

MANDATORY DISCLOSURE BY INSTITUTIONS RUNNING AICTE APPROVED ENGINEERING/TECHNOLOGY/PHARMACY PROGRAMMES TO BE INCLUDED IN THEIR RESPECTIVE INFORMATION BROCHURE, DISPLAYED ON THEIR WEBSITE AND TO BE SUBMITTED TO AICTE EVERY YEAR LATEST BY 30TH APRIL TOGETHER WITH ITS URL

The following information is to be given in the Information Brochure besides being hosted on the Institution's official Website.

"The information has been provided by the concerned institution and the onus of authenticity lies with the institution and not on AICTE."

I. NAME OF THE INSTITUTION

- **Shree Harish Chandra P. G. College, Institute of Pharmacy, Bawan Beegha Campus, Baniyapur, Azamgarh Road, Varanasi -221002, Phone No: 0542-6537074, 2503693, fax no. 0542-2502918, E-Mail: iphcpgc@rediffmail.com**

II. NAME & ADDRESS OF THE DIRECTOR

- **DEEPAK PRAKASH, Shree Harish Chandra P. G. College, Institute of Pharmacy, Bawan Beegha Campus, Baniyapur, Azamgarh Road, Varanasi -221002, Phone No. (R) 2413431, Fax -2502918**

III. NAME OF THE AFFILIATING UNIVERSITY

Uttar Pradesh Technical University, Lucknow, IET Campus, Sitapur Road, Lucknow

IV. GOVERNANCE

- ❖ Members of the Board and their brief background

	NAME	DESIGNATION	ADDRESS
1.	Sri Radha Ramana Ji	President	B-38/46, Mahmurganj –Varanasi, Ph-2361763.
2.	Sri Shyam Mohan Agrawal	Minister/Manager	D-59/45, A, Mahmurganj – Varanasi, Ph-2360023
3.	Ram Ji Agrawal	Co - secretary	C.K.-52/11, Rajaderwaja- Varanasi, Ph-2413826.
4.	Dr. Bhagwan Das	Joint Minister	C.K.-52/11, Rajadarwaja, Varanasi, Ph-353826.
5.	Sri Girishchandra Chaudhari	Joint Minister	C.K.-4/20, Chaukhambha, Varanasi, Ph- 320261
6.	Sri G.P. Agrawal	Joint Minister	C.K.-3/28, Chaukhambha, Varanasi, Ph- 320261
7.	Sri Om Prakash Ji	Joint Minister	C K-16/188, Visheshwarganj, Varanasi, Ph- 330527.Sri
8.	Sri Chandrashakher Shah	Member	B-27/65, Durgakund, Varanasi, Ph- 2311024
9.	Sri G.P. Agrawal	Member	C.K.-3/28, Chaukhambha, Varanasi,

			Ph- 24202611
10	Sri Om Prakash Ji	Member	K.-16/188, Visheshwarganj-Varanasi, Ph-24405271
11	Sri Anil Kumar Ji	Member	B.-38/47, Mahmurganj, Varanasi, Ph- 23608131
12	Sri Prem Das Ji	Member	B- 59/65, Mahmurganj, Varanasi, Ph- 2362956
13.	Sri P.N. Tripathi	Member	Madagin Varanasi, Ph- 2440042.
14.	Pro. R.C. Sharma	Member	10, Sriram Coloni, Bajardiha, Varanasi, Ph- 23635661.Sri
15	Rai Girish chandra	Member	S-2638, Cantt-Varanasi, Ph-382165
16	Sri Brijandra Kishor	Member	C. 154, Bulanala-Varanasi, Ph-335080
17.	Sri Kuwar Parmanand Singh	Member	K-5348, Maidagin- Varanasi-Ph-332129
18	Sri Radha Raman Prasad	Member	B-3846, Mahmurganj, Varanasi, Ph- 361763.
19.	Sri Mahendra Shah	Member	B-368, Sankatmochan- Varanasi, Ph- 311755.
20	Sri K. P. Singh	Member	D-59/45-A, Mahmurganj, Varanasi, Ph-360023.
21.	GirishChandra Chaudhari	Member	C.K.-4/20, Chaukhambha, Varanasi, Ph-2420257
22.	Sri Chandrashakher Shah	Member	B-27/65, Durgakund, Varanasi, Ph- 2311024
23	Sri G.P. Agrawal	Member	C.K.-3/28, Chaukhambha, Varanasi, Ph- 24202611
24	Sri Om Prakash Ji	Member	K.-16/188, Visheshwarganj-Varanasi, Ph-24405271
.25.	Sri Premdas	Member	D- 59/65, Mahmurganj, Varanasi, Ph- 362956.
26	Sri Baijnath Das	Member	K-41/1, Bulanala, Varanasi, Ph-
27.	Sri Raj Krinshna Das	Member	C.K.- 52/17, Rajadarwaja, Varanasi, Ph- 385496.
28.	Dr. Nirmal Kumar	Member	C.K.- 16/30, Bulanala, Varanasi, Ph-
29.	Sri Shardul Vikram Gupt	Member	B- 30/5-A, Lanka, Varanasi, Ph- 310266
30.	Sri Kuwar Vijayanand	Member	K-53/48, Maidagin, Varanasi, Ph- 330581.

31.	Sri Moti lal Khatri	Member	D-59/103,Q-7, Sigra, Varanasi, Ph- 361969.
32.	Sri Raman	Member	D-38/46, Mahmurganj, Varanasi, Ph- 360426
33.	Sri Anil Kumar	Member	B-38/47, Mahmurganj, Varanasi, Ph-360813.
34.	Sri Rai Anand Krishna	Member	N-1/55, Amethikothi, Lanka, Varanasi, Ph- 310876.
35.	Sri Chandra Kumar Shah	Member	D-59/37, Mahmurganj, Varanasi, Ph- 360032.
36.	Sri Anup Chandra Chaudhari	Member	C.K.-4/20, Chaukhambha, Varanasi, Ph-320647.
37.	Sri ChandraShakher Shah	Member	B-27/65, DurgaKund, Varanasi, Ph-311024.
38.	Sri Giriraj Agrwal	Member	K-39/6, Plot 50 A, Bharhmanand Coloni, Varanasi, Ph-314823.
39.	Sri A.K.Gujrati	Member	K-37/76, Chaukhambha, Varanasi, Ph-333474.
40.	Sri Pramod Agrawal	Member	K-16/49, Thatheribazar, Varanasi, Ph-333602.
41.	Sri Radhe Krishna (Kajubabu)	Member	C.K.-4/25, Thatheribazar, Varanasi, Ph- 53442.
42.	Dr. Vidhaniwas Mishra	Member	Kashi Vidhya Pith Varanasi, Ph-
43.	Dr. P.N. Tripathi	Member	Maidagin Varanasi
44.	Sri S.K.Singh	Member	Maidagin Varanasi.
45.	Smt. Sarswatirow	Member	Maidagin Varanasi.
46.	Sri Arvind Kumar	Member	Sunderbila, Chaukaghatt, Varanasi.
47.	Sri.Vimal Jain	Member	Panjab National Bank, Nichibag, Varanasi.
48.	Sri Subodh Agrawal	Member	Makbul Alam Rod, Varanasi.
49.	Sri Birendra Kumar Gupta	Member	Jagrana Varanasi.
50.	Sri Kumar Agrawal	Member	Mahmurganj Varanasi.

❖ Members of Academic Advisory Body

1.	Sri Radha Ramana Ji	President	B-38/46, Mahmurganj –Varanasi, Ph-2361763.
2.	Sri Shyam Mohan Agrawal	Manager	D-59/45, A, Mahmurganj – Varanasi, Ph-2360023
3.	Dr. Bhgwan Das	Asst Member	C.K.-52/11, Rajaderwaja- Varanasi, Ph-2413826.
4.	Sri GirishChandra Chaudhari	Member	C.K.-4/20, Chaukhambha,Varanasi,

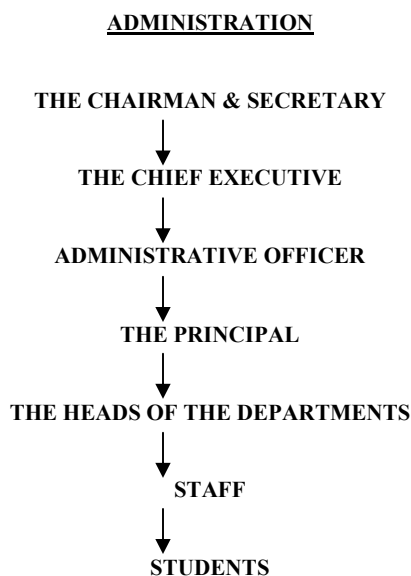
5.	Sri Chandrashakher Shah	Member	Ph-2420257 B-27/65, Durgakund, Varanasi, Ph- 2311024
6.	Sri G.P. Agrawal	Member	C.K.-3/28, Chaukhambha, Varanasi, Ph- 24202611
7.	Sri Om Prakash Ji	Member	K.-16/188, Visheshwarganj-Varanasi, Ph-24405271
8.	Sri Anil Kumar Ji	Member	B.-38/47, Mahmurganj, Varanasi, Ph- 23608131
9.	Sri Prem Das Ji	Member	B- 59/65, Mahmurganj, Varanasi, Ph- 2362956
10.	Sri P.N. Tripathi	Member	Madagin Varanasi, Ph- 2440042.
11.	Pro. R.C. Sharma	Member	10, Sriram Coloni, Bajardiha, Varanasi, Ph- 2363566

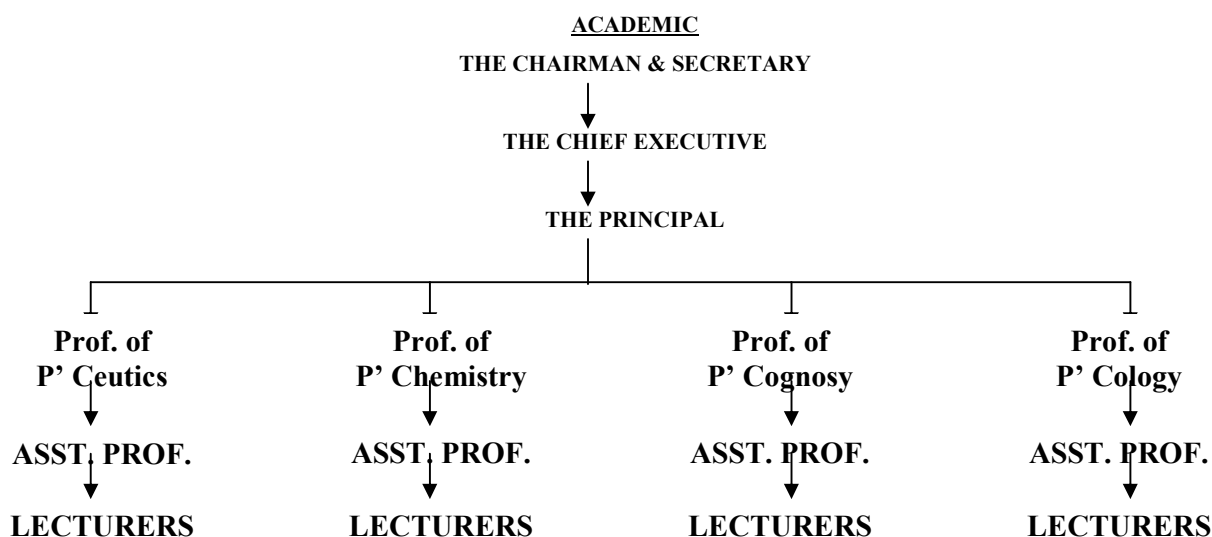
❖ Frequency of the Board Meetings and Academic Advisory Body

Board Meetings --- 4 times / academic year

AAB Meetings --- 6 times / academic year

❖ Organizational chart and processes





- ❖ Nature and Extent of involvement of faculty and students in academic affairs/ improvements

The Academic environment in Institute of Institute of Pharmacy, Harish Chandra P. G. College, is built on the strong foundation of building up of students by continuous learning. An interactive mode of teaching-learning is practiced. Oral feedback from students is taken time to time to improve teaching-learning process and feedback regarding academic taken regularly.

The institute has adopted efficient methods for students by providing useful study material after lecture. Performance of students is assessed by conducting periodical examinations both in theory and practical. Copies of students are being shown to the students to know their mistakes and they are motivated to improve them. The institute organizes pharmacy week during which awareness to the people regarding community pharmacy, community health and hygiene is done. Students are always motivated for their duties towards society and locality. Also poster presentation, speeches and play also played by the students.

Staffs are using OHP and L C D projector as aid for teaching and making study as interactive.

- ❖ Mechanism/Norms & Procedure for democratic/good Governance
 - **Vision / Mission statements and Quality Policy fixed for better, tangible results and transparency.**
 - **Class Monitoring Committee with coordinator, Staff Concerned and student representatives.**
 - **Staff meeting conducted once in a week.**
 - **Staff meeting for anti- ragging purpose**
 - **Staff meeting for students dressed, behavior, on presenting seminars so that it increases their boldness and moral values.**
 - **Students' Feedback collected and Staff performance are checked / analyzed.**
 - **Class Advisor/ Student Representative in every class for better academic/ general performance of staff/ student**
 - **Parents meet for continuous monitoring of students**
 - **Lesson plans are monitored by the Head of the Department for the proper coverage of syllabus.**
 - **Students' performances are analyzed through periodic assessment tests.**

- ❖ Student Feedback on Institutional Governance/faculty performance
Not Applicable

- ❖ Grievance redressal mechanism for faculty, staff and students
Usual

V. PROGRAMMES

- ❖ Name of the Programmes approved by the AICTE
Bachelor of Pharmacy
- ❖ Name of the Programmes accredited by the AICTE
Bachelor of Pharmacy
- ❖ For each Programmes the following details are to be given:
 - Name: **B. Pharm**
 - Number of seats: **60 (sixty)**
 - Duration: **4 year course**
 - Cut off mark/rank for admission during the last three years: **NA**
 - Fee: **47,550/-**
 - Placement Facilities: **NA**
 - Campus placement in last three years with minimum salary, maximum salary and average salary: **NA**
- ❖ Name and duration of programme(s) having affiliation/collaboration with Foreign University(s)/Institution(s) and being run in the same Campus along with status of their AICTE approval. If there is foreign collaboration, give the following details:
No

VI. FACULTY

❖ Branch wise list faculty members:

- Permanent Faculty: 16
- Visiting Faculty: 3
- Adjunct Faculty: 3
- Guest Faculty: 2
- Permanent Faculty: Student Ratio: 1:15

❖ Number of faculty employed and left during the last three years

Employed	18
Left	02 (1 for higher studies)

VII. PROFILE OF DIRECTOR/PRINCIPAL WITH QUALIFICATIONS, TOTAL EXPERIENCE, AGE AND DURATION OF EMPLOYMENT AT THE INSTITUTE CONCERNED

RESUME

Name: - Dr. Deepak Prakash
Permanent address: - CK 54/9, Machharhatta gate, Varanasi.
221001, Ph. No. 0542-2413431, 9415585402
Date of Birth: - 14th Aug. 1944
Language: - English & Hindi
Educational Qualification: - B. Pharm (1967- BHU)
M. Pharm. (Pharmacognosy) (1969- BHU)
Ph. D. (Pharmaceutics) (1973- BHU)

Related achievement:-

1. Attended a course of Industrial Management conducted by Development Commissioner, Small Scale Industries Organization, Govt. of India.
2. APPROVED ANALYSIS AND MANUFACTURING CHEMIST, Approval granted by food and Drugs controller, U.P.

Experience:

- **Teaching:-** 11 Years.(1969-1973, 1986-1990, 2005 –till dated)
- **Research:-** 5 years (1981-1986)
- **Industry:-** 21 years 1973-1981, 1991-2004, Calcutta

Positions held:-

- Lecturer, Dept of Pharmaceutics, BHU, Varanasi (1969- 1973)
- Works manager, M/s Bharat Pharma Chem, 30 Ganesh Chandra Avenue: Calcutta. 1973-1981.
- Senior Lecturer, Al Fateh University, Faculty of Pharmacy 1986-1990.

- Executive director Jeewanram Sheoduttrai (Medicine and surgical specialist) Culcutta. 1991-2004.
- Director, Shri H.C.P.G. College, Institute Of Pharmacy, Varanasi. 2005- Till date.

Social Activities:-

- Hon. Secretary, Indian Pharmaceutical Association, Varanasi Branch since 1978.
- Ex Hon. Departmental Secretary (Drugs and Pharmacy services) into prominent charitable hospital of Varanasi.
 1. Hindu Sevasadan Hospital Bansphatak, Varanasi 1977- 1980
 2. Shri Ram Laxmi Narayan Marwadi Hindu Hospital, Godowalia, Varanasi, 1980-1984.

Number of research paper published:- Fifteen

Reference:-

- | | |
|---|---|
| 1. Dr. J. K. Pandit
Head of Deptt. Pharmacy,
IT. BHU, Varanasi. | 2. Dr. S. Chauramani Gopal
Medical Supridtendent,
Sir. Surenderlal Hospital, BHU. Varanasi, |
|---|---|

List of Paper Publication

1. Pharmacognostical studies on *Polygonum glabrum* Willd., 1986, International Journal of Crude Drug Research, 24,(1), 45-51.
2. A Comparative Pharmacognostical study of the four species of *Desmodium* (I), 1985, Indian Drugs, 23(2), 65-71.
3. Evaluation of Mangrove cutch, May-June 1985, Ind. Jour. Pharm. Sci., 112.
4. An evaluation of Alkaloidal constituents of *Crotalaria juncea* Linn., 1985, Indian Drugs, 22(9), 495-96.
5. An evaluation of *Tribulus terrestris* Linn. (Chotee gokharu), 1985, Indian Drugs, 22(6), 332-333.
6. The Alkaloids of Genus *Crotalaria* (I), 1984-85, The Pharmastudent, XXII, 19-37.
7. Preliminary Pharmacological studies on *Polygonum glabrum* Willd. (Baana) 1985, Indian Drugs, 22(5), 242-46.
8. Preliminary Pharmacological studies on *Barleria* (Part-I), Leaf of *B. oristapa* Linn., Jour. Mod. Ayurveds.
9. Studies on the Starches isolated from *Sorgium vulgare* Linn, & *Paspalum scrobiculatum* Linn., 1983, Ind.Jour.Pharm.Sci., 45(2), 85-86.
10. Pharmacognostical studies on *Desmodium floribundum* G. Doa, 1974, Jour.Res.Ind.Med., 10(2), 32-43.
11. Pharmacognostical studies on *Desmodium gyrans* DC., 1975, Jour.Res.Ind.Med., 10(2), 44-54.
12. Pharmacognostical studies on *Cassia occidentalis* Linn (Kasundi), 1974, Jour.Res.Ind.Med., 9(3), 56-67.
13. Pharmacognostical studies on *Cassia tora* Linn. (Chakawad), 1971, Jour.Res.Ind.Med., VI(3), 270-80.
14. Pharmacological identification of an identical Quaternary bases isolated from 11 species of Leguminosae, 1971, Indian Medical Gazette, XI(91), 16-17.
15. Acetylcholine like activity of some Indian Medicinal Plants, 1969, Nagarjun, XIII(4), 9-11.

