BP 701 T. INSTRUMENTAL METHODS OFANALYSIS (Theory)

Credit Points	04	Total Teaching Hours	45
No. of lectures per week	03	No. of tutorials per week	01

Scope:

This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing

Objectives:

Upon completion of the course student shall be able

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. Understand the chromatographic separation and analysis of drugs.
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments

Course Content:

Unit I	**UV Visible spectroscopy** electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations. Instrumentation- Sources of radiation, wavelength selectors, sample cells, detectors Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode. Applications- Spectrophotometric titrations, Single component and multi component analysis **Fluorimetry** Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications	10 hours
Unit II	**IR spectroscopy** Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations Instrumentation- Sources of radiation, wavelength selectors, detectors- Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications **Flame Photometry**-Principle, interferences, instrumentation and applications **Atomic absorption spectroscopy**- Principle, interferences, instrumentation and applications **Nepheloturbidometry**- Principle, instrumentation and applications	**10 hours**
Unit III	Introduction to chromatography **Adsorption and partition column chromatography**-Methodology,	**10 hours**

	advantages, disadvantages and applications. **Thin layer chromatography**- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications. **Paper chromatography**-Introduction, methodology, development techniques, advantages, disadvantages and applications **Electrophoresis**– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications	
Unit IV	**Gas chromatography**- Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications **High performance liquid chromatography (HPLC)-**Introduction, theory, instrumentation, advantages and applications.	**08 hours**
Unit V	**Ion exchange chromatography**- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications Gel chromatography- Introduction, theory, instrumentation and applications **Affinity chromatography**- Introduction, theory, instrumentation and applications	**07 hours**

Suggested Readings: (Latest Editions)

1. Instrumental Methods of Chemical Analysis by B.K Sharma

2. Organic spectroscopy by Y.R Sharma

3. Text book of Pharmaceutical Analysis by Kenneth A. Connors

4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel

5. Practical Pharmaceutical Chemistry by A. H. Beckettand J. B.Stenlake

6. Organic Chemistry byI. L. Finar

7. Organic spectroscopy by William Kemp

8. Quantitative Analysis of Drugs by D. C. Garrett

9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P.D. Sethi

10. Spectrophotometric identification of Organic Compounds by Silverstein

Course Description

Name of the Course: INSTRUMENTAL METHODS OF ANALYSIS	
Course Code: BP701T	Semester: VII B.Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP701T1	Understand the interaction of matter with electromagnetic radiations and its quantitative and qualitative applications in drug analysis
BP701T2	To understand electrophoresis and different chromatographic techniques for separation and analysis of drug
BP701T3	able to understand the different spectroscopic techniques with their instrumentation and application
BP701T4	Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP701T1	3		3	3	-	-	-	-	-	-	2
BP701T2	3	1	3	3	-	-	-	-	-	-	2
BP701T3	3		2	3	-	-	-	-	-	-	2
BP701T4	3	1	1	3	-	-	-	-	-	-	2

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high

BP705P. INSTRUMENTAL METHOD OF ANALYSIS (Practical)

Credit Points	02	Total Teaching Hours	04/week
No. of practicals per week	04	No. of tutorials per week	00

Scope:

- This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs.
- This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique.
- This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives:

Upon completion of the course student shall be able to:

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis

2. Understand the chromatographic separation and analysis of drugs.

3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Course Content:

Sr. No.	Course Contents
1.	Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
2.	Estimation of dextrose by colorimetry
3.	Estimation of sulfanilamide by colorimetry
4.	Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
5.	Assay of paracetamol by UV Spectrophotometry
6.	Estimation of quinine sulfate by fluorimetry
7.	Study of quenching of fluorescence

8.	Determination of sodium by flame photometry
9.	Determination of potassium by flame photometry
10.	Determination of chlorides and sulphates by nephelo turbidometry
11.	Separation of amino acids by paper chromatograph
12.	Separation of sugars by thin layer chromatography
13.	Separation of plant pigments by column chromatography
14.	Demonstration experiment on HPLC
15.	Demonstration experiment on Gas Chromatography

Course Description

Name of the Course: Instrumental methods of Analysis (Practical)	
Course Code: BP705P	**Semester: VII B. Pharm.**
Teaching hours: 04 Hours per week	**Maximum marks**: 50 Marks
Examination scheme: Internal Assessment (I.A.): 15 Marks End Semester Examination (E.S.E.): 35 Marks **Total**: 50 Marks	**Examination duration**: 04 Hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP705 P1	Students shall able to 1) Perform, analyze and determine and report the content of drug by using colorimetry and UV Visible spectroscopy,
BP705 P2	2) Separate the mixture component by applying separation principle on chromatographic technique.
BP705 P3	3) Determine the concentration of metal ion by Flame Photometry
BP705 P4	4) Elaborate the Demonstration experiment on HPLC' Gas Chromatography.

