

MOHANLAL SUKHADIA UNIVERSITY  
UDAIPUR (RAJASTHAN)

SYLLABUS

SCHEME OF EXAMINATION AND COURSE OF STUDY

FACULTY OF SCIENCE

BACHELOR OF PHARMACY  
(FOUR YEAR DEGREE COURSE)

EXAMINATION: 2012-13

ORDINANCE RELATING TO BACHELOR OF PHARMACY EXAMINATION  
(FOUR YEAR DEGREE COURSE)

I Duration of course: The duration of Bachelor of Pharmacy course shall be of four years, each year spread over a period of at least 25 weeks excluding the days spent in examination.

II Eligibility for admission to Bachelor of Pharmacy (B. Pharmacy) Course:

The course of study of B. Pharmacy shall be open to both male and female candidates.

- a) Admissions to this course are made through the Pre Pharmacy Test (PPT) conducted by the Institution authorized by the Government of Rajasthan.
- b) A candidate who after passing the B. Pharm Part I examination of the University has attended a regular course of study for one academic year shall be eligible for admission to B. Pharm Part II examination.
- c) A candidate who after passing the B. Pharm Part II examination of the University has attended a regular course of study for one academic year shall be eligible for admission to B. Pharm Part III examination.
- d) A candidate who after passing the B. Pharm Part III examination of the University has attended a regular course of study for one academic year shall be eligible for admission to B. Pharm Part IV examination.

III. Scheme of Examination:

- a) The examination shall be conducted by means of written papers in theory and practical examination as laid down in the Plan & Scheme of Examinations. Candidates shall be required to pass separately in theory and practicals (including sessionals) in Part I, II, III and IV Bachelor of Pharmacy Examinations. The medium of instruction and examination shall be English.
- b) Three sessionals examinations of theory shall be conducted (20 marks each) by the Institute during each academic year. The sessional marks calculated on the basis of best two performances at these examinations shall be submitted to the University. The sessional marks in Practical shall be awarded on the basis of day to day assessment in practical class and attendance (20 marks)
- c) No candidate shall be allowed to appear in any examination unless he/ she has attended 75% of the classes held in each theory and practicals separately in each subject in an academic year.
- d) There shall be two University examinations (one main and one supplementary) in a year in each paper of B. Pharmacy Part I, II, III and IV (Final year). A candidate shall have to appear in the nearest scheduled main examination after the

- completion of regular course of study and if he/ she fails in one or more subjects he/she shall appear in the subsequent examination of the failing subjects only.
- e) Each theory examination shall be of three hours duration.
  - f) No candidate shall be declared as having passed an examination unless he/she has secured 50% of the maximum marks separately in theory (including sessionals) and practical (including sessional).
  - g) Candidate who has appeared in all subjects and passed the examinations are eligible for promotion to subsequent part of B. Pharmacy. A candidate failing in one or more subjects (each theory and practical examination shall be considered as subject) shall appear in the Supplementary examination of that class. However, failure in more than three subjects in supplementary examination shall debar him/her for promotion to the next higher class. Such candidates shall be examined in failing subjects only at subsequent examination. Further, such candidates will be permitted 4 (four) subsequent attempts including attempt already availed to clear the failing subject (each theory and practical examination shall be considered as a subject) failing which they shall have to appear in all subjects of that year as an ex-student. Failure to attend the subsequent examination will add to the count of four attempts.
  - h) A candidate who fails in not more than three subjects in the supplementary examination can proceed to the next higher class/ examination, the result of which shall not be declared until he/she has passed in the failing subjects of the previous class.
  - i) No candidate shall be promoted to B. Pharmacy Part III and Part IV if he/she fails to clear all subjects of B. Pharmacy Part and Part II respectively.
  - j) In cases of candidates who fails in any subject his/her sessional marks shall be considered as such in supplementary examination. However, if his/her sessional marks are less than 50% of the maximum marks then automatically his/her sessional marks in that subject will be treated as 50% of maximum marks in third attempt and onwards.
  - k) Class shall be awarded on the basis of aggregate of all four University examinations regardless of the attempts as shown below:

First Class : 60% and above.  
 Second Class : More than 50% but less than 60%

Candidates securing 75% marks in a subject in first attempt shall be awarded a distinction in that subject. Merit shall be conferred to those candidates who have passed the whole examination in first attempt (without any re- evaluation and grace) and such candidates shall be eligible for any prize or scholarship.

#### IV. Industrial Visit and Training:

- a) Every candidate shall undergo practical training in Pharmaceutical manufacturing unit or in an analytical laboratory for a period of not less than 400 hours to be

- covered in not less than two months any time after completion of B. Pharmacy Part III course and shall submit the training report to the Head of the Institution. The degree of the successful candidate shall be awarded after his/her producing the certificate of training from the Head of the respective manufacturing unit duly accepted and certified by the Head of the Institution conducting the B. Pharmacy Course.
- b) Every candidate shall undergo industrial visit in Pharmaceutical manufacturing or bulk drug unit for a period of around two weeks any time after completion of B. Pharmacy Part II course as per the schedule decided by the Head of the Institution.