For each Faculty give a page covering

LIST OF FACULT MEMBERS

S.N O.	Name	Designation	Highest Qualification	Specialization	Age	Date of joining	Duration of employment
1.	Dr. Deepak Prakash	Director	Ph.D	Pharmacognosy	64	31/05/2005	18400-22400
2.	Mr. Om Prakash Tiwari	Principal	M. Pharm	Pharmaceutical Chemistry	53	02/07/2005	16400-22400
3.	Mr. Santosh Kumar Rai	Lecturer	M. Pharm	Pharmacology	33	02/07/2005	12000-18300
4.	Mr. Manish Kumar Gupta	Lecturer	M. Pharm	Pharmaceutics	29	27/08/2005	12000-18300
5.	Mr. Pradeep Kumar	Lecturer	M. Tech.	Biotechnonology & Biochem. Engg.	47	17/07/2006	12000-18300
6.	Mr. Adesh A. Bawane	Lecturer	M. Pharm	Pharmacognosy	31	14/08/2006	12000-18300
7.	Mr. Pradeep K. Agrawal	Reader	M. Pharm	Pharmaceutical Chemistry	57	03/10/2006	12420-18300
8.	Mr. Brijesh Singh	Lecturer	M. Pharm	Pharma chemistry	27	27/08/2007	8000-13500
9.	Mr. A. K Tiwari	Lecturer	M. Pharm	Pharmaceutical Chemistry	27	29/08/2007	8000-13500
10	Mrs. Rekha Gupta	Reader	M. Pharm	Pharmacology	46	01/08/2007	12420-18300
11	Mr. A. Kumar	Reader	M. Pharm	Pharmacognosy	50	01/08/2008	12420-18300
12	Mr. Briyyog	Lecturer	M. Pharm	Pharmacognosy	36	02/08/08	8000-13500
13	Miss. Nidhi Singh	Lecturer	M. Pharm	Pharmaceutical Chemistry	26	01/08/08	8000-13500
14	Mr. N. Das	Lecturer	M. Pharm	Pharmaceutical Chemistry	27	16/08/2007	8000-13500
15	Mr. Laliteshwar Pratap Singh	Lecturer	M. Pharm	Pharmaceutical Chemistry	31	14/08/08	8000-13500
16	Mr. Dhananjay Rai	Lecturer	M. Pharm	Pharmaceutics	28	16/08/08	8000-13500

VIII. Fee

- ❖ Details of fee, as approved by State fee Committee, for the Institution.
47,600/-
- ❖ Time schedule for payment of fee for the entire programme.
Two schedule
- ❖ No. of Fee waivers granted with amount and name of students.
No
- ❖ Number of scholarship offered by the institute, duration and amount
No

- ❖ Criteria for fee waivers/scholarship.
Should have 80% or higher in UPTU exam
- ❖ Estimated cost of Boarding and Lodging in Hostels.
34,000/-

IX. ADMISSION

- ❖ Number of seats sanctioned with the year of approval.
Sixty for session 2008-2009
- ❖ Number of students admitted under various categories each year in the last three years.

Sr no	Year	SC	ST	TOTAL
1	2005-2006	10	00	10
2	2006-2007	11	00	11
3	2007-2008	10	00	10

- ❖ Number of applications received during last two years for admission under Management Quota and number admitted.
Received - 107 in one year (in session 2006-2007)
Admitted - 09
Received - 46 in one year (in session 2007-2008)
Admitted - 09

X. ADMISSION PROCEDURE

- ❖ Mention the admission test being followed, name and address of the Test Agency and its URL (website).
SEE-UPTU 2007, www.uptu.org
- ❖ Number of seats allotted to different Test Qualified candidates separately [AIEEE/CET (State conducted test/University tests)/ Association conducted test]
By University Test
- ❖ Calendar for admission against management/vacant seats:
 - Last date for request for applications.
: 10 Aug 2008
 - Last date for submission of application.
: 14 Aug 2008
 - Dates for announcing final results.
: 19 Aug 2008
 - Release of admission list (main list and waiting list should be announced on the same day)
: 20 Aug 2008
 - Date for acceptance by the candidate (time given should in no case be less than 15 days)
: 22 Aug 2008
 - Last date for closing of admission.
: 24 Aug. 2008
 - Starting of the Academic session.
: 11 Aug 2008
 - The policy of refund of the fee, in case of withdrawal, should be clearly notified.
: As per UPTU Lucknow, University ordinance.

XI. CRITERIA AND WEIGHTAGES FOR ADMISSION

- ❖ Describe each criteria with its respective weightages i.e. Admission Test, marks in qualifying examination etc.
: **Marks in qualifying examination**
- ❖ Mention the minimum level of acceptance, if any.
: **Minimum 60% in PCB/ PCM in HSC.**
- ❖ Mention the cut-off levels of percentage & percentile scores of the candidates in the admission test for the last three years.
2005 - 2006 - 56 %
2006 - 2007 - 57 %
2007 - 2008 - 61 %
2008 - 2009 - 62 %
- ❖ Display marks scored in Test etc. and in aggregate for all candidates who were admitted.
: **NA**

XII. APPLICATION FORM

- ❖ Downloadable application form, with online submission possibilities.
: **On college web site: [www. schv.org](http://www.schv.org)**

XIII. LIST OF APPLICANTS

- ❖ List of candidates whose applications have been received along with percentile/percentage score for each of the qualifying examination in separate categories for open seats. List of candidates who have applied along with percentage and percentile score for Management quota seats.
a) The seat is allotted through the university (UPTU, Lucknow) via centralized admission.
b) For session 2008-09 the admission is still under process.

XIV. RESULTS OF ADMISSION UNDER MANAGEMENT SEATS/VACANT SEATS

- ❖ Composition of selection team for admission under Management Quota with the brief profiles of members (This information be made available in the public domain after the admission process is over)
: **The selection teams were as,**
Director - Pharmacy - (Dr. Deepak Prakash)
Director - Management- (Dr. R. C. Sharma)
Secretary - Society- (Mr. Shyam Mohan Agrawal)
Co Secretary - (Ram ji Agrawal)
Other - Office Staff

- ❖ Score of the individual candidates admitted arranged in order of merit.
List of Candidate admitted in Management Quota
2008-09

S. No	Form no.	Student	Score %
1	1077	Shikha Singh	82
2	1061	Lovely	79
3	INT/003	Priyanka Singh	71
4	INT/ 004	Abhishek Mishra	70
5	1024	Puja Dubey	70
6	1016	Anuj Kumar Tiwari	68
7	1083	Kumari Arti	67

LIST OF WAITING CANDIDATE
(CAN BE CONFORM AFTER 30TH JULY 2008)

S. No	Form no.	Student
1	1021	Amit Kumar
2	1009	Anand Kumar Singh
3	1080	Rakesh Kumar Yadav

- ❖ List of candidates who have been offered-

S. No	Form no.	Student
1	1077	Shikha Singh
2	1061	Lovely
3	INT/003	Priyanka Singh
4	INT/ 004	Abhishek Mishra
5	1024	Puja Dubey
6	1016	Anuj Kumar Tiwari
7	1083	Kumari Arti

- ❖ Waiting list of the candidates in order of merit to be operative from the last date of joining of the first list candidates. -

S. No	Form no.	Student
1	1026	Munmun Jaiswal
2	1023	Vidushi
3	1025	Eshika Singh

- ❖ List of the candidates who joined within the date, vacancy position in each category before operation of waiting list. **Under processes**

XV. INFORMATION ON INFRASTRUCTURE AND OTHER RESOURCES AVAILABLE

LIBRARY:

- Number of Library books/Titles/Journals available (programme-wise)
 - : Total number of Library books - **4225**
 - : Total Titles - **488**
 - : Journals - **16**
- List of online National/International Journals subscribed.
 - : **IJP, Drug Today**
- E-Library facilities
 - : **Not available**

LABORATORY:

For each Laboratory

- **List of Major Equipment/Facilities**

Pharmaceutics: Ball mill, Hot air oven, Cutter mill, Percolator, Hand grinder, mixer, suppository moulds, IR moisture balance, Tablet punching, hardness tester, dissolution apparatus, disintegration apparatus, friability tester, etc.

Anatomy, Physiology and Pharmacology : Microscope, Kayrnograph, Spirometer, Hemocytometer, RBC/WBC set, Sphygmomanometer, Sythescope, Bones and skeletons, stage micrometer, Gluco-meter, Respire-meter, ESR set, Rota rod, Actophotometer, muscle grip strength, gas kymograph burner, muscle electrode, etc.

Chemistry: pH meter, Polarymeter, DM unit, Water Distillation still, Oven, Water Bath, Chemical balance, Physical Balance, Analytical Balance, Hot plate, vacuum pump, chromatography chamber, conductometer, IR moisture balance, UV chamber, Karl fisher apparatus, Electrode, etc.

Pharmacognosy : Muffle Furnace, Cmera Lucida, Chromatography Chamber, TLC Applicator, Soxhlet Apparatus, Eye peace micrometer.

Microbiology: B.O.D, Incubator, Autoclave, Laminar flow, Oven , U.V Chamber,

- **List of Experimental Setup:**

Chemistry: Acid Base Titrations, Oxidation Reduction Titrations, Precipitation Titrations, Gravimetric Analysis, Salt analysis, Preparation of inorganic compounds, Limit test, molecular modeling, Element detection, Group detection, etc.

Pharmaceutics: Formulation of Aromatic Waters, Solutions, Syrups, Elixirs, Powders, Lotions, Liniments, Mucilage, Glycerins, Inhalation, Tinctures & Extracts etc., Size reductions, Mixing, Psychometric chart, crystallization, Reynold No. study, etc.

Anatomy and Physiology: Study of human skeleton, Microscopic study of different tissues, Estimation of haemoglobin in blood, Determination of bleeding time, clotting time, R.B.C, Count, Total leucocyte count, D.L.C. and E.S.R., Recording of body temperature, pulse rate and blood pressure, basic understanding of Electrocardiogram – PQRST waves and their significance. Lung function test, glucose level detection, etc.

Pharmacognosy : Plant study, microscopically measurement of cell, calcium oxalate crystal, phloem fibers, stomatal index, stomatal number, veislet number, pelisite ratio, identification of crude drugs, herbarium preparation, etc.

Pharmacology : Animals experiments, DRC, PA2 value, Bioassay, in vivo studies etc.

COMPUTING FACILITIES:

- Number and Configuration of Systems:
: **40+ 1**
- Total number of systems connected by LAN
: **10**
- Total number of systems connected to WAN
: **No**
- Internet bandwidth
: **Broad Band with 512kbps**
- Major software packages available
: **Windows, M S office, FORTRAN 77, Pascal.**
- Special purpose facilities available
: **Yes**

WORKSHOP:

- List of facilities available.

Games and Sports Facilities

: **Both for outdoor and indoor games**

Extra Curriculum Activities

: **Yes, time to time**

Soft Skill Development Facilities

: **Yes**

Number of Classrooms and size of each

: **Four, 80 sq m**

Number of Tutorial rooms and size of each

: **One, 54.63 sq. m**

Number of laboratories and size of each

: **Thirteen, 815 sq. m (approx) depending on lab**

Number of drawing halls and size of each

: **Not applicable**

Number of Computer Centres with capacity of each

: **1:6**

Central Examination Facility, Number of rooms and capacity of each.

: **No**

Teaching Learning process

- Curricula and syllabi for each of the programmers as approved by the University.

SEMESTER I

PHAR-IIIM REMEDIAL MATHEMATICS 5092

Unit-I 1. Algebra: **Equations reducible to quadratics, simultaneous equations (linear & quadratic). Determinants, Properties of determinants, solution of simultaneous equations by Cramer's rule, matrices, properties of matrices, solution of simultaneous equations by matrices, pharmaceutical applications of determinants and matrices.**

[08]

Unit-II 2. Measures of Central value: **Objectives and pre-requisites of an ideal measure, mean, mode and median.**

[05]

Unit-III 3. Trigonometry: **Measurement of angle, T-ratio, addition, subtraction and transformation formulae, T-ratio of multiple, submultiple, allied and certain angles, application of logarithms in pharmaceutical computations.**

[08]

Unit-IV 4. Analytical Plain Geometry: **Certain co-ordinates, distance between two points, area of triangle, locus of a point, straight line, slope and intercept form, double intercept form normal (perpendicular form), slope-point and two point form, general equation of first degree.** [07]

Unit-V Calculus: **Differential: Limits and functions, definition of differential coefficient, differentiation of standard functions, including function of a function (chain rule).**

Integral: Intregation as inverse of differentiation indefinite integrals of standard form, intergration by parts.

[12]

BOOKS RECOMMENDED

1. A textbook of Mathematics for XI-XII Students, NCERT Publication Vol. I-IV.
2. Loney, S.L. "Plane Trigonometry" AITBS Publishers.
3. Loney, S.L. "The elements of coordinate geometry" AITBS Publishers.
4. Gupta S.P. Statistical Methods, Sultan Chand and Co., New Delhi.
5. Narayan Shanti, Integral calculus, Sultan Chand & Co.
6. Prasad Gorakh Text book on differential calculus, Pothishala Pvt. Ltd., Allahabad.
7. Narayan Shanti, Differential calculus, Shyamal Charitable Trust, New Delhi.
8. Prasad Gorakh Text book on integral calculus, Pothishala Pvt. Ltd., Allahabad.

PHAR-IIIB REMEDIAL BIOLOGY 5094

THEORY

Unit-I **General survey of Animal Kingdom. Structure and life history of parasites as illustrated by amoeba, entamoeba, trypanosoma, plasmodium, taenia, ascaris, schistosoma, oxyuris and ancylostoma.**

[08]

Unit-II **General structure and life history of insects like mosquito, house fly, mites and silk worm.**

[08]

Unit-III **Morphology and histology of root, stem, bark, wood, leaf, flower, fruit and seed, modification of stems and roots.**

[12]

Unit-IV **Plant cell: Its structure and non living inclusions, mitosis and meiosis, different types of plant tissues and their functions. Basic concept of molecular biology (DNA,RNA).**

[08]

Unit-V **Methods of classification of plants.**

[04]

PHAR-IIIP REMEDIAL BIOLOGY PRACTICAL

PRACTICAL

1. **Morphology of plant parts indicated in theory.**
2. **Care, use and type of microscopes.**
3. **Gross identification of slides of structures and life cycle of lower plants/animals mentioned in theory.**
4. **Morphology of plant parts indicated in theory.**
5. **Preparation, microscopic examination of stem, root and leaf of monocot and dicot plants.**
6. **Structure of human parasites and insects mentioned in theory with the help of specimens.**

Note: **There shall be no University Examination for Remedial Biology Practical.**

BOOKS RECOMMENDED

1. Dutta A.C. "Botany for Degree students" Oxford.
2. Marshall & Williams "Text Book of Zoology" CBS Publishers & Distributors, Delhi.
3. Fahn "Plant Anatomy" Aditya Books Private Limited, New Delhi.
4. Weiz, Paul B "Laboratory Manual in Science of Biology" Mc Graw-hill book company.

PHAR-112 PHARMACEUTICAL ANALYSIS-1 5093

THEORY

Unit-1 : **Significance of quantitative analysis in quality control different techniques of analysis, preliminaries and definitions, precision and accuracy. Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards.** [06]

Unit-II: **Acid Base Titrations: Acid base concepts, role of solvent, relative strengths of acids and bases, ionization, law of mass action, common-ion effect, ionic product of water, pH, hydrolysis of salts, Henderson-Hasselbach equation, buffer solution, neutralization curves, acid base indicators, theory of indicators, choice of indicators, mixed indicators, polyprotic system.**

[10]

Unit-III: **Oxidation reduction Titrations: Concepts of oxidation and reduction, redox reactions, strengths and equivalent weights of oxidizing and reducing agents, theory of redox titrations, redox indicators, oxidation reduction curves, iodimetry and iodometry, titrations involving ceric sulphate, potassium iodate, potassium bromate, potassium permanganate.**

[10]

Unit-IV: **Precipitation Titrations: Precipitation reactions, solubility products, effect of acids, temperature and solvent upon the solubility of precipitate. Argentometric titrations and titrations involving ammonium or potassium thiocyanate, mercuric nitrate indicators, Gaylussac method, Mohr's method, Volhard's method and Fajan's method.**

[06]

Unit-V : **Gravimetric Analysis: Precipitation techniques, solubility products, the colloidal state, supersaturation, co-precipitation, post-precipitation, digestion, washing of the precipitate, filtration, filter papers and crucibles, Ignition, thermogravimetric**

curves, specific examples like barium as barium sulphate, aluminium as aluminium oxide, organic precipitants.

[08]

PHAR-112 P PHARMACEUTICAL ANALYSIS – 1 PRACTICAL 5207

The students should be introduced to the main analytical tools through demonstration. They should have a clear understanding of a typical analytical balance, the requirements of a good balance, weights, care & use of balance, methods of weighing, and errors in weighing. The students should also be acquainted with the general apparatus requiring various analytical procedures.

1. Standardization of analytical weights and calibration of volumetric apparatus.
2. Acid Base Titrations : Preparation and Standardization of acids and bases, some exercises related with determination of acids and bases separately or in mixture form, some official assay procedures, e.g. boric acid, should also be covered.
3. Oxidation Reduction Titrations : Preparation & standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc. Some exercises related to determinations of oxidizing & reducing agents. Exercises involving potassium iodate, potassium bromate, iodine solution and ceric ammonium sulphate.
4. Precipitation Titrations : Preparation and standardization of titrants like silver nitrate and ammonium thiocyanate, titrations according to Mohr's, Volhards and Fajan's methods.
5. Gravimetric Analysis : Preparation of gooch crucible for filtration and use of sintered glass crucible. Determination of water of hydration, some exercise related to gravimetric analysis should be covered.

BOOKS RECOMMENDED :

1. Mendham J, Denny R.C., Barnes J.D., Thomas M, Jeffery G.H., "Vogel's Textbook of Quantitative Chemical Analysis", Pearson Education Asia.
2. Conners K.A., "A Text book of Pharmaceutical Analysis", Wiley Inter-science.
3. Beckett, A.H., and Stenlake, J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University of London.
4. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
5. Alexeyev V. "Quantitative Analysis". CBS Publishers & Distributors.
6. The Pharmacopoeia of India.

PHAR – 113 PHARMACEUTICAL CHEMISTRY-1 (INORGANIC PHARMACEUTICAL CHEMISTRY) 5095

Unit-I A. Sources of impurities & their control, limit test for iron, arsenic, lead, heavy metals, chloride & Sulphate

B. An outline of methods of preparation, uses, sources of impurities, tests of purity and identification and special tests, if any, of the following classes of inorganic pharmaceuticals included in Indian Pharmacopoeia. (1996)

Gases and Vapours : Inhalants (Oxygen), Anaesthetics (Nitrous oxide)

Pharmaceutical aids and necessities: water (purified water, water for injection and sterile water for injection), pharmaceutical acceptable glass, acids and bases (Sodium hydroxide, phosphoric acid).

Topical Agents : Protectives (Calamine, titanium dioxide, talc, kaolin), astringents (Zinc oxide, Zinc Sulphate) and anti infectives (Boric Acid, Hydrogen peroxide, Iodine, Povidone Iodine, Potassium permanganate, Silver nitrate).

Dental Products : Dentrifices- anti-caries agents (Sodium fluoride).

[08]

Unit-II: Gastrointestinal Agents : Acidifying agents (Dilute Hydrochloric acid), antacids (Bismuth subcarbonate, Aluminium hydroxide, Calcium carbonate, Magnesium hydroxide, Magnesium oxide {light and heavy}, Magnesium carbonate {light and heavy}, Magnesium trisilicate), cathartics (disodium hydrogen phosphate, Magnesium sulphate and other Magnesium compounds), protective and adsorbents (Activated Charcoal, Light Kaolin, Aluminium sulphate

Miscellaneous Agents: Expectorants (Ammonium chloride, Potassium Iodide), antioxidants (Sodium metabisulphite). [08]

Unit-III : Major intra and extra- cellular electrolytes : Physiological ions, Electrolytes used for replacement therapy, acid-base balance & combination therapy (Calcium chloride, Calcium gluconate, Calcium lactate, Calcium levulinate, Sodium dihydrogen phosphate, sodium acetate, sodium bicarbonate, sodium chloride, potassium chloride, magnesium chloride).

Cationic and anionic components of inorganic drugs useful for systemic effects. [08]

Unit-IV : Essential and Trace Elements : Transition elements and their compounds of pharmaceutical importance. Iron and haematinics (Ferrous fumarate, Ferrous gluconate, Ferrous sulphate, Ferric Ammonium citrate), mineral supplements (Cu, Zn, Cr, Mn, Sb, S, I).

Co-ordination compounds and complexation- study of such compounds used in therapy including poison antidotes (Calcium folinate, Sodium thiosulphate). [08]

Unit-V Inorganic Radio-Pharmaceuticals: Nuclear radio pharmaceuticals, nomenclature, methods of obtaining, standards and units of activity, measurement of activity, clinical application and dosage, hazards and precautions.

[08]

PHAR-113P

PHARMACEUTICAL CHEMISTRY-I (INORGANIC PHARMACEUTICAL CHEMISTRY) LAB 5208

List of Experiments

No. of Labs

To perform limit test of chloride, sulphate, Iron, Heavy metal and arsenic in the given sample

5

Salt analysis

7

Preparation of following compounds:- Boric acid, Magnesium sulphate, Heavy magnesium carbonate, Calcium Carbonate, Alum, Zinc sulphate 3

BOOKS RECOMMENDED :

1. Block, J.H. Roche, E. Soine, T and Wilson, C., "Inorganic, Medicinal & Pharmaceutical Chemistry", Lea & Febiger.
2. Discher, C.A., et.al Modern Inorganic Pharmaceutical Chemistry, waveland press.
3. Pharmacopoeia of India, 1996 edition.
4. Atherden L.M., Bentley and Drivers' "Text Book of Pharmaceutical Chemistry", Oxford University Press, London.

