determination of ascorbic acid using dye 2, 6 dichlorophenol indophenol.
4. A study of activity of enzyme salivary amylase.
5. Separation of amino acid by paper chromatography.
6. Estimation of Total Proteins in a given plasma/serum sample
7. Estimation of Total Albumin in a given plasma/serum sample
8. Estimation of Total Cholesterol in a given plasma/serum sample
9. Estimation of Triglyceridein a given plasma/serum sample
10. Estimation of LDL in a given plasma/serum sample
11. Estimation of HDL in a given plasma/serum sample
12. Estimation of Bilirubin in a given plasma/serum sample

Recommended Books

1. Lehninger's Principles of Biochemistry by Albert Lehninger, 4/Ed., Palgrave Macmillon.
2. Biochemistry by Lubert Stryer, W.H., Freeman &Company, New York.
3. Harper's Illustrated Biochemistry by R.K. Murray & D.K. Granner, 27/Ed, McGraw Hill.
4. Molecular Biology by J.D. Watson, The Benjamin/Cummings Company Inc.
5. Clinical Biochemistry by Herold Varley, CBS Publishers, New Delhi.
6. Text Book of Biochemistry with Clinical Correlations by Thomas & Devlin, A Wiley Medical Publication.
7. Clinical Chemistry Interpretation and Techniques by Alex Kaplan Lavernel L. & Szebo Kent E. Opheim Published Lea and Febiger.
8. Text Book of Pathology by Harsh Mohan, 5/Ed., Jaypee Brothers Medical Publishers (P) Ltd.
9. Clinical Biochemistry by S. P. Dandekar 2/Ed
10. Pathophysiology of Disease by Mephee & Lingappa, 2/Ed., Appleton & Lane.
11. Pharmaceutical Biochemistry by Sharma P.K & Dandiya P.C, Vallabh Prakashan.
12. Text book of Biochemistry by A. C. Deb
13. Human Biochemistry by Jamam, Orten publisher.
14. Biochemistry by U.Satyanarayan.
15. Varley's Practical Clinical Biochemistry by Harold Varley, 6/Ed., CBS Publishers, New Delhi.
16. Clinical Chemistry Interpretation and Techniques by Alex Kaplan Lavernel L. & Szebo Kent E. Opheim Published Lea and Febiger.
17. Mukherjee K.L. Medical Laboratory Technology. Tata McGraw Hill. New Delhi (Vol. I, II, III)
18. Deb A.C. Viva &Practicals in biochemistry. Central book agency. Calcutta.
19. Plummer D.T. An Introduction to Practical Biochemistry. Tata Mc-Graw Hill, New Delhi.
20. Godkar P.B. Clinical Biochemistry- Principles and Practice. Bhalani Publishing House, Bombay.

Subject code: T- 2.6
Subject : Mathematics
THEORY **45 Hours (3 hrs. /week)**

SECTION-A

1. **Trigonometry:** Measurement of angles - Degree and Radian, Different types of functions, Inverse functions, graphs of various function, Addition Formula & factor formula of functions.
2. **Limit & Continuity:** Definition, Right Hand & Left Hand Limits, Non-existence of limits Working Rules of limit, Evaluation of limits of simple and trigonometric functions, A brief about continuity.
3. **Differentiation:** Definition of a derivative, working rules, Derivatives of special functions, chain rule, second order derivatives, Applications of derivative: Rate of change, Tangent to a curve, Maxima & Minima and Examples.
4. **Integration:** Definition of integral, Integration of special functions, Methods of Integration: Integration by substitution, Integration by parts, Integration by using partial fractions, Definite integrals, Examples. Evaluation of area, and volume, in simple cases.

SECTION-B

5. **Probability:** Definition, Theorems of probability & Examples.
6. **Differential equation:** Formation and Derivation, order and degree, first order and degree, linear equations with constant co-eficience, homogeneous linear equation (first method of solution only), Simultaneous differential equations which are linear and of first order.
7. **Statistics:** Definition of statistics, random and non-random sampling methods, calculation of mean, mode, median, standard deviation, standard error estimates. Coefficient of variation and regression analysis, method of least squares.

Books Recommended:

1. Differential Calculus by Shanti Narayan
2. Integral calculus by Shanti Narayan
3. A textbook of Engineering Mathematis -by B.M. Patel
4. Advanced Calculus by Murry R.Spiegel
5. Mathematics for pharmacy students (Volume–I) by Dr. K.N.Gujar & Prof.Ashok Bhavale
6. Calculus by Frank Ayres Jr.-& Elliott Mandelson.
7. Frank Mathematics for B.Pharm by G.D.Dhall, S.N.Chhibber, Hari Om Trivedi

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