ORDINANCE REGARDING THE LATERAL ENTRY OF DIPLOMA HOLDERS  
DIRECTLY TO B. PHARMACY PART II

I. Duration of Course: The duration of Bachelor of Pharmacy course shall be of four years, each year spread over a period of at least 25 weeks excluding the days spent in examination.

II. Eligibility for admission to Bachelor of Pharmacy (B. Pharmacy) Course:

The course of study of B. Pharmacy shall be open to both male and female candidates.

- a) Admissions to this course are made through the Pre Pharmacy Test (PPT) conducted by the Institution authorized by the Government of Rajasthan. Candidate shall be admitted to B. Pharm. Part II under Lateral Entry Scheme in response to the letter from the Department of Technical Education, Government of Rajasthan No. F.17 (1) T.E./2003 dated 19.07 2003, who have acquired a Diploma in Pharmacy with a minimum of 60% marks (aggregate) from A.I.C.T.E. and P.C.I. approved Institutions.
- b) P.C.I. guidelines vide letter No 14-11/75- PCI – 3453-4078, dated 19 June 2001 stating that such students directly admitted to B. Pharm Part II shall pass those subjects of B. Pharm Part I which are not covered under the D. Pharm course, shall be adhered to.
- c) Accordingly 3 (three) subjects of B. Pharm Part I have been identified which have not been taught at the Diploma level viz. Pharm. Chemistry I (Organic), Pharm Biology and Mathematics.
- d) The candidates will have to appear in the three theory sessional examinations of these three subjects. Main examinations of these papers will be held in theory only.
- e) These subjects will be considered as Non graded subjects i.e. students will have to pass these subjects with 50% marks but the marks shall not be added to the B. Pharm. Final result. Their final result will be based on the aggregate of marks secured in B. Pharm Part II, Part III and Part IV.

- f) Such students may attend classes of these subjects with the juniors i.e. following B. Pharm Part I students.
- g) A candidate after passing the B. Pharm Part II examination of the University has attended a regular course of study for one academic year shall be eligible for admission to B. Pharm Part III examination.
- h) A candidate who after passing the B. Pharm Part III examination of the University has attended a regular course of study for one academic year shall be eligible for admission to B. Pharm Part IV examination.

### III. Scheme of Examination :(From B.Pharm. Part II onwards)

- a) The examination shall be conducted by means of written papers in theory and practical examination as laid down in the Plan & Scheme of Examinations. Candidates shall be required to pass separately in theory and practicals (including sessionals) in Part I, II, III and IV Bachelor of Pharmacy Examinations. The medium of instruction and examination shall be English.
- b) Three sessionals examinations of theory shall be conducted (20 marks each) by the Institute during each academic year. The sessional marks calculated on the basis of best two performances at these examinations shall be submitted to the University. The sessional marks in Practical shall be awarded on the basis of day to day assessment in practical class and attendance (20 marks)
- c) No candidate shall be allowed to appear in any examination unless he/ she has attended 75% of the classes held in each theory and practicals separately in each subject in an academic year.
- d) There shall be two University examinations (one main and one supplementary) in a year in each paper of B. Pharmacy Part I, II, III and IV (Final year). A candidate shall have to appear in the nearest scheduled main examination after the completion of regular course of study and if he/ she fails in one or more subjects he/she shall appear in the subsequent examination of the failing subjects only.
- e) Each theory examination shall be of three hours duration.
- f) No candidate shall be declared as having passed an examination unless he/she has secured 50% of the maximum marks separately in theory (including sessionals) and practicals (including sessional).
- g) Candidate who has appeared in all subjects and passed the examinations are eligible for promotion to subsequent part of B. Pharmacy. A candidate failing in one or more subjects (each theory and practical examination shall be considered as subject) shall appear in the Supplementary examination of that class. However, failure in more than three subjects in supplementary examination shall debar him/her for promotion to the next higher class. Such candidates shall be examined in failing subjects only at subsequent examination. Further, such candidates will be permitted 4 (four) subsequent attempts including attempt already availed to clear the failing subject (each theory and practical examination shall be considered as a

- subject) failing which they shall have to appear in all subjects of that year as an ex-student. Failure to attend the subsequent examination will add to the count of four attempts.
- h) A candidate who fails in not more than three subjects in the supplementary examination can proceed to the next higher class/ examination, the result of which shall not be declared until he/she has passed in the failing subjects of the previous class.
  - i) No candidate shall be promoted to B. Pharmacy Part IV if he/she fails to clear all subjects of B. Pharmacy Part II. However such candidates will be promoted to B.Pharm Part III if they fail in not more than three subjects of B.Pharm Part II
  - j) In cases of candidates who fails in any subject his/her sessional marks shall be considered as such in supplementary examination. However, if his/her sessional marks are less than 50% of the maximum marks then automatically his/her sessional marks in that subject will be treated as 50% of maximum marks in third attempt and onwards.
  - k) Class shall be awarded on the basis of aggregate of all four University examinations regardless of the attempts as shown below:

First Class : 60% and above.