PHAR – 114 PHARMACEUTICS- 1 (GENERAL PHARMACY) 5096

Unit-I History of Pharmacy : Origin & development of pharmacy, scope of pharmacy, introduction to pharmacopoeias with special reference to I.P, B.P., U.S.P, & International Pharmacopoeia. [04]

Pharmaceutical Additives : Coloring, flavouring & sweetening agents, cosolvents, preservatives, surfactants & their applications, antioxidants. [03]

Unit-II Size Reduction : Definition, factors affecting size reduction, principles, laws & factors affecting energy requirements, different methods of size reduction, study of hammer mill, ball mill, fluid energy mill & disintegrator, various methods & equipments employed for size separation e.g. sieving, sedimentation, cyclone separator, elutriation methods.

[06]

- Unit-III : Pharmaceutical calculations : Posology, calculation of doses for infants, adults and elderly patients; Enlarging and reducing recipes percentage solutions, alligation, alcohol dilution, proof spirit. [10]
- Unit-IV Extraction & Galenicals: Extraction processes, study of infusion, decoction, digestion, percolation, maceration & their modifications, applications in the preparation of tinctures & extracts. Factors affecting selection of extraction processes. [07]
- Unit-V Mixing: Theory of mixing, solid-solid, solid-liquid & liquid-liquid mixing equipments. [03]
- Introduction to Pharmaceutical Dosage Forms: A brief theory of : Solutions, mixtures, spirits, aromatic waters, glycerins, paints, syrups, elixirs, mouth washes, mucilages, lotions, liniments, pastes, inhalations and powders. [07]

PHAR-114P PHARMACEUTICS-I (GENERAL PHARMACY) 5209

I – Preparation of following classes of Pharmaceutical dosage forms (involving the use of calculations in metrology) as official in IP, BP, USP/NF.

- | | | | |
|--------------------|--|-------------------------|---|
| a) Aromatic Waters | 1.Chloroform water BP, 2.Camphor Water BP, | g) Lotions | 1.Calamine lotion IP, 2. Amino benzoic acid lotion |
| 3. Rose Water NF | | h) Liniments | 1.Methyl salicylate liniment BP, 2. Turpentine liniment BP |
| b) Solutions | 1.Lysol solution IP, 2. Strong Ammonium Acetate solution | i) Mucilage | 1.Starch Mucilage IP |
| BP | | j) Glycerins | 1.Kaolin Poultice BP |
| c) Syrups | 1.Simple syrup BP, 2.Simple syrup USP/NF | k) Inhalation | 1.Benzoin Inhalation BP |
| d) Elixirs | 1.Aromatic Elixirs USP/NF | l) Tinctures & Extracts | 1.Infusion of Tea, 2.Decoction of Ispaghula, |
| e) Spirits | 1.Aromatic Ammonia spirit BP | | 3.Compound benzoin tincture BP, 4.Strong Ginger tincture BP |
| f) Powders | 1.ORS Powder IP, 2. Absorbable dusting | | 5.Liquorice liquid extract BP. |
| powder USP/NF | | | |

- II - Experiments to illustrate principles of size reduction using Ball Mill.
 ▪ Effect of size of balls, number of balls and time on the efficiency of ball mill.
- III - Experiments to illustrate mixing efficiency. Solid-Solid mixing.

BOOKS RECOMMENDED:

1. Pharmacopoeia of India, The Controller of Publications, Delhi.
2. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
3. Carter S.J., "Cooper and Gunn's Tutorial Pharmacy", CBS Publishers, Delhi.
4. Rawlins E.A., "Bentley's Text Book of Pharmaceutics", ELBS Bailliere Tyn dall.
5. Lachman L, Liberman H.A and Kanig J.L., "Theory and Practice of Industrial Pharmacy", Lea and Febiger.
6. Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS Publishers, New Delhi.
7. Aulton, M.E, Text Book of Pharmaceutics, Vol., I & II. Churchill Livingstone.
8. United States Pharmacopoeia (National Formulary).
9. Remington – "The science and practice of pharmacy" Vol. I & II. Mack Publishing Co., Pennsylvania.

PHAR-115 ANATOMY & PHYSIOLOGY-I 5097

Unit –I Introduction to human body & organisation of human body Functional & structural characteristics of cell. Detailed structure of cell membrane & physiology of transport process. Structural & functional characteristics of tissues- epithelial, connective, muscle and nerve. [08]

Unit-II Skeletal system Structure, composition & functions of skeleton. Classification of joints, types of movements of joints. [08]

Unit-III Anatomy & physiology of skeletal & smooth muscle, neurotransmission, physiology of skeletal muscle contraction, energy metabolism, types of muscle contraction, muscle tone. [08]

Unit-IV Haemopoietic system : Composition & function of blood & its elements, erythropoiesis, blood groups, blood coagulation.

Unit-Va) Concepts of health & disease: Disease causing agents & prevention of disease.

- b) Classification of food requirements : Balanced diet, Nutritional deficiency disorders, their treatment & prevention, specification for drinking water. [08]

PHAR-115P HUMAN ANATOMY, PHYSIOLOGY & HEALTH EDUCATION-I 5210

PRACTICAL

1. Study of human skeleton.
2. Microscopic study of different tissues.
3. Estimation of haemoglobin in blood, Determination of bleeding time, clotting time, R.B.C, Count, Total leucocyte count, D.L.C. and E.S.R.
4. Recording of body temperature, pulse rate and blood pressure, basic understanding of Electrocardiogram – PQRST waves and their significance.

BOOKS RECOMMENDED:

1. Ranade VG, "Text Book of Practical Physiology", Pune Vidyarthi Griha Prakashan, Pune.
2. Difore S.H. "Atlas of Normal Histology" – Lea & Febiger Philadelphia.
3. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
4. Guyton AC, Hall JE., "Text book of Medical Physiology", WB Saunders Company.
5. Chatterjee C.C. "Human Physiology", Medical Allied Agency, Calcutta.
6. Ross & Wilson "Anatomy & Physiology in Health & Illness", Churchill Livingstone.
7. Tortora G.J. & Anagnostokos NP "Principles of Anatomy & Physiology", Harper & Row Publishers, New Delhi.
8. Parmar N.S. "Health Education & Community Pharmacy" CBS Publishers, Delhi.
9. Shalya Subhash "Human Physiology" CBS Publishers & Distributors.
10. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.

PHAR-116 PROFESSIONAL COMMUNICATION-I 9957

UNIT-I English Grammer

Parts of speech, Articles, Preposition, Tenses, Active-Passive voice, Direct- Indirect, speech. [12]

UNIT-II Letter writing, Precis and Essay writing, Comprehension, Speed reading, scanning & swimming. [08]

UNIT-III Working on accent neutralisation, pauses, stresses, non words, voice modulation, eye contact for small & large groups. [08]

UNIT-IV Presentation techniques, - Tips., Importance of non-verbal communication, debates, Role plays. [06]

XVI. BOOKS RECOMMENDED

1. Wren P.C and Martin H., "High School Grammar and Composition", S. Chand & Co.
2. Robbins, S "Organisational Behaviour"

SEMESTER-II

PHAR-121

PHYSICAL CHEMISTRY

5067

Unit-I 1. Behaviour of gases : **Kinetic theory of gases, deviation from ideal behaviour and explanation.**

2. The liquid state : **Physical properties (surface tension, parachor, viscosity, rheochor, refractive index, optical rotation, dipole moment) and chemical constituents.**

3. Amorphous and crystalline solids : **geometry & symmetry of crystals, Millers indices, types of crystals, Physical properties of crystals, crystal diffraction.** [08]

Unit-II 4. Thermodynamics : **Fundamentals, first, second, third and zeroth law, Joule-Thompson's effect, absolute temperature scale.**

5. Thermo chemistry: **Definition & conventions, heat of reaction, heat of formation, heat of solution, heat of neutralisation, heat of combustion, Hess law of constant summation, Bomb calorimeter, bond energies, Kirchoffs equation.**

[08]

Unit-III 6. Solutions : **Ideal and real solutions, solutions of gases in liquids, colligative properties.**

7. pH : **Its determination, buffer, theory of buffers.**

8. Adsorption : **Freudlich and Gibbs adsorption Isotherms, Langmuir theory of adsorption.** [08]

Unit-IV 9. Electro chemistry : **Faraday's Laws of Electrolysis, Electrolytic conductance & its measurement, molar & equivalent conductivity, its variation with dilution. Kohlrausch law, Arrhenius theory, degree of ionisation & Ostwald dilution law. Transport number & migration of ion, Hittorfs theoretical device, theory of strong electrolytes (Debye Huckle theory).** [08]

Unit-V 10. Chemical kinetics : **Zero, first and second order reaction, complex reactions, elementary idea of reaction kinetics, characteristics of homogenous and heterogeneous catalysis, acid base and enzyme catalysis.**

11. Phase equilibria : **Phase, component, degree of freedom, phase rule (excluding derivation). Cooling curves & Phase diagrams for one & two component system involving eutectics, congruent & incongruent melting point (examples-water, sulphur, KI-H₂O, NaCl-H₂O system). Distribution law & application to solvent extraction.**

PHAR-I21P

PHYSICAL CHEMISTRY 5246

PRACTICAL

1. Determination refractive index of given liquids.
2. Determination of specific rotation of sucrose at various concentrations and determine the intrinsic rotation.
3. Determination of rate constant of simple reaction.
4. Determination of cell constant, verify Ostwald dilution law and perform conductometric titrations.

5. Determination of surface tension.
6. Determination of partition co-efficient.
7. Determination of viscosity.
8. pH determination by different methods.
9. Determination of solubility

BOOKS RECOMMENDED:

1. Pali S.R., and Prabartak, S.K.D.E., Practical Physical Chemistry, Haltone Limited, Calcutta.
2. Shoemaker, D.P. Garland, C.W., Experiments of Physical Chemistry, MC Graw Hill Book Co.
3. Bahl B.S., Tuli G.D. & Bahl Arun, Essential of Physical Chemistry, S. Chand & Co.
4. Negi A.S. & Anand S.C. "Textbook of Physical Chemistry" Wiley Eastern Ltd.
5. Glasstone S. & Lewis D, Elements of Physical Chemistry, Macmillan Education.
6. Atkins P & Paula, J.D. "Atkins Physical Chemistry" Oxford University Press.

PHAR-122

PHARMACEUTICAL CHEMISTRY-II (ORGANIC CHEMISTRY- I) 5068

Unit-I **Structure and Properties** : **Atomic Structure, atomic orbital, molecular orbital, hybridization, sigma & Pi bond, covalent, electrovalent and co-ordinate bond, inductive effect, resonance, Classification & Nomenclature of organic compounds.**

[08]

Unit-II **Isomerism, geometrical isomerism, Stereochemistry including optical activity, stereoisomerism, specification of configuration and conformational analysis.**

[08]

Unit-III **Important methods of preparation, reactions with special reference to mechanism of the following classes of compounds: Alkanes, alkenes, alkynes & dienes, free radical substitution reaction, alkyl halides, Alcohols.** [08]

Unit-IV **Aromatic Compounds, aromatic character, structure of benzene, resonance, orientation of aromatic substitution, arenes, amines (aliphatic & aromatic), phenols, aryl halides.**

[08]

Unit-V **Aldehydes and ketones (aliphatic & aromatic), carboxylic acids & their derivatives, di & tricarboxylic acids, hydroxy acids. Organometallic Compounds- Grignard reagent, organolithium compounds, their preparation & synthetic application.**

[08]

PHAR-I22P PHARMACEUTICAL CHEMISTRY -II (ORGANIC CHEMISTRY-I) 5247

SUGGESTED LIST OF PRACTICALS

1. Identification of elements and functional groups in given sample.

6

2. Purification of solvents like Benzene, chloroform, acetone and preparation of absolut alcohol.
Synthesis of compounds involving benzylation, acetylation, bromination, reduction & oxidation.
Synthesis of following compounds: Picric acid, Aniline, Acetanilide, Aspirin, Hippuric acid

4

3. P-Bromo acetanilide, Iodoform, Oxalic Acid

5

BOOKS RECOMMENDED:

1. Mann, F.G. & Saunders, B.C., Practical Organic Chemistry, ELBS/ Longman.
2. Vogel A.I., Textbook of Practical Organic Chemistry, ELBS/Longman.
3. Morrison, R.T., and Boyd R.N., Organic Chemistry, Prentice Hall of India Pvt. Ltd, New Delhi.
4. Finar, I.L., Organic Chemistry, Vol. I & II, ELBS/Longman.
5. Jain, M.K. Organic Chemistry, Sohan Lal Nagin Chand & Co. 60 B, Bunglaw Road, Delhi.
6. Hendrikson, Organic Chemistry.

PHAR-123

ANATOMY, PHYSIOLOGY & PATHOPHYSIOLOGY-II 5069

Unit-I : Central Nervous System: **Functions of different parts of brain and spinal cord. Neurohumoral transmission in the central nervous system, reflex action, electroencephalogram, specialized functions of the brain. Cranial nerves and their functions.**

[06]

Autonomic Nervous System : **Physiology and functions of the autonomic nervous system. Mechanism of neurohumoral transmission the A.N.S.**

[04]

Unit-II : Sense Organs : **Basic anatomy and physiology of the eye (vision), ear (hearing), taste buds, nose (smell), and skin (superficial receptors).**

[06]

Unit-III : Lymphatic System : **Composition, formation and circulation of lymphs, lymph node and spleen.**

Unit-IV : Demography and Family Planning, **Medical termination of pregnancy.**

First Aid : **Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods.**

Unit-V Communicable Diseases : **Brief outline, their causative agents, modes of transmission and prevention (Chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, helminthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy, syphilis, gonorrhoea, and AIDS).**

BOOKS RECOMMENDED:

1. Ranade VG, Text Book of Practical Physiology, Pune Vidyarthi Griha Prakashan, Pune.
2. Difore SH, "Atlas of Normal Histology" Lea & Febiger Philadelphia.
3. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
4. Guyton AC, Hall J.E., Text book of Medical Physiology, WB Saunders Company.
5. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
6. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.
7. Tortora G.J., & Anagnostakos N.P., Principles of Anatomy & Physiology, Harper & Rave Publishers, New Delhi.
8. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.
9. Shalya Subhash, Human Physiology, CBS Publishers & Distributors.
10. Keele, C.A., Niel, E and Joels N., Samson Wright's Applied Physiology, Oxford University Press.

PHAR-124 COMPUTER FUNDAMENTALS AND PROGRAMMING 1056

Unit-I : **Basic computer organization functionality computer codes computer classification boolean algebra, primary storage, secondary storage devices, input-output devices, computer software, computer languages, operating system, business data processing concepts, data communication and networks and advances**

[08]

Unit-II **Planning the computer program, algorithm, flowcharts, decision tables.**

[07]

Unit-III Writing simple programs in 'C', Numeric constants and variables. Arithmetic Expressions, Input & Output in 'C' Programs, conditional statements, implementing loops in programs, arrays, logical expressions, and control statements such as switch, break and continue functions, processing character strings, files in 'C'.

Unit-IV **Introduction to Fortran 77, Writing simple programme in Fortran 77.**

Fortran constants & variables, arithmetic expressions, input-output statements, control statements. Do statement, subscripted variables and elementary format specifications. [08]

Unit-V **Basic Database concept and classification, operations performed on database, eg- addition, deletion etc using MS-Access. Computer applications in Pharmaceutical and clinical studies.**

[05]

PHAR-124P COMPUTER FUNDAMENTALS & PROGRAMMING PRACTICAL 5249

Exercise based on the following are to be dealt:

1. **Computer operating system like DOS and Windows.**
2. **Simple Program in 'C' Language.**
3. **Simple Program in Fortran 77.**
4. **Introduction to MS-OFFICE (MS-Word, MS-Excel, Power Point).**
5. **Internet features.**

BOOKS RECOMMENDED:

1. Sinha, R.K., Computer Fundamentals, BPB Publications.
2. Raja Raman, V, Computer Programming in 'C', PHI Publication.
3. Raja Raman, V, Computer Programming in Fortran 77, PHI Publication.
4. Hunt N and Shelley J. "Computers and Common Sense" Prentice Hall of India.

PHAR-125 ADVANCED MATHEMATICS 9925

Unit-I Differential Equation: **Revision of integral calculus, definition & information of different equations, equations of first order & first degree.**

[04]

Unit-II Variable separable homogenous & Linear differential equations & equations reducible to such types.

Unit-III Linear differential equation of order greater than one with constant coefficients, complimentary function and particular integral, simultaneous, pharmaceuticals applications.

[10]
Unit-IV Biometrics : Significant digits and rounding off numbers, data collection, random and non random sampling methods, sample size, data organization diagrammatic representation of data, bar, pie, 2-D and 3-D diagrams measures of central tendency, measures of dispersion, standard deviation and standard error of means, coefficient of variation, confidences (fiducial) limits.

[10]
Unit-V: Probability and events, Bayes theorem, probability theorems, probability, distributions, elements of binomial and poisson distribution, normal distribution, curve and properties, kurtosis and skewness, correlation and regression analysis, method of least squares, statistical inference, application of statistical concepts in pharmaceutical sciences. [10]

BOOKS RECOMMENDED

1. A textbook of Mathematics for XI-XII Students, NCERT Publication Vol. I-IV.
2. Gupta S.P. Statistical Methods, Sultan Chand and Co., New Delhi.
3. Greval B.S., Higher Engineering Mathematics, Khanna Publication, New Delhi.
4. Boltan's Pharmaceutical Statistics, Practical and Clinical Application, Marcel Dekker, N.Y.
5. Narayan Shanti, Integral calculus, Sultan Chand & Co.
6. Prasad Gorakh, Text book on differential calculus, Pothishala Pvt. Ltd., Allahabad.
7. Narayan Shanti, Differential calculus, Shyamal Charitable Trust, New Delhi.
8. Prasad Gorakh, Text book on integral calculus, Pothishala Pvt. Ltd., Allahabad.
9. Ayres Frank "Theory & problems of differential equations" Mc Graw Hill Book Co., Singapore.

XVII.

XVIII. SEMESTER-III

PHAR-231 PHARMACEUTICS-II (UNIT OPERATIONS-I) 5098

- Unit-I 1. Unit Operations : Introduction, basic laws.
2. Fluid Flow : Types of flow, Reynold's number, Viscosity, Concept of boundary layer, basic situations of fluid flow, valves, flow meters, manometers and measurement of flow and pressure.
- XIX. Unit-II 3. Water systems – Raw water, soft water, purified Water, water for injection, quality requirement and treatment of water. washing, cleaning and standardisation of cleaning.
4. Filtration and Centrifugation : Theory of filtration, filter aids, filter media, industrial filters including filter press, rotary filter, edge filter. Factors affecting filtration, Principles of centrifugation, industrial centrifugal filters, and centrifugal sedimenters. [10]
- Unit-III 5. Crystallization : Characteristics of crystals like-purity, size, shape, geometry, habit, forms size and factors affecting them, Solubility curves and calculation of yields. Material and heat balances around Swenson Walker Crystallizer. Supersaturation theory and its limitations, Nucleation mechanisms, crystal growth, Study of various types of Crystallizer, Tanks, agitated batch, Swenson Walker, Single vacuum, circulating magma and Krystal crystallizer, Caking of crystals and its prevention.

UNIT – IV 6. Heating, Ventilation & AC Systemers : Basic concepts and definition, wet bulb and adiabatic saturation temperatures, Psychometric chart and measurement of humidity, application of humidity measurement in pharmacy, equipment for dehumidification operations. Principles and applications of refrigeration and air conditioning.

- Unit-V 7. Material of Construction : General study of composition, corrosion, resistance, Properties and applications of the materials of construction with special reference to stainless steel and glass.
8. Industrial Hazards and Safety Precautions : Mechanical, Chemical, Electrical, fire and dust hazards. Industrial dermitits, t record.

PHAR - 231 P PHARMACEUTICS-II UNIT OPERATIONS-I 5216

PRACTICAL

1. Measurement of rate of flow of fluids and pressure by: Simple and differential manometers, Venturimeter, Orifice meter
2. Determination of Reynold Number.
3. Study of factors affecting rate of filtration Effect of different filter media, Effect of viscosity of filtrate, Effect of pressure, Effect of thickness of cake, Effect of filter aids.
4. Study principle of centrifugation for Liquid –Liquid separation and stability of emulsions, Solid – liquid separation and stability of suspension.
5. Determination of dry bulb and wet bulb temperatures and use of Psychometric charts.
6. Study of characteristics of crystals
7. Study of solubility curve of crystals.

BOOKS RECOMMENDED

1. Badger W.L. and Banchero J.T. Introduction to Chemical Engineering Mc Graw Hill International Book Co., London.
2. Perry R.H. & Chilton C.H. Chemical Engineers Handbook, Mc Graw Kogakusha Ltd.
3. McCabe W.L. and Smith J.C. Unit Operation of Chemical Engineering Mc Graw Hill International Book Co., London.
4. Sambhamurthy, Pharmaceutical Engineering, New Age Publishers.
5. Gavhane, K.A. "Unit Opeation-1", Nirali Prakashan.

PHAR-232 PHARMACEUTICAL JURISPRUDENCE & ETHICS 5099

- Unit-1 : Introduction
1. Pharmaceutical Legislations – A brief review.
 2. Drugs & Pharmaceutical Industry – A brief review.
 3. Pharmaceutical Education – A brief review.
 4. Pharmaceutical Ethics:
- Unit-II : An elaborate study of the following: (A) Pharmacy Act 1948 (B) Drugs and Cosmetics Act 1940 and Rules 1945 [14]
- Unit-III : (C) Medicinal & Toilet preparations (Excise duties Act 1955) (D) Narcotic Drugs & Psychotropic Substances Act 1985 & Rules. (E) Drugs Price Control Order 1995. [08]
- Unit-IV : A brief study of the following with special reference to the main provisions.
- (A) Poisons Act 1919 (B) Drugs and Magic remedies (Objectionable Advertisements) Act 1954. (C) Medical termination of Pregnancy Act 1970 & Rules 1975. (D) Prevention of Cruelty to Animals Act 1961. (E) States Shops & Establishments Act & Rules. [05]

[07]

Note : The teaching of all the above Acts should cover the latest amendments.

BOOKS RECOMMENDED :

1. B.M. Mittal, Textbook of Forensic Pharmacy, National Book Centre, Dr. Sundari Mohan Avenue, Calcutta.
2. Relevant Acts & Rules Published by the Govt. of India.
3. N.K. Jain, A Textbook of Forensic Pharmacy, Vallabh Prakashan, N. Delhi.
4. Singh, Harkishan "History of Pharmacy in India- Vol.-I, II & III" Vallabh Prakashan.

PHAR-233 PHARMACOGNOSY – I 5029

Unit-I : Definition history, scope & development of Pharmacognosy.

[02]

1. Source of Drug : Biological, marine, mineral and plant tissue cultures as source of drugs. With Marine pharmacognosy, Novel medicinal agents from marine sources. [04]

2. Classification of Drugs : Alphabetical, Morphological, taxonomical, chemical & pharmacological. [02]

Unit-II : 3. Plant taxonomy : Study of following families with special reference to medicinally important plants – Apocynaceae, Solanaceae, Rutaceae, Umbelliferae, Leguminosae, Rubiaceae, Liliaceae, Labiatae, Acanthaceae, Compositae, Papaveraceae. [04]

Unit-III : 4. Cultivation, Collection, Processing & Storage of crude drugs :
A. Factors influencing cultivation of medicinal plants, Type of Soils & fertilizers of common use. [02]

B. Pest Management & natural pest control agents.

[02]

C. Plant hormones and their applications.

D. Polyploidy, Mutation & hybridization with reference to medicinal plants. [01]

[02]

E. Poly Houses/ Green Houses for cultivation.

Unit-IV : 5. Quality Control of crude drugs : Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation including Quantitative microscopy. WHO guidelines for standardisation of medicinal plants. [08]

Unit-V : 6. Systematic pharmacognostic study of following :
a) Carbohydrates & derived products : Agar, Guar gum, acacia, Honey, Isabgol, pectin, starch, sterculia & tragacanth.

Lipids – Beeswax, castor oil, Cocobutter, Kokum butter, hydnocarpus oil, Codliver oil, sharkliver oil, Linseed oil, wool fat Rice-bran oil, Lard & Suet.

PHAR-233 P PHARMACOGNOSY – I 5217

PRACTICAL

1. Morphological characteristics of plant families mentioned in theory.
2. Microscopical Measurements of cell & cell contents Starch grains, Calciumoxalate Crystals & Phloem Fibres.
3. Determination of leaf Constants such as Stomatal index, Stomatal numbers, Veinlet numbers, Vein termination number and palisade ratio.
4. Identification of crude drugs belonging to carbohydrates & lipids.
5. Preparation of herbarium sheets.

XX.

SUGGESTED PRACTICALS

1. Study of Plants belonging to family Solanaceae.
2. Study of Plants belonging to family Rutaceae.
3. Study of Plants belonging to family Liliaceae
4. Study of Plants belonging to family Umbelliferae.
5. Microscopical measurements of starch grains (Wheat, Maize).
6. Microscopical measurements of starch grains (Rice, Potato).
7. Various types of calcium-oxalate crystals, their study and microscopical measurements (Rhubarb, Senna, Liquorice etc.)
8. Study of various types of phloem fibres.
9. Determination of stomatal number with the help of camera lucida along with the working of instrument.
10. Determination of stomatal index.
11. Determination of vein-islet and vein termination number.
12. Determination of palisade ratio.
13. Chemical Tests of Agar, Acacia, Sterulia and Tragacanth.
14. a) Chemical tests of Pectin, Starch and Honey.
b) Swelling factor of Isapaghula husk.
c) Average weight of Isapaghula husk.
15. Physical characteristics of Caster oil, Cod-liver oil, Shark-liver oil and Linseed oil.

PROJECT WORK :

Preparation of herbarium sheets.

BOOKS RECOMMENDED

1. Trease, G.E. & Evans, W.C., "Pharmacognosy" Bailliere tindall East bourne, U.K.
2. Wallis, T.E., Text book of Pharmacognosy, J.A. Churchill, Ltd.
3. Kokate, C.K. "Practical Pharmacognosy" Vallabh Prakashan, Delhi.
4. Wallis T.E., Analytical Microscopy, J&A Churchill Limited, London.
5. Brain K.R. and Turner T.D. "The Practical Evaluation of Phyto Pharmaceutical", Wright, Scientechica- Bristol.
6. Kokate, C.K. Pharmacognosy, Nirali Prakashan, Pune.
7. Schewer PJ, "Marine Natural products", Academic press, London

PHAR-234 PHARMACEUTICAL CHEMISTRY – III (ORGANIC CHEMISTRY -II) 5090

Unit-I : α , β - Unsaturated carbonyl compounds, cycloaddition.

Compounds containing active methylene group and their synthetic importance- Acetoacetic ester and malonic ester.

[08]

Polynuclear hydrocarbons-Napthalene, anthracene and phenantherene.

Unit - II : Heterocyclic Compound – Nomenclature, Chemistry, preparation, properties and pharmaceutical importance of pyrrole, furan, thiophene, pyridine, pyrimidine, imidazole, pyrazole, thiazole, benzimidazole, indole, phenothiazines. [08]

Unit-III : Name reactions – Definition, reaction mechanism and synthetic application of Merwin –Pondorff, Verley reduction, Oppeneaur oxidation, Bechmann rearrangement, Mannich reaction, Diel's alder reaction, Michel, Reformatsky, Knoevanegal reaction, Benzoin condensation.

[08]

Unit-IV: Classification, structure, reactions, structure elucidation, identification of :

- a) Carbohydrates
 i) Monosaccharides – Glucose and fructose.ii) Disaccharides – Sucrose, lactose and maltose. iii) Polysaccharides– Starch. [08]
 Unit-V : Classification, identification, general methods of preparation and reactions of amino acids and proteins.

Structure of Nucleic Acids. Chemistry & identification of oils, fats and waxes. Polymers and polymerisation. [08]

PHAR-234P PHARMACEUTICAL CHEMISTRY-III (ORGANIC CHEMISTRY-II) 5218

PRACTICAL

- | | |
|---|--|
| <p>1. Identification of organic compounds with derivatization.
 2. Synthesis of Organic Compounds involving two steps.
 XXI. BOOKS RECOMMENDED
 1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.
 2. Furniss B S, Hannaford A J, Smith P W G and Tatehall A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.</p> | <p>3. Workshop on molecular modelling of some organic molecule
 3. Morrison, T.R. and Boyd, R.N., Organic Chemistry, Prentice Hall of India, Private Limited, New Delhi.
 4. Finar, I.L., Organic Chemistry Vol. I & II, ELBS/Longman.
 5. Jain, M.K. and Sharma S.C., Organic Chemistry, Shoban Lal Nagin Chand & Co., Delhi.</p> |
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PHAR-235 PHARMACEUTICS – III (COMMUNITY PHARMACY) 5031

- XXII. Unit-I .1. Definition, scope of community pharmacy, Ethics. Roles and responsibilities of Community pharmacist, code of
 2. Community Pharmacy Management
 i) Selection of site, Space layout, and design iv) Maintenance of various registers
 ii) Staff, Materials- coding, stocking v) Use of Computers
 iii) Legal requirements
 Unit-II 3. Prescriptions- parts of prescription, legality & identification of medication related problems like drug interactions incompatibility.
 4. Inventory control in community pharmacy. Definition, various methods of Inventory Control. ABC, VED, EOQ, Lead time, safety stock
 Unit-III 5. Pharmaceutical care, Definition and Principles of Pharmaceutical care.
 6. Communication skills and Patient counselling, Need for good communication, Key communication skills. Strategies to overcome barriers, Patient information leaflets- content, design, & layouts, advisory labels
 7. Patient compliance: Definition, Factors affecting compliance, role of pharmacist in improving the compliance. [10]
 Unit-IV 8. Health screening services , Definition, importance, methods for screening, Blood pressure/ blood sugar/ lung function, And Cholesterol testing. [06]
 9. OTC Medication- Definition, OTC medication list & Counselling
 Unit-V, 10. Health Education, WHO Definition of health, and health promotion, care for children, pregnant & breast feeding women, and geriatric patients. Role of Pharmacist in family planning, prevention of communicable diseases, nutrition.
 11. Pharmacoepidemiology & Pharmacoconomics – Brief introduction
 12. Rational drug therapy – Brief introduction

PHAR-235 P PHARMACEUTICS – III (COMMUNITY PHARMACY) 5219

PRACTICAL

- | | |
|--|---|
| <p>1. Categorization and storage of Pharmaceutical products bases on legal requirements of labeling and storage.
 2. Project report on visit to the nearby Community for Counseling on the rational use of drugs and aspects of health care.
 3. Prescription handling and identification of drug interactions, incompatibilities.
 4. Health screening services and study of equipments for:-
 ▪ Blood glucose determination (Glucometer)</p> | <p>▪ Blood pressure (BP apparatus)
 ▪ Lung function test (Peak flow meter)
 5. Design of community pharmacy to incorporate all pharmaceutical care services (as per schedule N).
 6. Study of OTC medications List & Available brands
 7. Interpretation of various pathological report of blood and urine.</p> |
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PHAR -236 ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY – III 5032

- Unit I – Digestive system –Parts of digestive system, their structure and functions. Various gastrointestinal secretions & their role.
 Unit II –Pathology of disorders related to digestive system Peptic Ulcer, Ulcerative colitis, Crohns disease, Zollinger- Ellison syndrome, Amoebiasis, typhoid, Hepatitis, Cirrhosis of liver, pancreatitis. [06]
 Unit-III – Urinary System – Anatomy & physiology of urinary system, physiology of urine formation, acid- base balance, pathophysiology of renal feature, glomerulonephritis, Urinary tract infection. [08]
 Unit-IV-Reproductive system–Male & female reproductive system. Menstruation, Pathophysiology of sexually transmitted diseases, spermatogenesis, oogenesis, pregnancy. [08]
 Unit-V – Endocrine system – Anatomy & Physiology of pituitary, thyroid, parathyroid, adrenal, pancreas, control of hormone secretion, pathophysiology of hypo & hyper secretion of endocrine glands & their disorders e.g. – Diabetes mellitus.

XXIII. BOOKS RECOMMENDED

- | | |
|--|---|
| <p>1. Difore SH, "Atlas of Normal Histology" Lea & Febiger Philadelphia.
 2. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company.
 3. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
 4. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.
 5. Tortora G.J. & Anagnodokos N.P, Principles of Anatomy & Physiology, Harper & Rave Publishers,
 6. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.</p> | <p>7. Shalya Subhash, Human Physiology, CBS Publishers & Distributors.
 8. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.
 9. Dijiroy J.L, Pharmacotherapy – A Pathophysiological Approach, Elsevier.
 10. Robbins SL, Kumar V, Basic Pathology, WB Saunders.</p> |
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SEMESTER IV

PHAR-241 PHARMACEUTICS – IV (UNIT OPERATIONS – II) 5104

- Unit-I : Stoichiometry : Unit processes material and energy balances, molecular units, mole fraction, tie substance, gas laws, mole volume, primary and secondary quantities, equilibrium state, rate process, steady and unsteady states, dimensionless equations, , dimensionless formulae, dimensionless groups, different types of graphic representation. [08]
 Unit-II : Evaporation : Basic concepts of phase equilibria, factor affecting evaporation, evaporator, film evaporators, single effect and multiple evaporator. [08]

Unit -III : Distillation : Raoult's law , Phase Diagrams , volatility, simple steam and flash distillations , principles of rectifications, McCabe thiele method for the calculations of number of theoretical plates, Azeotropic and extractive distillation .

[08]

Unit -IV : Drying : Moisture content and mechanism of drying , rate of drying and time of drying calculations, classification and type of dryers , dryers used in pharmaceutical industries – Tray dryer, Fluidised bed dryer, spray dryer and special drying methods. [08]

Unit-V : Automated Process Control Systems : Process variables, temperature, pressure, flow level and vacuum and their measurements. Elements automatic process control and introduction to automatic process control systems. Elements of computer aided manufacturing (CAM) Reactors and fundamentals of reactors design for chemical reactions.

[08]

PHAR-241P PHARMACEUTICS-IV(UNIT OPERATIONS-II) 5254

PRACTICAL

1. Determination of overall heat transfer coefficient.
2. Study of factors affecting rate of evaporation :- a) Effect of surface area b) Effect of temperature
3. Study of factors affecting rate of drying a) Surface area b) Temperature
4. Determination of rate of drying, free moisture content and bound moisture content.
5. Experiments based on a) Steam distillation b) Extractive distillation c) Azeotropic distillation
5. Elementary knowledge of engineering drawing ,Alphabets/ letters writing, Scales, Orthographic projections – First and third angle projection methods, Simple Isometric views

BOOKS RECOMMENDED :

1. Badger W.L. and Banchero J.T. Introduction to Chemical Engineering Mc Graw Hill International Book Co., London.
2. Perry R.H. & Chilton C.H. Chemical Engineers Handbook, Mc Graw Kogakusha Ltd.
3. McCabe W.L. and Smith J.C. Unit Operation of Chemical Engineering Mc Graw Hill International Book Co., London.
4. Gavhane, K.A. "Unit Operation-II", Nirali Prakashan.
5. Sambhamurthi Pharmaceutical Engineering, New Age Publishers.

PHAR-242

PHARMACEUTICAL MICROBIOLOGY 5105

Unit-I : 1. Introduction to the scope of microbiology.
2. Structure of bacterial cell.
3. Classification of microbes and their taxonomy: Bacteria and viruses.

[08]

Unit-II : 4. Identification of Microbes : Stains and types of staining techniques, electron microscopy.
5. Nutrition, cultivation & isolation of bacteria & viruses.

[08]

Unit-III : 7. Control of microbes by physical and chemical methods.
A. Disinfection, factors influencing disinfectants, dynamics of disinfection, disinfectants and antiseptics and their evaluation.
B. Sterilization, different methods, validation of sterilization methods & equipments. [08]

Unit-IV: A. Sterility testing as per I.P. B. Preservative efficacy C. Personal microbiology [08]

Unit-V : 8. Aseptic techniques and clean area classification

9. Microbial assays of antibiotics, vitamin B12.

10. Environmental microbiology

[08]

PHAR-242P PHARMACEUTICAL MICROBIOLOGY 5255

PRACTICAL

Experiments devised to prepare various types of culture media, sub-culturing of common aerobic and anaerobic bacteria, fungus and yeast, various staining methods, various methods of isolation and identification of microbes, sterilization techniques and their validation, validation of sterilization techniques, evaluation of antiseptics and disinfectants, testing the sterility of pharmaceutical products as per I.P. requirements, microbial assay of antibiotics and vitamins.

SUGGESTED PRACTICALS

1. Preparation of various types of culture media
2. Subculturing of common bacteria, fungi, yeast.
3. Isolation of bacteria.
4. Identification and staining of bacteria: Simple staining, Gram staining, Acid fast staining, Negative staining , Hanging drop preparation
5. Evaluation of disinfectants and antiseptics. Phenol coefficient test, minimum inhibitory concentration.
6. Study of sterilization methods & equipments- Dry heat, Moist heat
7. Test for sterility of pharmaceutical products as per IP
8. Microbial assay of antibiotics as per IP.

BOOKS RECOMMENDED :

1. Aneja K.R. Experiments in Microbiology, Plant Pathology, Tissue Culture & Mushroom Cultivation, Vishwa Prakashan.
2. Gunasekaran P, Lab Manual of Microbiology, New Age Publishers.
3. Davis, Dulbeton, Eisen Microbiology.
4. Stanier R.Y., Ingraham, J.L., Wheelis M.L. & Painter P.R. General Microbiology, Macmillan Press Limited.
5. Hugo and Russell, Pharmaceutical Microbiology, Black Well Scientific Publication, Oxford.
6. Prescott L.M., Harley J.P. & Klien D.A. Microbiology, McGraw Hill.
7. Sykes, Disinfection and Sterilization.
8. Pelczar & Reid, Microbiology, Tata Mc Graw Hill, Delhi.
9. Virella G. Microbiology and Infectious Diseases, William & Wilkins.
10. Ananthanarayan R & Paniker CKJ, Textbook of Microbiology, Orient Longman.

PHAR-243

PHARMACOGNOSY – II 5106

Unit-I: Resins : Study of drugs containing Resins and Resin Combination like Podophyllum, Cannabis, Capsicum, Shellac, Asafoetida, Balsam of tolu, Balsam of peru, Benzoin, Turmeric, Ginger.

Unit-II : Volatile oils : General methods of obtaining volatile oils from plants, Study of volatile oils from Mentha, Corianders, Cinnamon, Jatamansi, Cumin, Black pepper, Cassia, Lemon peel, Orange peel, Lemon grass, Citronella, Caraway, Dill, Spearmint, Clove, Fennel, Nutmeg, Eucalyptus, Chenopodium, Cardamon, Valerian, Musk, Palmarosa, Gaultheria, Sandalwood. [10]

Unit-III : Phytochemical Screening : An introduction to active constituents of drugs : Their isolation, classification and properties with Qualitative chemical tests of the followings – Alkaloids, Saponins, Cardenolides and bufadienolides, flavanoids and Leucoanthocyanidine, cynogenetic glycosides.

[14]

Unit-IV : Fibres : Study of fibres used in pharmacy such as cotton, silk, wool, nylon, glasswool, polyester and asbestos.

Pharmaceutical aids :- Study of Pharmaceutical aids like Talc, Diatomite, Kaolin, Bentonite, Fullers earth, Gelatin and Natural colors.

Unit-V : Tannins : Study of tannins & aromatic containing drugs like Gumbir (Pale Catechu), Black Catechu, Gall and Myrobalans (Harde, Baheda, Arjuna & Ashoka). [03]
 Utilization of aromatic plants & desired products will special reference to Sandalwood oil, Mentha oil, Lemon grass oil, Vetiver oil, Geranium oil & Eucalyptus oil. Role of aromatic plants in national economy [03]
 PHAR-243P PHARMACOGNOSY – II 5256

PRACTICAL

1. Identification of crude drugs mentioned in theory.
2. Study of fibres and pharmaceutical aids.
3. Microscopic study of seven selected drugs and their powders mentioned under the category of volatile oils in theory with their chemical tests.
4. General chemical test for Alkaloids, Glycosides, Steroids, Flavonoids & Tannins.

XXIV. SUGGESTED PRACTICALS

- | | |
|---|--|
| 1. Morphology of Mentha, Lemnagrass, Nutmeg and chenopodium. | 9. Morphology & microscopy of Bentonite, Gelatin & natural colours (Saffron). |
| 2. Morphology of Turmeric, Ginger, Cannabis, Eucalyptus. | 10. To perform the chemical tests of Balsam (Tolu and Peru) and Asafoetida. |
| 3. Morphology and microscopy of Coriander and Cinnamon. | 11. Preparation of reagents for the chemical tests of Alkaloids and to perform the chemical tests on any Alkaloid containing drug. |
| 4. Morphology and microscopy of Dill and Caraway. | 12. Test for identification of Glycosides (Saponin and Anthraquinone). |
| 5. Morphology and microscopy of Cardamom and Fennel. | 13. Test for identification of Tannins. |
| 6. Morphology & microscopy of Clove and to study its transverse section. | 14. Tests for identification of steroids. |
| 7. Study of Cotton, Silk and Wool along with their chemical Tests. | |
| 8. To study the morphology & chemical tests of Talc, Diatomite, & Kaolin. | |

15. Tests for identification of flavonoids.

PROJECT WORK :

Utilization of Aromatic plants; (Monograph).