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Candidates securing 75% marks in a subject in first attempt shall be awarded a distinction in that subject. Merit shall be conferred to those candidates who have passed the whole examination in first attempt (without any re- evaluation and grace) and such candidates shall be eligible for any prize or scholarship.

#### IV. Industrial Visit and Training:

- a) Every candidate shall undergo practical training in Pharmaceutical manufacturing unit or in an analytical laboratory for a period of not less than 400 hours to be covered in not less than two months any time after completion of B. Pharmacy Part III course and shall submit the training report to the Head of the Institution. The degree of the successful candidate shall be awarded after his/her producing the certificate of training from the Head of the respective manufacturing unit duly accepted and certified by the Head of the Institution conducting the B. Pharmacy Course.
- b) Every candidate shall undergo industrial visit in Pharmaceutical manufacturing or bulk drug unit for a period of around two weeks any time after completion of B. Pharmacy Part II course as per the schedule decided by the Head of the Institution.

**PLAN AND SCHEME OF EXAMINATION FOR B. PHARM PART I**

Sr. No	Subject	Theory	Practical	Annual Exam theory	Marks Practical	Sessional theory	Sessional Practical	Total
1.1	Pharmaceutical chemistry I (Organic Chemistry I)	3	3	80	80	20	20	200
1.2	Pharmaceutical Chemistry II (Inorganic Chemistry)	2	2	80	80	20	20	200
1.3	Pharmaceutics I (Pharm Technology- I)	2	3	80	80	20	20	200
1.4	Pharm. Engineering I	2	-	80	-	20	-	100
1.5	Pharm. Biology	2	3	80	80	20	20	200
1.6	Pharmaceutics II	2	3	80	80	20	20	200
1.7	Human Anatomy ,Physiology including Pathophysiology &Health Education	2	3	80	80	20	20	200
1.8	Mathematics (Calculus & Biostatistics)	3	-	80	-	20	-	100

**PLAN AND SCHEME OF EXAMINATION FOR B.PHARM PART II**

Sr. No.	Subject	Theory	Practical	Annual Exam. Theory	Marks Practical	Sessional theory	Sessional Practical	Total
2.1	Pharmaceutical chemistry III (Organic Chemistry II including	2	3	80	80	20	20	200



	Heterocyclic & Natural Products)							
2.2	Pharmaceutical Analysis I	2	3	80	80	20	20	200
2.3	Pharm. Microbiology	2	3	80	80	20	20	200
2.4	Pharmaceutics III (Physical Pharmacy)	2	3	80	80	20	20	200
2.5	Pharmacology I	2	3	80	80	20	20	200
2.6	Business Mathematics (Budgeting, Costing Accountancy & audit)	2		80	-	20	-	100
2.7	Computer Applications	2	3	80	80	20	20	200
2.8	Engineering Drawing	--	3	--	80	--	20	100

PLAN AND SCHEME OF EXAMINATION FOR B.PHARM PART III

Sr. No	Subject	Theory	Practical	Annual Exam Theory	Marks Practical	Sessional theory	Sessional Practical	Total
3.1	Pharmaceutical chemistry IV (Medicinal Chemistry I)	3	3	80	80	20	20	200
3.2	Pharmaceutics IV (Pharm. Technology II)	2	3	80	80	20	20	200
3.3	Pharm. Engineering II (Unit operations)	2	3	80	80	20	20	200
3.4	Hospital Pharmacy (Clinical Pharmacy including drug interactions)	2	--	80	--	20	--	100
3.5	Pharmacognosy I	2	3	80	80	20	20	200
3.6	Pharmacology II	2	3	80	80	20	20	200
3.7	Pharm. Biochemistry	2	3	80	80	20	20	200
3.8	Practice of Pharmacy ( Drug store Management, laws & ethics)	3	--	80	--	20	--	100