BOOKS RECOMMENDED :

- | | |
|---|--|
| 1. Trease G.E., & Evans W.C., "Pharmacognosy" Balliere Tindall East Bourne U.K. | 4. Kokate C.K. et al "Pharmacognosy" Nirali Prakashan, Pune. |
| 2. Tyler V.E. et al "Pharmacognosy" Lea & febiger, Philadelphia. | 5. Atal C.K. & Kapur BM, "Cultivation & utilization of Medicinal plant, RRL, Jammu. |
| 3. Wallis, T.E. "Text Book of Pharmacognosy" J&A Churchill Ltd, London. | 6. Harborne J B, Phytochemical method, Chapman & Hall International Edition, London. |

PHAR-244 PHARMACEUTICAL ANALYSIS- II 5107

Unit-I : Theoretical considerations and application in drug analysis and quality control by the following analytical techniques (assays included in the Indian Pharmacopia 1996) (A) Non-aqueous titrations (B) Complexometric titration.

Unit-II : (C) Miscellaneous methods of analysis : Diazotization titrations, Kjeldahl method of Nitrogen estimation, Karl- Fischer titration. Radioassays. Alcohol estimation in galenicals. [08]

Unit-III : 2. Electro Chemistry – Introduction, Dielectric cell, electrode potential, Nernst equation, salt bridge, standard potential, reference and indicator electrodes, measuring the relative voltage of cell.
 A. Potentiometry : General principles, instrumentation and applications.
 B. Conductometry : General Principles, instrumentation and applications. [08]

Unit-IV : Principle, instrumentation and pharmaceutical applications. Paper Chromatography, column chromatography, TLC. [08]

Unit-V: Basic Principles, Instrumentation and Applications of GLC & HPLC.

[08]

PHAR-244P PHARMACEUTICAL ANALYSIS – II 5257

PRACTICAL

1. Non-aqueous Titrations :Preparation and standardization of perchloric acid and sodium/potassium methoxide solutions, Estimation of some pharmacopoeial products.
2. Complexometric Titrations : Preparation and standardization of EDTA solution some exercise related to pharmacopoeial assays by Complexometric titrations.
3. Miscellaneous Determinations : Exercise involving Diazotization, Kjeldahl, Karlfisher.
4. Exercise based on acid base titration in aqueous and non-aquous media, oxidation reduction titrations using potentiometric technique, determination of acid base dissociation constants and plotting of titration curves using pH meter.
5. Exercises involving conductometric titrations.
6. Exercises based on paper, column and thin- layer chromatography.

BOOKS RECOMMENDED :

1. Beckett, A H and Stenlake, J.B, Practical Phamaceutical Chemistry, Vol. I and II, The Athlone Press of the University of London.
2. Pharmacopoeia of India, published by The Controller of Publications, Delhi.
3. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
4. Mendham J, Denny RC, Barnes, J.D. Thomas M.J.K. "Vogel's Text Book of Quantitative chemical" Pearson Education Asia.
5. Connors KA, A Textbook of Pharmaceutical Analysis, Wiley Intescience, New York.

PHAR-245 ANATOMY PHYSIOLOGY AND PATHOPHYSIOLOGY –IV 5108

Unit-I – Respiratory System – Anatomy & function of respiratory structures, Mechanism of respiration, regulation of respiration, pathophysiology of Asthma, Pneumonia, Bronchitis, Emphysema, Tuberculosis. [08]

Unit-II – Cardiovascular System – Functional Anatomy of heart, conducting system of heart, cardiac cycle, ECG (Electro cardiogram). Pathophysiology of hypertension, Angina, CHF, myocardial infarction, cardiac arrhythmias, Ischaemic heart disease, Arteriosclerosis. [10]

Unit-III – Cell injury & Adaptation – Courses of cell injury, pathogenesis & morphology of cell injury.

Cellular Adaptation – Atropy, hypertropy, aplasia, metaplasia, & dysplasia, intracellular accumulation & pathophysiology of Neoplasm. [08]

Unit IV – Basic mechanisms involved in the process of inflammation and repair Alterations in vascular permeability and blood flow, migration of WBC's , mediators of inflammation. Brief outline of the process of repair [08]

Unit-V- Pathophysiology of Joints disorder – Arthritis, gout, myasthenia gravis, spasticity, tetany, fatigue. Pathophysiology of anaemia, AIDS, hypersensitivity, allergic conditions, phsyosis, epilepsy, Parkinson & Alzheimer's diseases pathophysiology of cataract,glaucoma etc. [06]

BOOKS RECOMMENDED

- | | |
|---|---|
| 1. Difore SH, "Atlas of Normal Histology" Lea & Febiger Philadelphia. | 6. Tortora GJ, & Anagnodokos NP, Principles of Anatomy & Physiology, Harper & Rave Publishers, New Delhi. |
| 2. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi. | 7. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi. |
| 3. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company. | 8. Shalya Subhash, Human Physiology, CBS Publishers & Distributors. |
| 4. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta. | 9. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press. |
| 5. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone. | |

SEMESTER -V

PHAR-351 PHARMACEUTICAL CHEMISTRY – IV (BIOCHEMISTRY) 5033

Unit-I : 1. Enzymes :Nomenclature, enzymes-kinetics and mechanism of action, mechanism of inhibition of enzymes and isoenzymes in chemical diagnosis. 2. Co-enzymes:Vitamins as co-enzymes and their significance. Metals as co-enzymes and their significance.

[08]

Unit-II 3. Carbohydrate metabolism : Glycolysis, Gluconeogenesis and Glycogenolysis. Metabolism of galactose and galactosemia. Role of sugar nucleotides in biosynthesis and pentose phosphate pathway.

4. The citric acid cycle, significance, reactions and energetics of the cycle. [08]

Unit-III 5. Lipid metabolism : Oxidation of fatty acids-oxidation & energetics, Biosynthesis of ketone bodies and their utilization, Biosynthesis of saturated and unsaturated fatty acids., regulation of lipid metabolism, essential fatty acids.

6. Biological Oxidation : The respiratory chain, its role in energy capture & control, Energetics of oxidative phosphorylation, mechanism of oxidative phosphorylation. [08]

Unit-IV 7. Biosynthesis of amino acids, catabolism of amino acids and conversion of amino acids to specialized products, biosynthesis of purine and pyrimidine., formation of deoxyribonucleotides.

8. Biosynthesis of RNA, DNA replication, earcinogenesis & DNA repair mechanism. [08]

Unit-V. 9. Genetic Code and Protein synthesis, components of protein synthesis, inhibition of protein synthesis.

10. Regulation of gene expression. (Prokaryote and Eukaryote) [08]

PHAR- 351P PHARMACEUTICAL CHEMISTRY-IV (BIOCHEMISTRY) 5224

PRACTICAL

1. Preparation of standard buffers (citrate, phosphate and carbonate) and measurement of pH.

2. Titration curve for amino acids.

3. Separation of amino acids by chromatography.

4. The separation of lipids by TLC.

5. Quantitative estimation of amino acids.

6. The determination of glucose by means of the enzyme glucose oxidase.

7. Enzymatic hydrolysis of glycogen by α & β amylase.

8. Effects of temperature on the activity of alpha amylase.

9. Estimation of cholesterol in Blood.

10. Estimation of Glucose in blood & urine.

11. Estimation of Urea in blood.

12. Estimation of ketone bodies in blood.

13. Qualitative analysis of inorganic as well as organic constituents of Urine.

xxv.

BOOKS RECOMMENDED :

- Jayaraman J., Laboratory Manual in Biochemistry, Wiley Eastern Limited.
- Plummer, David J., An Introduction to Practical Biochemistry, Mc Graw Hill, New Delhi.
- Singh S.P., Practical Manual to Biochemistry, CBS Publisher, New Delhi.
- "Harpers Review of Biochemistry" Lange Medical Publication.

PH-352

PHARMACEUTICS – V (PHARMACEUTICAL TECHNOLOGY -I) 5034

Unit-I : Preformulation studies (a) Study of physical properties of drug like physical form, particle size, shape, density, wetting, dielectric constant, Solubility, dissolution and organoleptic properties and their effect on formulation, stability and bioavailability.

[08]

Unit-II: Liquid Dosage Forms : Introduction, types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavours and others, Manufacturing packaging & evaluation of clear liquids, suspensions and emulsions.

[08]

Unit-III : Semisolid Dosage Forms : Definitions, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection, General formulation of semisolids, clear gels & manufacturing procedure, evaluation and packaging. [08]

Unit-IV : Suppositories : Ideal requirements, bases, manufacturing procedure, packaging and evaluation.

Pharmaceutical Aerosols: Definition, Propellants, general formulation, manufacturing and packaging methods, pharmaceutical applications.

Unit-V : Cosmetology and cosmetic Preparations : Structure of skin, formulation of cold cream, vanishing cream, cleansing cream, all purpose cream, protective cream, antiperspirants, deodorant, face powder. Hair structure, Shampoos, Conditioner, Shaving and after shaving products, Dentrifrice & Mouthwash, Lipstick, Nail lacquer. [08]

PHAR-352P PHARMACEUTICS-V (PHARMACEUTICAL TECHNOLOGY-I) 5225

PRACTICAL

1. Preparation of cold cream, vanishing cream, cleansing lotion and creams. Moisturizing creams, Skin tonics, Hair creams, Hair Conditioners, Shampoos, Shaving creams and sticks. Tooth powder, Tooth pastes, After shave lotion and other cosmetic preparations.

2. Preparation, evaluation and packing of liquid orals like solutions, suspensions and emulsions, ointments, suppositories, eye drops, eye ointments etc.

SUGGESTED PRACTICALS

1. Preparation, Evaluation, and packing of (10 preparations =5 labs)

I- Liquid Orals a) Solutions : Strong Sodium salicylates oral solution BP, : Chloral hydrate BP

b) Suspensions : Magnesium sulphate oral suspension BP, : Milk of magnesia IP, :

Aluminium hydroxide gel IP

c) Emulsions : Liquid paraffin oral emulsion BP

II - Semi Solid d) Ointments : Salicylic acid ointment BP, Whitfield ointment BP, Compound benzoic acid ointment

III - Suppositories e) Suppositories : Glycerin suppositories BP, Lactic acid suppositories BP

2. Preparation of cosmetic preparations (30 preparation = 10 labs)

- | | | | |
|----------------------|--------------------|---------------------|-------------------|
| 1) Cold cream | 16) Cream | 9) Body powder | 24) Mouth wash |
| shampoo | | 10) Hand cream | 25) Hair |
| 2) Vanishing cream | 17) Clear liquid | conditioner | |
| shampoo | | 11) Face pack | 26) Anti dandruff |
| 3) Cleansing cream | 18) Shaving cream | shampoo | |
| 4) All purpose cream | 19)Brushless | 12) Deodorant | 27) Depilatory |
| shaving cream | | cream | |
| 5) Protective cream | 20) After shave | 13) Antiperspirant | 28) Bleach cream |
| lotion | | 14) Shampoo- powder | 29) Hair setting |
| 6) Foundation lotion | 21) Hair fixer gel | lotion | |
| 7) Sunscreen lotion | 22) Tooth powder | 15) Oily shampoo | 30) Tooth gel |
| 8) Face powder | 23) Tooth paste | | |

BOOKS RECOMMENDED

- Remington's Pharmaceutical Sciences, Vol I & Vol. – II, Mack Publishing Co., U.S.A.
- J.W. Cooper, & G. Gunn, Tutorial Pharmacy, Petman Books Ltd., London.
- Lachman L., Lieberman H.A, Kanig J.L, Theory and Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia, U.S.A.
- H.C. Ansel, Introduction to Pharmaceutical Dosage Forms, Lea & Febiger, Philadelphia, U.S.A.

- R.L. Juliano, Drug Delivery Systems, Oxford University Press, Oxford.
- Harrys Cosmetology
- Balsam and Sagarin, Cosmetics: Science and Technology.
- Thomssen E.G. Modern Cosmetics, Universal Publishing Corporation.
- Mittal B.M. & Saha R.N.-a handbook of cosmetics, Vallabh Prakashan.

Unit-I : 1. General Pharmacology – Introduction to pharmacology, sources of drugs, dosage forms & routes of administration, mechanism of action, concept of receptors, combined effect of drugs, factors modifying drug action, tolerance & dependence, absorption, distribution. [07]

Unit-II: Metabolism & excretion of drugs, principles of Clinical Pharmacokinetics. Adverse drug reactions & treatment of poisoning. ADME drug interactions, Bioassay of drugs & Biological standardization. Discovery & development of new drugs. [07]

Unit-III : Pharmacology of ANS-

a) Neurohumoral transmission (autonomic & somatic)

b) Parasympathomimetics, Parasympatholytics, Sympathomimetics, adrenergic receptor & neuron blocking agents, ganglionic stimulants & blocking agents.

Unit-IV : Pharmacology of CNS

Neurohumoral transmission in CNS. General Anaesthetics, Alcohols & disulfiram, Sedatives hypnotics, Anti-anxiety agents & centrally acting muscle relaxants. Psychopharmacological agents (antipsychotics), antidepressants. Antiepileptic drugs. Antiparkinsonism drugs, Narcotic Analgesics & antagonists., Drug Addiction & drug abuse. [12]

Unit-V : Drugs acting on PNS, Neuromuscular blockers. Local anaesthetics. [06]

PHAR-353P PHARMACOLOGY-I 5226

PRACTICAL

1. Use of computer simulated CDs or Video cassettes for pharmacology practical whenever possible.
2. Preparation of different solutions for experiments. Drug dilutions, use of molar and w/v solutions in experimental pharmacology. Common laboratory animals and anesthetics used in animal studies. Commonly used instruments in experimental pharmacology. Some common and standard techniques.
3. Study of different routes of administration of drugs in mice/rats. To study the effect of hepatic microsomal enzyme inhibitors and induction on the pentobarbitone sleeping time in mice.
4. Recording of spontaneous motor activity, stereotype, analgesia, anticonvulsant activity, anti-inflammatory activity, and muscle relaxant activity of drugs using simple experiments.

BOOKS RECOMMENDED :

- | | |
|--|--|
| 1. Ghosh, MN; Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta. | 6. Katzung, B.G. Basic & Clinic Pharmacology, Prentice Hall, International. |
| 2. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi. | 7. Laurence, DR & Bennet PN; Clinical Pharmacology, Churchill Livingstone. |
| 3. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi. | 8. Rang MP, Dale MM, Ritter JM, Pharmacology Churchill Livingstone. |
| 4. Barar F.S.K; Text Book of Pharmacology, Interpoint, New Delhi. | 9. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi. |
| 5. Goodman & Gilman, The Pharmacological basis of Therapeutics, Editors: J.G. Hardman, L.E. Limbird, P.B. Molinos, R.W. Ruddon and A.G. Gil, Pergamon press. | 10. Satoskar & Bhandarkar; Pharmacology & Pharmacotherapeutics., Popular Prakashan Pvt. Ltd. Bombay. |

PHAR-354 PHARMACEUTICAL CHEMISTRY –V (MEDICINAL CHEMISTRY –I) 5111

Unit-I : Basic Principles of Medicinal Chemistry: Physicochemical aspects (Optical, geometric and bioisosterism) of drug molecules and biological action.

Drug-receptor interaction including transduction mechanism, concept of prodrug.

[08]

Mode of action, uses, structure activity relationship of the following classes of drugs (Synthetic procedures of individually mentioned drugs only)

Unit-II : Drugs acting at Synaptic and neuro-effector junction sites: Cholinergic, Anticholinergic & Anticholinesterases-Neostigmine, Physostigmine, Methacholine, Pilocarpine, Atropine. Adrenergic Drugs-Ephedrine, Isoproterenol, Amphetamine, Salbutamol, Terbutaline, Adrenaline.

Unit-III: Drugs acting on the Central Nervous System : General Anaesthetics-Thiopental, Ketamine, Methohexital. Local Anaesthetics-Lignocaine, Benzocaine. Hypnotics and Sedatives-Phenobarbitone, Pentobarbitone. Opioid Analgesics-Pethidine, Methadone, Pentazocine. [08]

Unit-IV: Antitussives-Cramiphen, Dextromethorphen. Anticonvulsants-Phenytoin, Carbamazepine, Ethosuximide, Valproic Acid. Antiparkinsonism drugs-Carbidopa, Levodopa. CNS Stimulants-Caffeine, Nikethamide.

[08]

Unit-V :Psychopharmacological Agents : Neuroleptics – Imipramine, Amitriptyline. Antidepressants – Meprobamate, Chlordiazepoxide, Diazepam.

Antispasmodic and Antiulcer drugs-Dicyclomine, Ranitidine, Omeprazole. Neuromuscular Blocking Agents – Gallamine Triethiodide, Mephenesin, Pancuronium.

[08]

PH-354P PHARMACEUTICAL CHEMISTRY-V (MEDICINAL CHEMISTRY-I) 5277

PRACTICAL

1. Synthesis of selected drugs from the course content involving two or more steps.
2. Establishing the pharmacopoeial standards of the drugs synthesized.

XXVI.

SUGGESTED PRACTICALS

- | | |
|--|---|
| 1. Synthesis of Methyl salicylate. | 7. Synthesis of Phenytoin. |
| 2. To establish pharmacopoeial standards of Methyl salicylate. | 8. To establish pharmacopoeial standards of Phenytoin. |
| 3. Synthesis of Paracetamol. | 9. Synthesis of Hydantoin. |
| 4. To establish pharmacopoeial standards of Paracetamol. | 10. To establish pharmacopoeial standards of Hydantoin. |
| 5. To synthesize Benzocaine. | 11. Synthesis of Barbituric acid. |
| 6. To establish pharmacopoeial standards of Benzocaine. | 12. To establish pharmacopoeial standards of Barbituric acid. |

BOOKS RECOMMENDED :

- | | |
|--|--|
| 1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/Longman, London. | 6. Foye W C. Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia. |
| 2. Furniss B A, Hannaford A J, Smith P W G and Tatehall A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London. | 7. Singh Harkrishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi. |
| 3. Pharmacopoeia of India, Ministry of Health, Govt. of India. | 8. Nogrady T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford. |
| 4. Wolff ME. Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York. | 9. Finar I L. Organic Chemistry, Vol I & II, ELBS/ Longman, London. |
| 5. Degado J.N. and Remers W A R, 10th eds., Wilson and Giswold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Lippincott, William & Wilkins. | |

PHAR-355 PHARMACEUTICS – VI (PHYSICAL PHARMACY) 5037

Unit-I : (A) Matter, properties of Matter : States of matter, change in the state of matter, latent heats and vapor pressure, sublimation critical point, Eutectic mixtures, gases, relative humidity, liquid complexes, liquid crystals, glassy state, solids-crystalline, amorphous and polymorphism. [02]

(B) Kinetics and Drug Stability : General considerations & concepts, Degradative path ways, half life determination, Influence of temperature, light, solvent, catalytic species and other factors, Accelerated stability study, expiration dating. ICH guidelines for stability. [05]

(C) Buffers : Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity. [02]

Unit-II : Micromeritics and Powder Rheology : Particle size and distribution, average particle size, number and weight distribution, particle number, methods for determining particle volume, optical microscopy, sieving, sedimentation, measurement, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties. [07]

Unit-III : Surface and Interfacial Phenomenon : Liquid interface, surface and interfacial tensions, surface free energy, measurement of surface and interfacial tensions, spreading coefficient, adsorption at liquid interfaces, active agents, HLB classification, solubilization, detergency, adsorption at solid interfaces, solid-gas and solid-liquid interfaces, complex films, electrical properties of interface. [08]

Unit-IV : Viscosity and Rheology : Newtonian systems, Law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling ball, rotational viscometers. Complexation : Classification of complexes, methods of preparation and analysis, applications. [08]

Unit-V : Dispersion Systems : Colloidal Dispersions : Definition, types, properties of colloids, protective colloids, application of colloids in pharmacy; Suspensions and Emulsions; Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations; Emulsions-types, theories, physical stability. [08]

PHAR-355P PHARMACEUTICS – VI (PHYSICAL PHARMACY) 5228

PRACTICAL

1. Determination of particle size, Particle size distribution and surface area using various methods of particle size analysis.
2. Determination of derived properties of powders like density, porosity, compressibility, angle of repose etc.
3. Determination of surface/ interfacial tension, HLB value and critical micellar concentration of surfactants.
4. Study of rheological properties of various types of systems using different Viscometers.
5. Studies of different types of colloids and their properties.
6. Preparation of various types of suspensions and determination of their sedimentation parameters.
7. Preparation and stability studies of emulsions.
8. Studies of different types of complexes and determination of their stability constants.
9. Determination of half-life, rate constant and order of reaction.
10. To study the influence of various factors on the rate of reaction.
11. Accelerated stability testing, shelf-life determination and expiration dating of pharmaceuticals.
12. Preparation of pharmaceutical buffers and determination of buffer capacity.
13. Experiments involving tonicity adjustments.

BOOKS RECOMMENDED :

1. Martin A, Bustamante P. & Chun A.H.C- Physical Pharmacy, Lea & Febiger, Philadelphia.
2. Shotten E & Ridgway K, Physical Pharmaceutics, Oxford University Press, London.

SEMESTER –VI

PHAR –361 PHARMACEUTICAL CHEMISTRY-VI (MEDICINAL CHEMISTRY - II) 5112

Unit-I Principles of Drug Design: Traditional analogs. Introduction to QSAR & mechanism based approaches, Computer –aided drug design & molecular modeling MOA, uses, structure activity relationship of the following classes of drugs (Synthetic procedures of individually mentioned drugs only)

Unit- II Cardiovascular Agents – Antianginal & vasodilators, antiarrhythmics, antihypertensives, anticoagulants, antihyperlipidemics & cardiotonics – Nifedipine, Procainamide, Propranolol, Methyldopa, Captopril, Clofibrate, Warfarin, Phenidone. [08]

Unit-III Autocoids, : Antihistaminics : i) H1 antagonists – Diphenhydramine, Promethazine, Cyproheptadine, Cetrizine. ii) H2 antagonists – Ranitidine, Famotidine. Antineoplastics : Chlorambucil, 5- Fluorouracil, Methotrexate. [08]

Unit-IV : Analgesics and Antipyretics – Aspirin, Mefenamic Acid, Ibuprofen, Diclofenac, Antibacterials – Sulphamethoxazole, Sulphadiazine, Sulphacetamide, Nalidixic acid. [08]

Unit-V: Diuretics – Acetazolamide, Chlorthiazide; Frusemide, Spironolactone. [08]

Diagnostic Aids: Iopanoic Acid [08]
PHAR-361P PHARMACEUTICAL CHEMISTRY –VI (MEDICINAL CHEMISTRY-II)

PRACTICAL

1. Synthesis of selected drugs from the course content involving two or more steps.
2. Establishing the pharmacopoeial standards of the drugs synthesized.
3. Spectral analysis of the drugs synthesized.

BOOKS RECOMMENDED :

1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.
2. Furniss B S, Hannaford A J, Smith P W G and Tathell A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.
3. Pharmacopoeia of India, Ministry of Health, Govt. of India.
4. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
5. Delgado J N and Remers W A R, Eds, Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
6. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
7. Singh Harkishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
8. Nogrady, T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
9. Finar I L, Organic Chemistry, Vol I & II, ELBS/ Longman, London.

PHAR-362 PHARMACEUTICS-VII (PHARMACEUTICAL TECHNOLOGY - II) 5113

Unit-I : 1. Capsules: Advantages and disadvantages of capsule dosage form, material for production of hard gelatin capsule, size of capsules, methods of capsule filling, soft gelatin capsule shell and capsule content, importance of base absorption and minimum/gm factors in soft capsule, quality control, stability testing and storage of capsule dosage forms.

2. Micro-encapsulation : Types of microcapsule, importance of microencapsulation in pharmacy, microencapsulation by phase separation, coacervation, multi orifice, spray drying, spray congealing, polymerisation, complex, formulation, emulsion, air suspension technique, coating pan and other techniques, evaluation of micro capsules. [08]

Unit-II : Tablets : (A) Formulation of different types of tablets, granulation technology on large-scale by various techniques, physics of tablets making, different types of tablet compression machinery and the equipments employed, evaluation of tablets. (B) Coating of Tablets : Types of coating, film forming materials, formulation of coating solution, equipments for coating process, evaluation of coated tablet. Stability kinetics and quality assurance. [09]

Unit-III : (A) Approaches to Sustained and controlled release dosage forms. In-vitro methods of evaluation.

(B) Formulation and evaluation of Ophthalmic, Nasal and Ear products. [08]

Unit-IV : Parenteral Products : Preformulation factors, routes of administration, water for injection, pyrogenicity, nonaqueous vehicles. Formulation details, containers and closures and their selection.

Prefilling treatment, washing of containers and closures, preparation of solution and suspensions, filling and sealing of ampoules, vial, infusion fluids, lyophilization & preparation of sterile powders, equipment for large scale manufacture and evaluation of parenteral products. [07]

Unit-V : Surgical Products : Definition, primary wound dressing, absorbents, surgical cotton, surgical gauzes etc, bandages, adhesive type, protective cellulosic hemostasis, official dressings, absorbable and non absorbable sutures, ligatures and catguts.

Packaging of Pharmaceutical Products : Packaging component types, specifications and methods of evaluation, stability aspects of packaging equipments, factors influencing choice of containers, legal and other official requirements for containers, package testing. [08]

PHAR-362P PHARMACEUTICS-VII (PHARMACEUTICAL TECHNOLOGY - II)

PRACTICAL

1. Experiments to illustrate preparation, stabilization & physical evaluation of pharmaceutical products like powders, capsules, tablets, parenterals & microcapsules.
2. Evaluation of Materials used in pharmaceutical packaging.

SUGGESTED PRACTICALS

I – Preparation, Evaluation, Packing of the following dosage forms.

- | | | | |
|--------------------|--|--|----------------------------------|
| a) Capsules : | Chloramphenicol capsules IP | e) Tablets : | Enteric coated – Aspirin tablets |
| b) Microcapsules : | Coacervation Phase separation (Temperature change) | f) Parenteral (vials) : | Disodium EDTA injection IP |
| c) Tablets : | Uncoated – Paracetamol tablets IP | g) Parenteral infusion IP (Infusion boilers) : | Dextrose – NaCl IV |
| d) Tablets : | Film coated – Ibuprofen tablets IP | h) Parenterals : | Water for infection IP (Ampoule) |
| | | i) Eye drops : | Zinc sulphate IP |
| | | j) Eye ointment : | Sulphacetamide Sodium IP |

II - Formulation and evaluation of sustained release dosage forms – Aspirin Extended release (Matrix embedding method, Granules USP/NF coating of granules)

III - Evaluation of packages – containers & closures.

BOOKS RECOMMENDED

1. Remington: The Science and Practice of Pharmacy Pharmaceutical Sciences Vol. I & III, Mack Publishing Company, U.S.A.
2. R.E. Avis, Pharmaceutical Dosage Forms : Parenteral Medication, Vol-I, Marcel Dekker-Inc, New York & Basel.
3. H.C. Ansel, Introduction to Pharmaceutical Dosage Forms, Lea & Febiger, Philadelphia, U.S.A.
4. R.C. Juliano, Drug Delivery Systems, Oxford University Press, Oxford.
5. Herbert A. Liebermann & Leon Lachman, Theory & Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia, U.S.A.

PHAR-363 PHARMACOLOGY-II 5114

Unit-I : Pharmacology of CVS: Cardiac glycosides, Antihypertensive drugs, Antianginal drugs, Antiarrhythmics, Antihyperlipidemics, Therapy of Shock.

Unit-II : Drugs Acting on Hemopoietic System Haematinics, Vit. K & anticoagulants, Fibrinolytics & antiplatelet drugs, Plasma Volume expanders.

Drugs Acting on Respiratory System Anti-asthmatic drugs, Anti-tussives & Expectorants, Respiratory Stimulants. [08]

Unit-III : NSAIDS & Anti-gout Drugs.
Diuretics

[08]

Unit-IV : Autocoids: Histamine, 5HT and their antagonists, Prostaglandins, Thromboxans, Leukotrienes, Angiotensin and Bradykinin

Unit-V : Drugs acting on GIT, Antacids and Antiulcer drugs, Laxatives and antidiarrhoeal Agents, Emetics and antiemetics. [07]

PHAR-363 P PHARMACOLOGY-II

PRACTICAL

1. To record the dose response curve (DRC) of Acetylcholine using ileum of rat.
2. To study the parallel shift of DRC in presence of competitive antagonist on DRC of Ach using rat ileum.
3. To study effect of physostigmine on DRC of each on rat ileum.
4. To study the CRC of histamine on guinea pig on ileum preparation & study the effect of antihistaminics.

BOOKS RECOMMENDED:

- | | |
|---|--|
| 1. Ghosh, MN; Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta. | 6. Katzung, B.G. Basic & Clinical Pharmacology, Prentice Hall, International. |
| 2. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi. | 7. Laurence, DR & Bannet PN; Clinical Pharmacology, Churchill Livingstone. |
| 3. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi. | 8. Rang MP, Date MM, Ritter JM, Pharmacology Churchill Livingstone. |
| 4. Barar FSK : Text Book of Pharmacology, Interprint, New Delhi. | 9. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi. |
| 5. Goodman & Gilman, The Pharmacological basis of Therapeutics, Editors:-JG Hardman, Le Limbird, PB Molinoss, RW Ruddon & AG Gil, Pergamon Press. | 10. Satoskar & Bhandarkar; Pharmacology & Pharmacotherapeutics, Popular Prakashan Pvt. Ltd., Bombay. |
| | 11. Craig, C.R. and Stitzel, R.R., Modern Pharmacology, Little Brown and Co., 1994. |

PHAR-364

PHARMACOGNOSY – III 5115

Unit-I : (A) Study of the biological sources, cultivation, collection, Commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of following groups of drugs containing.

Glycosides: 1. Saponins: Liquorice, Ginseng, Dioscorea, Coleus species. [04]

2. Cardioactive sterols : Digitals, Squill, Stropanthus & Thevetia. [03]

3. Anthraquinone Cathartics : Aloe, Senna, Rhubarb & Cascara. [03]

Unit-II: Others : Psoralea, Ammi majus, Ammi visnaga, Gentian, Saffron, Chirata, Quassia and Andrographis paniculata. [03]

(B) Utilization and production of phytoconstituents such as calcium sennosides, Diosgenin, Solasodine & Podophyllotoxins. [03]

Unit- III : Studies of traditional drugs : Common Vernacular name, Biological sources, morphology, chemical nature of chief constituents, pharmacology, categories and common uses and toxicological activity of marketed formulations of following indigenous drugs : Amla, Kantkari, Satavari, Tylophora, Bhilwa, Kalijiri, Vach, Rasna. [07]

Unit-IV : Punarnava, Chitrak, Apamarg, Gokhru, Shankhpushpi, Brahmi, Methi, Lehsun, Palash, Guggul, Gymnema, Shilajit, Tulsi, Nagarmotha, Majith, Malkanguni and Neem. [08]

Unit-V : Brief Introduction and principals of Ayurvedic, Unani, Siddha and Homeopathic systems of medicines. Introduction to Herbal Pharmacopoeia with special reference to. Arishtas, Asavas, Gutikas, Tailas, Churnas, Lehyas and Bhasmas. [07]

PHAR-364 P PHARMACOGNOSY - III

PRACTICAL

1. Identification of crude drugs listed in theory.
2. Microscopic study of some important glycoside containing drugs as outlined above, Study of powdered drugs.
3. Standardization of some traditional drug formulations.

XXVII. SUGGESTED PRACTICALS

- | | |
|---|--|
| 1. Morphology and microscopy (powder) of Liquorice along with its chemical tests. | b) Identification Tests for Guggul lipids. |
| 2. Morphology of Aloe and chemical tests on Aloe-extracts. | 9. To study the following standards- |
| 3. Morphology and microscopy (powder) of Rhubarb | a) Loss on drying. |
| 4. Morphology of Psoralea, Ammimaus, Saffron and Chirata. | b) Extractive values. |
| 5. Morphology of Amla, Kantkari, Shatavari and Vach. | c) Ash values. |
| 6. Morphology of Punarnava, Apamarg, Gokhru, and Shankhpushpi. | d) pH of 1% solution, in water and alcohol of any Ayurvedic formulation (solid) available in the market. |
| 7. Morphology of Brahmi, Methi, Lehsun and Palash. | 10. To perform above studies (exp. 10) in any liquid Ayurvedic formulation. |
| 8. a) Morphology of Nagarmotha and Neem. | 11. Preparation of medicated oil. |

PROJECT WORK

A report on marketed preparations based on traditional drugs mentioned in theory.

BOOKS RECOMMENDED :

1. Kokate C.K. "Practical Pharmacognosy" Vallabh Prakashan, New Delhi.
2. Wallis T.E. "Analytical Microscopy" J&A Churchill Ltd., London.
3. Trease, G.E., & Evans, W.C., Evans, W.C., "Pharmacognosy" Bailliere Tindall east Baorne, U.K.
4. Tyler V.E. et al : "Pharmacognosy" Lea & Febiger, Philadelphia.
5. Wallis. T.E. "Text Book of Pharmacognosy" J&A Churchill Ltd. London.
6. Kokate C.K. et al "Pharmacognosy" Nirali Prakashan, Pune.
7. Medicinal plants of India I&II, Indian council of Medical Research, New Delhi.
8. Nadkarni A.K. Indian Materia Medica 1-2, Popular Prakashan (P) Ltd. Bombay.
9. Atal C.K. & Kapur BM. "Cultivation & utilization of Medicinal plants, RRL, Jammu.
10. Indian Herbal Pharmacopoeia, vol. I&II, ICMR & RRL, Jammu.
11. The wealth of India, Raw Materials (All volumes) Council of Scientific & Industrial Research, New Delhi.
12. Compendium of Indian Medicinal Plants I-IV, Rastogi & Malhotra.
13. Indian Ayurvedic Pharmacopoeia, Govt. of India.
14. Kokate CK, Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan.

PHAR-365 PROFESSIONAL COMMUNICATION-II 9933

Unit-I. 1. Written skills: Proposal writings formats. Report writings. Business letters. Applications. Covering letters. Curriculum Vitae Designing [10]

Unit-II 2. Productivity, Time Management simulation exercise

3. Leadership Skills.
4. Team work 'BSC' – Boss, Subordinates & Colleagues [06]

Unit-III 5. Group Discussions (G.D) Tips, GD [08]

Unit-IV 6. Corporate behaviour, corporate expectation, office etiquettes. 7. Extempore [06]

Unit-V. 8. Interview Tips:-

- What student is supposed to do before the interview, during the interview, after the interview & on the day of interview.
- Various questions that may be asked in an interview.
- Model interview (Video-shooting & displaying optional)

9. Exit Interview [10]

XXVIII. BOOKS RECOMMENDED

1. Raman, Meenakshi & Sharma Sangeeta, Technical Communications- Principles & Practice, Oxford University Press.
2. Sharma R.C. & Krishna Mohan, Business Correspondence & Report Writing, Tata Mc Graw Hill Co.
3. Lesikar RV, Lesikar's Basic Business Communication.

PHAR- 366 : ENVIRONMENT & ECOLOGY 5116

Unit-I Environment studies

- A- Definition, scope & importance , Natural Resources – renewable & non renewable
- B- Use, utilization, exploitation and associated problems of forests, Water resources, Mineral resources, Food resources, Energy resources, Land resources.
- C- Equitable use of resources for sustainable life style, role of an individual in conservation.

Unit-II Ecosystems

A. Introduction, types features & functions of difference ecosystems- Forest Grassland, Desert and Aquatic.

B. Biodiversity & its conservation with special reference to India.

Unit-III Environmental pollution- Air, Water, Soil, Marine, Noise, Thermal, Nuclear- Introduction causes and control measures.

Unit IV Law related to Environmental Protection

Air (Prevention and Control of pollution)Act 1987

Water prevention & Control of Pollution Act. 1974

Unit-V Environmental Protection Act -1986

Noise Pollution

Hazardous Wastes

Hazardous Chemical

Hazardous Microorganism

Biomedical Waste

Provisions applicable to drugs and cosmetic.

Reference

1. Principles of Environmental Studies, C. Manoharachary, P. Jyaranama Reddy, Pharma Book Syndicate, Hyderabad.
2. Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standards Vol. I & II. R.K. Trivedy, Pharma Book Syndicate, Hyderabad
3. Relevant Acts & Rules published by Govt. of India with latest amendments.

SEMESTER –VII

PHAR –471 PHARMACEUTICAL ANALYSIS -III

Unit-I : Ultraviolet and Visible Spectrophotometry : Electronic, excitation, quantitative laws, deviation from Beer's law, graphical presentation of data. Chromophores photometric error, instrumentation, single and double beam spectrophotometer.

Colorimetric methods : Chemistry of colorimetry, instrumentation, application (direct methods and indirect methods). Nephelometry & turbidimetry and densitometry. [08]

Unit-II : Infra Red Spectrophotometry : Theory, characteristics absorbance, bands of organic functional groups, interpretation of infrared absorption spectra, preparation of sample, sample cells, IR instrumentation qualitative and quantitative applications in pharmaceutical analysis.

Fluorimetric Analysis : Theory, quantitative description, experimental factors affecting fluorescence intensity, factors affecting IC and F directly, relationship of fluorescence to molecular structure, instrumentation, correction of spectra, pharmaceutical applications. [08]

Unit-III Nuclear Magnetic Resonance Spectroscopy

An introduction to the theory of 1H-NMR, chemical shift & spin-spin coupling, spectra of (CH₃ CH₂ -OH, Cl-CH₂ OH, CH₃ - CHO, CH₃ (CH₂)₄ CH₃, C₆H₆, CH₃ C₆H₅). [08]

Unit-IV Mass Spectrometry: Introduction to mass spectra, molecular ion peak, fragmentation peaks, mass spectra of some simple compounds.

Flame Photometry: Origin of spectra, atomization and ionization, instrumentation, background emission, interference, qualitative & quantitative applications in pharmaceutical analysis. [08]

Unit-V: Theory, instrumentation and applications of: Emission Photometry Atomic absorption spectroscopy

PHAR-471 P PHARMACEUTICAL ANALYSIS -III

PRACTICAL

1. Assay of at least 10 official formulation containing single and more active ingredients using instrumental techniques.
2. Interpretation of a few spectra.

BOOKS RECOMMENDED :

1. Pharmacopoeia of India, Ministry of Health, Govt of India.
2. Becket A.H. and Stenlake J.B. Practical Pharmaceutical Chemistry Vol. I and II, The Athlone Press of the University of London.
3. Chatten L.G. A text book of Pharmaceutical Chemistry Vol. I & II Marcel, Dekker, New York.
4. Willard H.H. and Merrit L. Jr and Dean J.A., Instrumental methods of analysis Van Nostrand Renhold, New York.
5. Obonson J.W.R. Undergraduate Instrumental Analysis, Marcel Dekker Inc, New York, 1970.
6. Parikh V.H. Absorption Spectroscopy of Organic Molecules Addison-Wesley Publishing Co., London 1974.
7. Silver stein RM & Webster FX, Spectrometric Identification of Organic Compounds, John Wiley & Sons.
8. Skoog V, Principles of Instrumental Analysis, Holler-Neimen

PHAR – 472 PHARMACEUTICS –VIII (BIOPHARMACEUTICS & PHARMACOKINETICS)

Unit-1 : Introduction to Biopharmaceutics and Pharmacokinetics and their role in formulation, development and clinical setting.

Biopharmaceutics : (A) Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion and pinocytosis).

- (B) Factors influencing absorption – Physicochemical, physiological and pharmaceutical.
 (C) Drug distribution in the body, plasma protein binding. [08]
 Unit-II : Pharmacokinetics : (A) Significance of plasma drug concentration measurement.
 (B) Compartment model and Non-compartment model. Definition and Scope.
 (C) Pharmacokinetics of drug absorption – zero order and first order absorption rate constant using Wagner – Nelson, Loo-Reigelman method.

- Unit-III:(A) Volume of distribution and distribution coefficient.
 (B) Compartment kinetics – One compartment and Preliminary information of multicompartment models. Determination of pharmacokinetic parameters from plasma and urine data after drug administration by intravascular and oral route.
 (C) Clinical Pharmacokinetics : Definition and scope [08]

- Unit-IV: (A) Dosage adjustment in patients with and without renal and hepatic failure.
 (B) Pharmacokinetic drug interactions and their significance in combination therapy.
 Unit-V :Bioavailability and Bioequivalence :
 (A) Measures of bioavailability, C-max, and area under the curve (AUC).
 (B) Review of regulatory requirements for conduction of bioequivalent studies. [08]

PHAR-472P PHARMACEUTICS-VIII (BIOPHARMACEUTICS & PHARMACOKINETICS)

PRACTICAL

- Experiments designed for the estimation of various pharmacokinetic parameters with given data.
- In *vitro* evaluation of different dosage forms for drug release.
- Absorption studies – in *vitro*.
- Statistical treatment of pharmaceutical data.