## PLAN AND SCHEME OF EXAMINATION FOR B.PHARM PART IV

Sr. No	Subject	Theory	Practical	Annual Exam theory	Marks Practical	Sessional theory	Sessional Practical	Total
4.1	Pharmaceutical chemistry V (Medicinal Chemistry II including drug design)	3	3	80	80	20	20	200
4.2	Pharmaceutics V (Dosage form design including cosmeticology)	3	3	80	80	20	20	200
4.3	Biopharmaceutics & Pharmacokinetics	2	--	80	--	20	--	100
4.4	Pharm. Analysis II (Instrumental & market sample analysis, QC including statistical QC)	2	3	80	80	20	20	200
4.5	Pharmacognosy II (Phytochemistry including isolation, identification, biogenesis of plant constituents & ayurvedic drugs)	2	3	80	80	20	20	200
4.6	Pharmacology III	2	--	80	--	20	--	100
4.7	Biotechnology & Fermentation including tissue culture	2	3	80	80	20	20	200
4.8	Industrial psychology & management including marketing	2	--	80	--	20	--	100
4.9	Library Assignment *	2	--	80	--	20	--	100

- Project to be evaluated by any two teachers of the Department

## B. PHARM PART-I

### 1.1 Pharmaceutical Chemistry-I (Organic Chemistry)

#### Theory

- 1. Stereochemistry-** Enantiomerism, Chirality, the Racemic Modification, Configuration (R&S, D&L, d&l), Sequence rules, Diastereomers, Meso-structures, conformational Isomers, Resolution of a racemic modification.
- 2. Nucleophilic Aliphatic Substitution-** Nucleophiles and leaving groups,  $S_N2$  &  $S_N1$  reactions, Duality of mechanism, Mechanism of Kinetics and Stereochemistry of  $S_N2$  &  $S_N1$  reactions, Carbonations and their rearrangements.
- 3. Elimination Reactions-** Geometric isomerism, Dehydro-halogenation of alkyl halides (1, 2 elimination), Kinetics of dehydrohalogenation, Duality of mechanism, mechanism of orientation and reactivity of E2 and E1 reactions, Elimination: E2 v/s E1: Elimination v/s Substitution.
- 4. Free Radical Substitution-** Halogenation of Alkanes upto four carbons & their relative reactivities, Mechanism & Orientation of Halogenation, Ease of abstraction of hydrogen atoms, Stability of free radicals, Ease of formation of free radicals, Transition state for halogenation, Orientation & reactivity, reactivity & selectivity, inhibitors.
- 5. Electrophilic and Free- Radical Addition-** Electrophilic addition: Mechanism, Reaction at the Carbon- Carbon double bond (addition) of hydrogen, Halogen, Hydrogen halides, Sulphuric acid & Water, Rearrangements in electrophilic addition, Orientation & reactivity, Mechanism & Orientation of free radical addition.
- 6. Conjugation & Resonance- Dienes-** The Carbon-Carbon bonds as a substituent, Free radical halogenation of alkenes: Substitution v/s addition, free radical substitution in alkenes: Orientation, reactivity and allylic rearrangements, Theory of resonance, The allyl radical as a resonance hybrid, stability radical & orbital picture of the allyl radical, Resonance stabilization of allyl radicals, The allyl cation as a resonance hybrid, Stabilization of carbonation.
- 7. Conjugate Addition.**
- 8. Aldehydes and Ketones-** Structure, physical properties, Nomenclature, Preparation and reaction of aldehydes and ketones with due emphasis on electrophilic addition reactions.
- 9. Aldol and Claisen condensation-** Acidity of hydrogens, reactions involving carbonions, Base promoted halogenation of ketones, Acid catalysed halogenation of ketones, Aldol condensation, Use of Aldol condensation, The witting reaction, Claisen condensation, Crossed Claisen condensation.
- 10. Alcohols-** Preparation, Physical properties and reaction.
- 11. Industrial sources, preparations, physical properties of Ethers, Epoxides & Alkynes.**

#### PRACTICALS

1. Basic Laboratory Techniques.
2. Qualitative Organic Analysis including preparation of derivatives.

**Book Recommended:**

1. R.T. Morrison & R.N. Boyd, "Organic Chemistry", Prentice Hall of India Pvt. Ltd., New Delhi.
2. I.L. Finar, "Organic Chemistry", Vol. I, ELBS, London.
3. R.D. Gupta, "A Textbook of Analytical Chemistry".
4. F.G. Mann & B.C. Saunders, "Practical Organic Chemistry", Longmans, Green and Co. Ltd. London.
5. B.S. Furniss, *et al.*, "Vogal's Textbook of "Practical Organic Chemistry", ELBS, London.
6. Wingrove, A.S. & Caret R.L.: "Organic Chemistry", Harper & Row Publishers, New York.
7. Pine, Handrikson *et al.*, "Organic Chemistry", McGraw Hill Book Co., New York.
8. Eliel L., "Stereochemistry of carbon compounds", Tata McGraw Hill, Bombay.
9. Singh and Kapoor, "Basic and Pharmaceutical Practical Chemistry", Vallabh Prakashan, Delhi.