SUGGESTED PRACTICALS

- In-*vitro* drug release study of the given powder dosage form using various dissolution media.
- In-*vitro* drug release study of the given uncoated tablet dosage form using different dissolution media.
- In-*vitro* drug release study of the given capsule dosage form using various dissolution media.
- In-*vitro* drug release study of the given film coated dosage form using various dissolution media.
- In-*vitro* dissolution study of the given sustained release dosage form.
- In-*vitro* dissolution study of the given fast release (M.D, Dispersible etc.) dosage form.
- To study the effect of hardness of tablet on dissolution rate.
- To study the effect of various diluents on dissolution rate of dosage form (Tablets, Capsules, Ointment etc.).
- To study the effect of formulation on drug release (powder, suspension etc.).
- To determine the % protein binding of the given drugs.
- To determine the effect of protein binding on drug bioavailability.
- To calculate various Pharmacokinetic parameters from the given zero order drug release data.
- To calculate various Pharmacokinetic parameters from the given first order drug release data.
- To calculate the various Pharmacokinetic parameters from the given blood data of I.V bolus injection (one compartment model).
- To calculate various Pharmacokinetic parameters from the given urinary excretion data of I.V bolus.injection using both methods (Rate of elimination & sigma minus method one compartment model).
- To study the in-*vitro* drug- drug interaction.
- To study the passive diffusion of the given drug using cellophane membrane.
- To study the passive diffusion of the given drug using egg or goat membrane.
- To determine the various Pharmacokinetic parameters from the given blood data of oral administration of dosage form.

DEMONSTRATION EXPERIMENTS

- Dissolution Apparatus.
- Preparation of Buffers & membranes.
- Use of semilog paper.
- Operation of colorimeter & U.V spectrophotometer.

BOOKS RECOMMENDED :

- Notari, R.E. Biopharmaceutics and Pharmacokinetics – An introduction Marcel Dekker Inc. N.Y.
- Rowland M, and Tozer T.N. Clinical Pharmacokinetics, Lea and Febrieger, N.Y.
- Wagner J.G. Fundamentals of Clinical Pharmacokinetics, Drugs Intelligence Publishers, Hamilton.
- Wagner J.G. Pharmacokinetics for the Pharmaceutical Scientist, Technomic Publishing A.G. Basel, Switzerland.

PHAR – 473 PHARMACOLOGY -III

Unit-I : Pharmacology of Endocrine System Hypothalamic & pituitary hormones, Thyroid hormones & Thyroid Drugs, Parathormone, Calcitonin & Vitamin D, Insulin, oral hypoglycemic agents & glucagon. [07]

Unit-II : ACTH & Cortico steroids, Androgens & anabolic steroids, Estrogens, Progesterone & Oral Contraceptives, Drugs acting on uterus. 8]

Unit-III : Chemotherapy General Principles of Chemotherapy, Sulfonamides, Cotrimoxazole, Quinolones, Antibiotics – Penicillins, Cephalosporins, Chloramphenicol, Tetracyclines, Macrolides. [08]

Unit-IV : Chemotherapy of Parasitic infections, Tuberculosis, Leprosy, Malaria, Fungal infections, Viral diseases, Introduction to Immunomodulators and Chemotherapy of Cancer. [10]

Unit-V : Principles of Toxicology Definition of poison, general principles of treatment of poisoning with particular reference to barbiturates, opioids, organophosphorous & atropine poisoning, Heavy metal Antagonists. [07]

PHAR-473P PHARMACOLOGY- III

PRACTICAL

- To calculate the pA2 value of Atropine & chlorpheniramine.
- Bioassay of Ach, histamine & oxytocin on suitable isolated preparations using matching assay, bracketing assay, three point assay & four point assay.

SUGGESTED PRACTICALS

Bioassay of histamine and acetylcholine using matching and interpolation method on rat guinea pig ileum.

BOOKS RECOMMENDED :

- | | |
|--|---|
| 1. Ghosh M.N. Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta. | 7. Katzung, B.G. Basic & Clinical Pharmacology, Prentice Hall, International. |
| 2. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi. | 8. Laurence, DR & Bennet PN; Clinical Pharmacology, Churchill Livingstone. |
| 3. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi. | 9. Rang MP, Dale MM, Ritter JM, Pharmacology Churchill Livingstone. |
| 4. Barar F.S.K : Text Book of Pharmacology, Interprint, New Delhi. | 10. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi. |
| 5. Goodman & Gilman, The Pharmacological basis of Therapeutics, Pergamon Press. | 11. Satoskar & Bhandarkar : Pharmacology & Pharmacotherapeutics, Popular Prakashan Pvt. Ltd., Bombay. |
| 6. Editors :- J.G. Hardman, Le Limbird, PB Molinoss, RW Ruddon & AG Gil, Pergamon Press. | 12. Paul. L., Principles of Pharmacology, Chapman and Hall. |

PHAR –474 PHARMACEUTICAL CHEMISTRY -VI (MEDICINAL CHEMISTRY - III)

Mode of action, uses, structure- activity relationship of the following classes of drug(Synthetic procedures of individually mentioned drugs only).

Unit-I : 1. Steroids and related drugs : Introduction, Classification, Nomenclature & Stereochemistry. (A) Androgens and Anabolic steroids – Testosterone, Stanazolol. (B) Estrogens and Progestational agents – Progesterone, Estradiol. (C) Adrenocorticoids – Prednisolone, Dexamethasone, Betamethasone.

Unit-II : Antibiotics-Penicillins, Semi-synthetic , penicillins, streptomycin, tetracyclines, Cephalosporins, Chloramphenicol, Fluroquinolones.

Antimycobacterial Agents: PAS, Ethambutol, Isoniazid, Dapsone

[08]

Unit III: Antimalarials: **Cholroquine, Primaquine, Pyrimethamine**

Antiamoebics: **Metronidazole, Tinidazole, Diloxanide**

Antiseptics & Disinfectants – **Benzalkonium chloride**

Anthelmintics- **Mebendazole**

Antifungals

[08]

Unit-IV : **Anti – HIV agents – Zidovudine, Zalcitabine, Saquinavir.**

Antivirals – Amantadine, Acyclovir, Lamivudine.

Prostaglandins – Misoprostol, Carboprost.

[08]

Unit-V **Thyroid and Antithyroids – Carbimazole, Levothyroxine, Propylthiouracil, Methimazole.**

Insulin & Oral Hypoglycaemics –

Chlorpropamide, Metformin, Tolbutamide, Glybenclamide. [08]

BOOKS RECOMMENDED :

1. Pharmacopoeia of India, Ministry of Health, Govt. of India.
2. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
3. Delagado J N and Remers W A R, Eds., Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
4. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
5. Singh Harkrishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
6. Nogrady T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
7. Finar I L, Organic Chemistry, Vol. I & II, ELBS/ Longman, London.
8. Hanch C, Comprehensive Medicinal Chemistry, Vol. IV, Quantitative Drug Design, Pergamon Press, Oxford.

PHAR-475

PHARMACOGNOSY-IV

Unit-1 : 1. **Systematic study of source, cultivation, collection, processing, commercial varieties, chemical constituents, substitutes adulterants, uses, diagnostic macroscopic & microscopic features & specific chemical tests of following alkaloid containing drugs.**

- (A) Pyridine-piperidine : **Tobacco, Areca & Lobelia.**
- (B) Tropane : **Belladonna, Hyoscyamus, Datura, Coca & Withania.**
- (C) Quinoline & Isoquinoline : **Cinchona, Ipecac & Opium..**
- (D) Indole : **Ergot, Rauwolfia, Catharanthus & Nux-vomica.**
- Unit-II : (E) Imidazole : **Pilocarpus.**
- (F) Steroidal : **Veratrum & Kurchi.**
- (G) Alkaloidal amine : **Ephedra & Colchicum.**
- (H) Glycoalkaloid : **Solanum.**
- (I) Purines : **Coffee & Tea**
- (J) Quinazoline : **Vasaka.**

[08]

[08]

Utilization & production of phytoconstituents such as – Tropane Alkaloids, Isoquinoline & Quinoline Alkaloids.

Unit-III (A) **World wide trade in Medicinal plants & derived product. Tropane alkaloids containing drugs, Cinchona, Ipecac, Rauwolfia, Taxol. Diosgenin, Digitalis, Liquorice, Papain, Ginseng, Aloe, Valerian, & plant laxatives.**

(B) **Role of Medicinal & aromatic plants in National Economy.**

[08]

Unit-IV **Biological sources, preparation, Identification tests and uses of following enzymes – Diastase, papain, Penicillinase, Hyalluronidase, Streptokinase.**

Plant Bitters & Sweeteners.

[08]

Unit-V : **Introduction, classification & study of different chromatographic methods. Application of chromatographic techniques in evaluation of herbal drugs.**

Historical development of plant tissue culture, type of culture, Nutritional requirement, growth & their maintenance. Application of plant tissue culture in pharmacognosy.

[08]

PHAR-475P

PHARMACOGNOSY -IV

PRACTICAL

1. **Identificaiton of crude drugs listed above.**
2. **Microscopic study of characters of any 8 selected drugs given in theory in entire and powder form.**
3. **Chemical evaluation of powdered drugs & Enzymes.**
4. **Chromatographic studies of some herbal constituents.**
5. **Some experiments in plant tissue culture.**

SUGGESTED PRACTICALS

1. **To study the morphology and microscopy of Datura and Withania.**
2. **To study the morphology and microscopy of Ipecac and Rauwolfia.**
3. **To study the morphology and microscopy of Catharanthus and Nux-vomica.**
4. **To study the morphology and microscopy of Ephedra and Kurchi.**
5. **To study the morphology and microscopy of Solanum and Vasaka.**
6. a) **Morphology of Areca, Colchicum.**
b) **Transverse section of Catharanthus leaf and Kurchi bark.**
7. **To study the TLC profile of Catharanthus leaf.**
8. **To study the TLC profile of Withania root.**
9. **Chemical test of Tea, Tobacco, Datura and Withania.**
10. **Chemical test of Nux-vomica, Ephedra, and Kurchi.**
11. **Introduction of plant-tissue culture techniques on laboratory scale.**
12. **Preparation of Agar slants.**
13. **To grow callus in any defined media.**
14. **Maintenance of callus culture.**

PROJECT :

World wide trade of medicinal plants. (Monograph).

BOOKS RECOMMENDED :

1. Kokate, C.K. Practical Pharmacognosy, Vallabh Prakashan, Delhi.
2. Wallis T.E. Analytical Microscopy, J&A Churchill Ltd, London.
3. Ganborg & Wetter, Plant Tissue Culture Methods, National Research Council of Canada, Saskatchewan.
4. Clarke ECG, Isolation & Identification of drugs. The Pharmaceutical Press, London.
5. Trease, G.E. & Evans, W.C. "Pharmacognosy" Bailliere Tindall East Bourne, U.K.
6. Tyler V.E. etal Pharmacognosy, Lea & Febiger Phjadelphia.
7. Wallis T.E. Text book of Pharmacognosy" J&A Churchill Ltd. London.
8. Kokate, C.K. etal Pharmacognosy" Nirali Prakashan, Pune.
9. Atal & Kapur, Cultivation & Utilization of Medicinal Plants, RRL, Jammu.
10. Stahl E, Thin Layer Chromatography. A laboratory handbook, Springer Verlog, Berlin.
11. Henry TA. The Plant Alkaloids, McGraw Hill, New York.
12. Dixit, V.K., Vyas. S.P. Pharmaceutical Biotechnology, CBS Publication, ND.
13. Street H.E. Tissue Culture & Plant Science, Academic Press, London.
14. Kokate, C.K. Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan.

SEMESTER – VIII

PHAR –481 PHARMACEUTICAL BIOTECHNOLOGY

Unit-I : Immunology and Immunological preparations : **Principles, Antigen and haptens, immune system, Cellular, humoral immunity, immunological tolerance, antigen-antibody reactions and their applications, standardization and storage of BCG.**

[08]

Unit-II : Genetic Recombination Transformation, conjugation, transduction, protoplast fusion and gene cloning and their applications, development of hybridoma for monoclonal antibodies, study of drugs produced by biotechnology such as activase, humulin, Humatrope.

[08]

Unit-III : Antibiotics : Historical development of antibiotics, Antimicrobial spectrum and methods used for their standardization. Screening of soil for organisms producing antibiotics fermenter, its design, control of different parameters. Isolation of mutants, factors affecting mutation.

Unit-IV : Microbial Transformation : Introduction, types of reactions mediated by microorganisms, Design of Bio-transformation process, selection of organisms, biotransformation processes and its improvements with special reference to steroids.

[08]

Unit-V : Enzyme immobilization : Techniques of immobilization of enzymes, factors affecting enzyme kinetics, study of enzymes such as hyaluronidase, penicillinase, streptokinase and streptodaranse, amylases and proteases Immobilization of Bacteria and plant cells.

BOOKS RECOMMENDED :

1. S.P. Vyas and V.K. Dixit, Pharmaceutical Biotechnology, CBS Publication, New Delhi.
2. Prescott and Dunn's Industrial Microbiology, 4th Ed, 1987, CBS Publishers and Distributors, Delhi.
3. P.F. Stanbury & A. Ahhitar Principles of Fermentation Technology.
4. K. Kieslich Ed. Biotechnology Vol. 69 Verlag Chernie Switzerland 1984.
5. P.F. Standury & A. Whitaker & Hall S.J. Principles of Fermentation. Aditya Book Private Limited, New Delhi.
6. Crueger W. & Crueger A, Biotechnology-A Textbook of Industrial Microbiology, Panima Publishing Corporation, Delhi.

PHAR-482 NATURAL PRODUCTS

Unit-I : 1. Chemical & Spectral approaches to simple molecules of natural origin.
2. Biogenetics Investigations and basic metabolic pathways, (alkaloids, terpenes, steroids) Brief introduction to biogenesis of secondary metabolites of Pharmaceutical importance. [08]

Unit-II Extraction, Isolation & Chemistry of – i) Glycosides - Digitoxin, Digoxin, Hecogenin, Diosgenin & Sarasapogenin ii) Lignans iii) Quassinoids iv) Flavonoids (Quercetin) [08]

Unit-III : Alkaloids – Atropine & related compounds, quinine, reserpine, morphine, papaverine, ephedrine, ergot, and Vinca Alkaloids. Natural Allergens, Photosensitizing agents and fungal toxins. [08]

Unit-IV:

Extraction, Isolation & Chemistry of – Terpenoids- Camphor, Menthol, Citral, β -Carotene, α -Tocopherol, α -Pinene. [03]

Unit-V Herbal Cosmetics and their formulation. [02]

Recent developments of natural products used as anticancer agents, antidiabetics and immunomodulators.

PHAR-482 P NATURAL PRODUCTS

PRACTICAL

1. Laboratory experiments on Isolation, separation, purification of various groups of chemical constituents of Pharmaceutical significance.
2. Exercises on paper & thin layer chromatographic evaluations of herbal drug constituents.
3. Extraction of volatile oils & theirs chromatographic profiles.

SUGGESTED PRACTICALS

1. Isolation of caffeine from Tea leaves.
2. Isolation of piperine from Black Pepper.
3. Isolation of Hesperidin from Orange Peel.
4. Isolation of Clove oil from clove.
5. Isolation of Caraway oil from caraway.
6. Isolation of cumin oil from cumin.
7. To study the TLC profile of extracted oils.
8. To performs the column chromatography of any available herb.
9. To study the paper chromatographic profile of glycone portion separated from senna.
10. To Isolate the active constituent of any available drug with the help of preparative TLC.
11. Quantitative determination of Ascorbic acid present in Amla. (Fresh/ Dry).

BOOKS RECOMMENDED

1. Brain, K.R., & Turner T.D, The Practical evaluation of phytopharmaceutical, Wright, Bristol.
2. Sim, Medicinal Plant Alkaloids & Glycosides.
3. Kokate C.K., "Practical Pharmacognosy" Vallabh Prakashan, New Delhi.
4. Stahl E. "Thin layer chromatography" A Laboratory Hand Book, Springer Verlag, Berlin.
5. Harborne, J.B. Phytochemical Methods Chapman & Hall, International Ed, London.
6. Pharmacopoeia of India.
7. I.L. Finar "Organic chemistry" Vol. I & II ELBS, London.
8. O.P. Agarwal, "Chemistry of Organic Natural Product" Vol. I & II Goel Pub. House, Meerut.
9. Trease G.E. & Evan, W.C., "Pharmacognosy" Bailliere tindall East bourne, U.K.
10. Tyler V.E. etal "Pharmacognosy" Lea & Febiger Philadelphia.
11. Kokate, C.K. "Pharmacognosy" Nirali Prakashan, Pune.
12. Pridham JB & Swain T. Biosynthetic pathway Higher plants, Academic Press, New York.

PHAR- 483 PHARMACEUTICAL INDUSTRIAL MANAGEMENT

Unit-I : 1. Concept of Management : Administrative Management (Planning, Organising Staffing Directing and Controlling). Entrepreneurship development, Operative Management (Personnel, Materials, Production, Financial, Marketing, Time/space, Margin/ Morale) Principles of Management (Co-ordination, Communication, Motivation, Decision making, leadership, Innovation Creativity, Delegation of Authority / Responsibility. Record Keeping), Identification of key points to give maximum thrust for development and perfection.

Unit-II Economics : Principles of economics with special reference to the Laws of demand and supply, demand schedule, demand curves labor welfare, general principles of insurance and inland and foreign trade, procedure of exporting and importing goods.

[03]

Accountancy : Principles of Accountancy, Ledger posting and book entries preparation of trial balance, columns of a cash book, Bank reconciliation statement, rectification of errors, profits and loss account, balance sheet, purchase, keeping and pricing of stocks, treatment of cheques bills of exchange, promissory notes and bundles documentary bills. [04]

Unit-III 3. Pharmaceutical Marketing : Functions, buying, selling, transportation, storage financed feedback information, channels of distribution, wholesale, retail, department store, multiple shop and mail order business.

[04]

4. Salesmanship : Principle of sales promotion, advertising, ethics of sales, merchandising, literature, detailing, Recruitment, training, evaluation, compensation to the pharmacist. [04]

Unit-IV . 5. Market Research

(A) Measuring & Forecasting Market Demand - Major concept in demand measurement, Estimating current demand Geo-demo-graphic analysis. Estimating industry sales, Market share and future demand.

(B) Market segmentation & Market targeting. [06]

Unit-V

6. Materials Management : A brief exposure of basic principles of management major areas, scope, purchase, stores, inventory control and evaluation of materials management. [04]

7. Production Management : A brief exposure of the different aspects of Production Management – Visible and Invisible inputs, Methodology of Activities Performance Evaluation Technique Process – Flow, Process Know-how, Maintenance Management. [03]

BOOKS RECOMMENDED :

1. Beri, Market Research – Tata Mc Graw Hill
2. Chary S.N, Production and Operative Management / Tata Mc Graw Hill.
3. Datta A.K., Material Management / PHI.
4. Chadwick Leslie, The essence of management accounting / PHI.
5. Massie L. Joseph Essentials of Management / PHI.
6. Barthwal R.R, Industrial Economics – / New Age International.
7. Shreenivasan K.R., An Introduction to Industrial Management –/ Vikas.
8. Daver Rustam S. Salesmanship and Publicity –/ Vikas.
9. Mukopadhyay Sekhar, Pharmaceutical Selling, Sterling Publishers.
10. Koontz H, Wehrich H, Essentials of Management, Tata Mc Graw Hill.

PHAR- 484 HOSPITAL PHARMACY

Unit-I: Organization and Structure: **Organization of a hospital and hospital pharmacy, Responsibilities of a hospital pharmacist. Pharmacy and therapeutic committee, Budget preparation and implementation.**

Hospital Formulary: **Contents, preparation and revision of hospital formulary.**

Unit-II : Drug Store Management and Inventory Control: **Organization of drug., Types of materials stocked, storage conditions.**

Purchase and Inventory control: **Principles, purchase procedures, purchase order, procurement and stocking.**

Unit-III : Central Sterile Supply Unit and their Management: **Types of materials for sterilization, packing of materials prior to sterilization, sterilization equipments, Supply of sterile materials.**

Manufacture of Sterile and Nonsterile Products: **Policy making of manufacturable items, demand and costing, personnel requirements, manufacturing practice, Master formula card, Production control, Manufacturing records.**

Unit-IV: Drug information service: **Sources of information on drugs, treatment schedules, procurement of information, computerized services (e.g. MEDLINE), Retrieval of information, Medication error.**

Records and Reports : **Prescription filling drug profile, Patient medication profile, case on drug interaction & adverse reactions, idiosyncratic cases etc.**

Unit-V: Drug distribution systems in Hospitals : **Out-patient dispensing, methods adopted, Dispensing of drugs to in-patients. Types of drug distribution systems Charging Policy, labeling, Dispensing of drugs to ambulatory patients, Dispensing of controlled drugs.**

Nuclear Pharmacy : **Introduction to Radiopharmaceutics- radio-active half life, Units of radio-activity. Production of radio pharmaceuticals, methods of isotonic tagging, preparation of radio-isotopes in laboratory using radiation dosimetry, radio-isotope generators, permissible radiation dose level, Radiation hazards and their prevention, specifications for radio-active laboratory.**

XXIX. BOOKS RECOMMENDED

1. Hasan, Hospital Pharmacy, Lea & Febiger, Philadelphia.
2. Merchant H.S. and Qadry J.S. Text Book of Hospital Pharmacy, B.S. Shah Prakashan, Ahmedabad.

PHAR – 485 ELECTIVE

Any one of the following :

- | | |
|--|---|
| (A) Standardisation of herbal drugs. | (E) Pharmaceutical Packaging |
| (B) Drug design. | (f) Novel drug delivery system |
| (C) Clinical; Pharmacy and Drug interactions | XXX. (G) GMP, Quality Assurance & Validation |
| (D) Pharmaceutical marketing. | |

(A) STANDARDISATION OF HERBAL DRUGS

Unit I – **Commerce and quality control of natural medicinal plants products, organoleptic, microscopical, physical & chemical evaluation of crude drugs.** [08]

Unit-II - **Standardisation of plant material as per WHO guidelines.**

[08]

Unit-III -**Methods of extraction and modern techniques for the isolation, purification, separation estimation and characterisation of active plant constituents.**

Unit-IV -**Analysis of official formulations derived from crude drugs including some ayurvedic preparations.**

Unit-V -**General methods of screening of natural products for following biological activity:**

- | | | |
|----------------------|--------------------------|------------------|
| a) Anti-inflammatory | b) Hypoglycaemic | c) Antibacterial |
| d) Antifertility | e) Psychopharmacological | |

[08]

BOOK RECOMMENDED

1. Trease, G.E. Evans W.C., Pharmacognosy ELBS.
2. Tyler Varro. E., Brady Lynn. R. Robbers J.E. Pharmacognosy
3. Wallis T.E., Text book of Pharmacognosy
4. Harborne Phytochemical methods of chemical analysis .
5. Pharmacopial standards for Ayurvedic formulations CCRAS, Delhi.
6. Vapoorte, Swenson Chromatography of alkaloids.
7. Lala P.K., Elements of chromatography
8. Mottal.A.C. Clerk's isolation & identifications of drugs
9. Dhavan B.N. & Srimal R.C., The use of pharmacological techniques for evaluation of natural products. CDRI Lucknow.
10. Brain K.R. and Turner T.D., The practical evaluation of phytopharmaceuticals
11. Peach K. & Tracey MV, Modern methods of plant analysis
12. British herbal pharmacopocia.
13. Indian herbal pharmacopocia.
14. Chaudhary.R.R., Herbal drug industry

(B) DRUG DESIGN

XXXI. Unit-I

A general study of the approaches to drug design- method of variation, study of the use of Biochemical & Physiological information involving new drugs.

Unit-II

Physicochemical properties in relation to drug action; metabolic transformation of drugs and its role in development of new drug molecules; Metabolic antagonism.

XXXII. Unit-III. Stereochemical aspects of drug receptor interactions and mechanism of drug interaction. Isosterism and bioisosterism as guides to structural variations; Concepts of conformational analysis and its role in design and development of new drug molecules.

XXXIII. Unit-IV. Principles of drug design: Analogue synthesis versus rational design; discovery of lead compounds, Pharmacophoric identification, Prodrugs and soft drugs.

Unit-V QSAR and introduction to molecular modeling, Computer Aided Drug Design.

BOOKS RECOMMENDED:

1. E.J, Ariens: Drug Design, Academic Press, New York (1975).
2. S.H. Salkovskiy, A.A. Sinkula and S.C. Valvani, Physical Chemical Properties of Drugs, Marcel Dekker Inc. New York.
3. M.E. Wolff, Burger's Medical Chemistry, John Wiley and Sons, New York.
4. R.F, Doerge, Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co, Philadelphia.
5. Olson, Edward C "Computer Assisted Drug Design (American Chemical Society).
6. Burger A "A guide to chemical basis of Drug Design "John Wiley & Sons".

(C) CLINICAL PHARMACY AND DRUG INTERACTIONS

Unit-I. 1. Introduction to Clinical Pharmacy.

[08]

Unit-II 2. Basic concepts of pharmacotherapy,

Clinical Pharmacokinetics and individualization of Drug Therapy, Drug Delivery, Systems and their Biopharmaceutic & Therapeutic Considerations, Drug use during Infancy and in the Elderly (Pediatrics & Geriatrics).

Unit-III Drug use during Pregnancy, Drug induced Diseases, The Basics of Drug Interactions, General Principles of Clinical Toxicology, Interpretation of Clinical Laboratory Tests.

[08]

Unit-IV 3. Important Disorders of Organ Systems and their Management:

Cardiovascular Disorders-Hypertension, Congestive Heart Failure, Angina, Acute Myocardial Infarction, Cardiac arrhythmias, CNS Disorders: Epilepsy, Parkinsonism, Schizophrenia, Depression, Respiratory Disease-Asthma, Gastrointestinal Disorders-Peptic ulcer, Ulcerative colitis.

[08]

Unit-V

Hepatitis, Cirrhosis, Endocrine Disorders- Diabetes mellitus and Thyroid Disorders, Infectious Diseases-Tuberculosis, Urinary Tract Infection, Enteric Infections, Upper Respiratory Infections, Haematopoietic Disorders-Anemias, Joint and Connective Tissue Disorders-Rheumatic Diseases, Gout and Hyperuricemia, Neoplastic Diseases-Acute Leukaemias, Hodgkin's disease.

[08]

4. Therapeutic Drug Monitoring.

5. Concept of Essential Drugs and Rational Drug use,

BOOKS RECOMMENDED

- | | |
|--|--|
| 1. Barar F.S.K. Text Book of Pharmacology, Interprint, New delhi. | 7. Satoskar & Bhandarkar; Pharmacology & Pharmastherapeutics, Popular Prakashan Pvt, Ltd. Bombay. |
| 2. Goodman & Gilman, The Pharmacological basis of Therapeutics, 3, Editors :- JG Hardman, Le Limbird, PB Molinos, RW Ruddon & AG Gill, Pergamon Press. | 8. Davidson's Principles and Practice of Medicine, ELBS/Churchill Livingstone. |
| 3. Katzung B.G. basic & Clinical Pharmacology, Prentice Hall, International. | 9. Herfindal E.T. and Hirashman J.L., Clinical Pharmacy and Therapeutics Williams and Wilkins. |
| 4. Laurence, DR & Bennet PN; Clinical Pharmacology, Churchill Livingstone. | 10. Parthasarathi G, Nyfort-Hansen K, Nahata M.C., A Textbook of Clinical Pharmacy Practice-Essential Concepts and Skills, Orient Longman. |
| 5. Rang MP, Dale MM, Ritter JM, Pharmacology Churchill Livingstone. | |
| 6. Tripathi, K.D, Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi. | |

(D) PHARMACEUTICAL MARKETING

Unit-I Principles of marketing management, Introduction to pharmaceutical marketing, Identification of the marketing, Market behaviour, Prescribing habits of physician, Patient motivation, Market analysis.

Unit-II Drug development and the marketing research interface, Diversification and specialisation, Marketing generic drugs.

Unit-III Economic and competitive aspects of pharmaceutical industry- Advertising, Detailing, Retail competition, International marketing.

Unit-IVDistribution channels in pharmaceutical marketing – Manufacturer, Wholesaler, Retailer, Hospital & Government agencies, Selection of stockists and distributors.

[08]

Unit-V Controls- Internal control and external control.

[08]

BOOKS RECOMMENDED

1. Smith, Mickey C, "Principles of pharmaceutical marketing", CBS Publishers & Distributors.
2. Kotler, Philip "Marketing Management". Pearson Education Asia.

(E) PHARMACEUTICAL PACKAGING

XXXIV. Unit-I 1. New concepts in pharmaceutical packaging. 2. Package systems, package design research.

XXXV. Unit-II. 1. Packaging materials with special reference to polymers, metals, glass and plastics, control of packaging materials.

2. Blister and strip packaging.

[08]

XXXVI. Unit-III

1. Testing of containers & closures, Pharmacopoeial tests and specifications, Defects in packages.

2. Stability of package and packaging material.

3. Ancillary materials used in packaging.

[08]

XXXVII. Unit-IV

4. Sterilization of packaging materials.

5. Packaging of Parenterals, Ophthalmic and aerosols.

[08]

XXXVIII. Unit-V

6. Corrugated fibre board materials, Pointing requirements, label and leaflets preparation, Legal requirement.

BOOKS RECOMMENDED:

- | | |
|--|--|
| 1. Ross, Packaging of Pharmaceuticals. | 5. Harburn, Quality-Control of Packaging Materials in Pharmaceutical |
| 2. Joseph D.O. Brien, Medical Device Packaging Handbook. | Industry. |
| 3. Griffin, Drug and cosmetic Packaging. | 6. Kac Chensney, Packaging of Cosmetics and Toiletries. |
| 4. Barail, Packaging Engineering. | |

(F) NOVEL DRUG DELIVERY SYSTEM

XXXIX. Unit-I

1. Theory of controlled release drug delivery systems.

2. Release and diffusion of drugs from C.D.D.S., General methods of design and evaluation of C.D.D.S.

[08]

XL. Unit-II

3. Carriers for drug delivery systems, Prodrugs, Physical, chemical and biomedical engineering approach to achieve controlled drug delivery.

4. Microencapsulation: Methods, kinetics of drug release from microcapsules technology and applications.

XLI.

XLII. Unit-III

5. Transdermal drug delivery systems: Theory, formulation and evaluation, Iontophoresis.

6. Implants and inserts: Types, design and evaluation methods, Osmotic pumps.

[08]

XLIII.

XLIV. Unit-IV

7. Targeted Drug delivery systems: Concept of drug targeting, importance in therapeutics, methods in drug targeting, drug immobilization techniques, nanoparticles, liposomes, neosomes, pharmacosomes and erythrocytes.

XLV. Unit-V

8. Advances in drug delivery systems. An Introduction to buccal, nasal, ocular, pulmonary colonic delivery, etc.

XLVI. BOOKS RECOMMENDED

1. Roiche, Design of Biopharmaceutical Properties Through Prodrugs and Analogs.
2. Jolles and Wooldbridge, Drug Design: Facts or Fantasy.
3. Julian, Drug Delivery Systems.
4. Robinson and Vincent, Controlled Drug Delivery.
5. Robinson, Sustained and Controlled Drug Delivery Systems.
6. Noxon, Microencapsulation.
7. Chien, Novel Drug Delivery Systems.
8. Deasy, Microencapsulation and Related Processes.
9. Gutcho, Microencapsulation and Related Processes.
10. Lisbeth, Illum & Davis, Polymers in Controlled Drug Delivery.

XLVII. (G) GMP, QUALITY ASSURANCE & VALIDATION

Unit-I 1. Requirements of GMP, CGMP, GLP, USFDA, WHO guidelines and ISO 9000 series. [08]

XLVIII. Unit-II

2. Documentation- Protocols, Forms and maintenance of records in Pharmaceutical industry.

3. Preparation of documents for new drug approval and export registration. [08]

XLIX. Unit-III 4. Basic concept of quality assurance, Quality assurance systems, Sources and control of quality variation- raw materials, containers, closures, personnel, environment etc

L. **Unit-IV.** 5. Concepts in validation, validation of manufacturing and analytical equipment, Process validation in manufacturing dosage formulations, applications of process validation.

LI. **Unit-V.** 6. In process quality control tests, IPQC problems in pharmaceutical industries.

7. Sampling plans, Sampling and operating characteristics curves. [08]

BOOKS RECOMMENDED:

1. Willing, Tuckerman and Hitchings, Good Manufacturing Practices for Pharmaceuticals.
2. OPPI, Quality Assurance.
3. Loftus and Nash, Pharmaceutical Process Validation.
4. Florey, Analytical Profile of Drugs (All volumes).
5. Indian Pharmacopoeia.
6. United States Pharmacopoeia.
7. British Pharmacopoeia.
8. Garfield, Quality Assurance Principles for Analytical Laboratories.

U.P. TECHNICAL UNIVERSITY, LUCKNOW
REVISED ACADEMIC CALENDAR
B. TECH. / B. PHARM. / B. ARCH. / B.H.M.C.T. / M. B. A. / M. C. A.
ACADEMIC SESSION-2007-2008

S. No.	Particular	Date(s)		
		For III, V, IX Semester	For I, VII Semester	For IV, VI, VIII and X Semester
	Commencement of Classes	Aug. 6, 2007	Aug. 13, 2007	Jan. 12, 2008
2	Classes and Carry over Common Papers (Theory) Exam. 1 st Year of 2004 onwards.	Classes July 0 to 30, 2007 Examination Aug. 13 to 23, 2007		
3	Last date for submitting admission list of students to University. (For newly admitted students)	August 30, 2007		
4	Last date for submitting Engagement Form	September 15, 2007 to September 24, 2007		
5	Last date of submitting Enrolment Form with late fee @ Rs.1000/- per student	Oct. 05, 2007		
6	Last date of submitting Examination Form	Oct. 03, 2007 to Oct. 10, 2007		
7	Last date of submitting Examination Form with late fee @ Rs.1,000/- per student	Upto Oct.29, 2007		
8	Last date of submitting Sessional Marks to University	Dec. 03, 2007		
9	End Semester Theory Examination	Dec. 07, 2007 to Dec.24, 2007		
10	End Semester Practical Examination	Dec. 26, 2007 to Jan. 02, 2008		
11	Evaluation of Answer Books	Jan. 02, 2008 to Jan. 12, 2008		
12	Summer Training if any (4 weeks)	-		
13	Winter Vacation/Summer Vacation	Jan. 02, 2008 to Jan. 11, 2008		
14	Commencement of Classes (1 st Semester onwards) (Session 2008-09)	Aug. 11, 2008		

Note :

- The Institute should ensure that at least two class tests are conducted after completing 1st & 2nd of syllabus respectively. All student(s) will be required to appear in both first class test. The left over class test will be conducted before the second class test and if for any reason beyond the control of student(s) such as illness, tragic incident in family, the student(s) fail to appear in any test, it will be responsibility of Principal / Director of Institute to arrange class test for such student(s). However, if the student has failed to appear in concerned end semester theory examination. The duration of class test will be minimum one hour for each class test. 70% attendance at 1st test and 75% attendance at 2nd test are essential. In case, attendance is short, parents are to be informed accordingly.
- The Institutes shall ensure that 540 hours are completed, if required the Director/ Principal shall arrange classes in weekend days / holidays.
- The Director/ Principal of Institute will submit attendance of students to University after 1st and 2nd class tests and shall ensure that none of student is allowed to appear in the examinations who does not attain the minimum required attendance as per norms prescribed in the relevant ordinances. It will be obligatory on the part of Director / Principal of Institute to detain such students. Only a list of students detained from appearing in University Examination(s) be submitted to University before 30 days from the date of commencement of theory examination.
- The teachers who are assigned evaluation duty during Vacation shall be entitled for earned leave as per rules.

(U.S. Tomer)
Registrar

➤ Academic Time Table

Time Table

INSTITUTE OF PHARMACY, HCPG COLLEGE, VARANASI, B. PHARM 2008-09
Time Table

w.a.f.25-01-2008

	Seat	7th	8:00 am - 11:00 am	11:00 am - 11:30 am	11:30 am - 2:00:00	11:30 am - 4:00 pm
Monday	I	I	Maths (AM)	General Pharmacy (PKA)	Analysis (ND)	G.P. - B (MKG + DR) Inorg. - A (MS + KKS)
	II	II	Organic Chem. (LPS)	A.P.P. - MKG	Jurispudence (SAB)	Organic - A (LPS + B D) Unit operation - B (AAB + PK)
	V	III	Physical Pharmacy (DR)	Biochemistry (BK)	Pharmacology - I (SKK)	Mat. Chem. - A (AT + BR) Pharmacology - B (SKR + RG)
	VII	IV	Medicinal Chem. (BS)	Pharmacology - I (SKK)	Pharmacognosy (DP)	Analysis (ERS + OPE)
Tuesday	I	I	Maths (AM)	General Pharmacy (PKA)	Analysis (ND)	G.P. - A (MKG + PK) Inorg. - B (MS + KKS)
	III	II	Organic Chem. (LPS)	A.P.P. - MKG	Jurispudence (SAB)	Community ph. - A (DR + B*) Organic - I (LPS + ND)
	V	III	Physical Pharmacy (DR)	Biochemistry (BK)	Pharmacology - I (SKR)	Pharmacology - B (MS + AT) Pharmacognosy - A (SKR + RG)
	VII	IV	Medicinal Chem. (BS)	Pharmacology - II (SKK)	Pharmacognosy (DP)	Pharmacology (SAB)
Wednesday	I	II	Maths (AM)	General Pharmacy (PKA)	Analysis (ND)	A.P.P. - A (MS + AT) Analysis - I (LPS + OPE)
	III	II	Organic Chem. (LPS)	A.P.P. - MKG	Jurispudence (SAB)	Pharmacology - B (BY + ND) Unit operation - A (AAB + KKS)
	V	III	Physical Pharmacy (DR)	Biochemistry (BK)	Pharmacology - I (SKK)	Physical Pharmacy - A (MS + MKG) Biochemistry - B (PK + PKA)
	VII	IV	Medicinal Chem. (BS)	Pharmacology - I (SKK)	Pharmacognosy (DP)	Pharmacology (SKR + RG)
Thursday	I	I	Prof. Comm.	Inorganic (MS)	A.P.P. (AT)	Analysis - A (LPS + OPE) A.P.P. - B (SAB)
	II	II	Unit Operation (PK)	Pharmacognosy (BY)	Community Ph. (DR)	Community ph. - B (DR + ND) Pharmacognosy - A (BY + AAB)
	V	III	Pharma Tech. (MKG)	Medicinal Chem. (AT)	Library	Biochem. - A (PK + PKA) Physical Pharmacy - B (BS + KKS)
	VII	IV	Biopharmaceutics (MKG)	P. Analysis (OPE)	Library	Bio-Pharmaceutics (MKG + SKR)
Friday	I	I	Prof. Comm.	Inorganic (MS)	A.P.P. (AT)	Maths - Maths - Library
	II	II	Unit Operation (PK)	Pharmacognosy (BY)	Community Ph. (DR)	A.P.P. - B (SAB) - Library
	V	III	Pharma Tech. (MKG)	Medicinal Chem. (AT)	Library	Pharma. Tech. - A (MS + MKG) Med. Chem. - B (AT + LPS)
	VII	IV	Biopharmaceutics (MKG)	P. Analysis (OPE)	Library	Med. Chem. - P (MKG) - Library
Saturday	I	I	Prof. Comm.	Inorganic (MS)	A.P.P. (AT)	Prof. Comm. - Maths - Library
	II	II	Unit Operation (PK)	Pharmacognosy (BY)	Community Ph. (DR)	Organic - Pharmacog. - Community
	V	III	Pharma Tech. (MKG)	Medicinal Chem. (AT)	Library	Bio- Chem. - Med. Chem. - Biochem. P
	VII	IV	Biopharmaceutics (MKG)	P. Analysis (OPE)	Library	Med. Chem. - P (MKG) - Maths

12:00 PM to 1:30 PM
LUNCH

➤ Teaching Load of each Faculty

S.NO.	Name	Load
1.	Dr. Deepak Prakash	04
2.	Mr. Om Prakash Tiwari	13
3.	Mr. Santosh Kumar Rai	19
4.	Mr. Manish Kumar Gupta	19
5.	Mr. Pradeep Kumar	20
6.	Mr. Adesh A. Bawane	18
7.	Mr. Pradeep K. Agrawal	09
8.	Mr. Brijesh Singh	16
9.	Mr. A. K Tiwari	22
10	Mrs. Rekha Gupta	13
11	Mr. Amrish K. Shrivastava	15
12	Mr. Brijyog	16
13	Miss. Nidhi Singh	16
14	Mr. N. Das	16
15	Mr. Laliteshwar Pratap Singh	19
16	Mr. Dhananjay Rai	17

➤ Internal Continuous Evaluation System and place

: **Through Class tests (sessionals)**

➤ Students' assessment of Faculty, System in place.

: **Under Process**

For each Post Graduate programme give the following:

: **Not Applicable**

Special Purpose

: **Not Applicable**