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP305P1	3	-	2	3	-	1	-	-	-	1	3
BP305P2	3	-	2	3	-	1	-	-	-	1	3
BP305P3	3	-	2	3	-	1	-	-	-	1	3
BP305P4	3	-	2	3	-	1	-	-	-	1	3

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high

BP 702 T. INDUSTRIAL Pharmacy II (Theory)

Credit Points	**04**	**Total Teaching Hours**	**45**
No. of lectures per week	**03**	**No. of tutorials per week**	**01**

Scope:

This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market

Objectives:

Upon completion of the course student shall be able to:

- Know the process of pilot plant and scale up of pharmaceutical dosage forms
- Understand the process of technology transfer from lab scale to commercial batch
- Know different laws and acts that regulate pharmaceutical industry.
- Understand the approval process and regulatory requirement for drug products

Course Content:

Unit I	**Pilot plant scale up techniques:** General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology	**10 hours**
Unit II	**Technology Development and transfer:** WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues	**10 hours**

Unit III	**Regulatory Affairs:** Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals **Regulatory requirements for drug approval:** Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.	**10 hours**
Unit IV	**Quality management systems:** Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP	**08 hours**
Unit V	**Indian Regulatory Requirements:** Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.	**07 hours**

Recommended Books: (Latest Editions)

1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http, //en.wikipedia.org/wiki/Regulatory_ Affairs.
2. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php
3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
4. Regulatory Affairs brought by learning plus, inc. available at http.//www.cgmp.com/ra.htm.

Course Description

Name of the Course: Industrial Pharmacy II	
Course Code: BP702T	Semester: VII B. Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP702T1	Explain the pilot plant scale up techniques, general consideration of solid, liquid, semisolid dosage form and SUPAC guidelines.
BP702T2	Outline the various aspect of technology transfer involved from R & D to production also technology transfer agencies and their documentation.
BP702T3	Analyse and study of various responsibilities and regulatory requirements for drug approval and quality management systems in pharmacy field.
BP702T4	Determine the requirements and approval procedures for new drugs by Indian regulatory.

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP702T1	3	3	2	1	1	1	2	2	2	1	3
BP702T2	3	2	2	1	1	1	2	2	2	1	3
BP702T3	3	1	1	1	1	1	2	1	2	1	3
BP702T4	3	2	2	1	1	1	2	2	2	1	3

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high

BP 703 T. Pharmacy Practice (Theory)

Credit Points	04	Total Teaching Hours	45
No. of lectures per week	03	No. of tutorials per week	01

Scope:

In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

Objectives:

Upon completion of the course student shall be able to:

- Know various drug distribution methods in a hospital
- Appreciate the pharmacy stores management and inventory control
- Monitor drug therapy of patient through medication chart review and clinical review
- Obtain medication history interview and counsel the patients
- Identify drug related problems 6. Detect and assess adverse drug reactions
- Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
- Know pharmaceutical care services
- Do patient counseling in community pharmacy.
- Appreciate the concept of rational drug therapy

Course Content:

Unit I	a) Hospital and its organization Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions. b) Hospital pharmacy and its organization Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists. c) Adverse drug reaction Classifications – Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction-	**10 hours**

	beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management. d) Community Pharmacy Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store	
Unit II	a) Drug distribution system in a hospital Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs. b) Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary. c) Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring. d) Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence. e) Patient medication history interview Need for the patient medication history interview, medication interview forms. f) Community pharmacy management Financial, materials, staff, and infrastructure requirements.	**10 hours**
Unit III	a) Pharmacy and therapeutic committee Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation. b) information services Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information. c) counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist. d) Education and training program in the hospital Role of pharmacist in the education and training program,	**10 hours**

	Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education. e) Prescribed medication order and communication skills Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients	
Unit IV	a) preparation and implementation Budget preparation and implementation b) Clinical Pharmacy Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and pharmaceutical care. Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern. c) Over the counter (OTC) sales Introduction and sale of over the counter, and Rational use of common over the counter medications.	**08 hours**
Unit V	a) Drug store management and inventory control Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure b) Investigational use of drugs c) Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee. d) Interpretation of Clinical Laboratory Tests Blood chemistry, hematology, and urinalysis	**07 hours**

Recommended Books: (Latest Editions)

1. Merchant S.H. and Dr. J.S.Quadry. A textbook of hospital pharmacy, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice- essential concepts and skills, 1 st ed. Chennai: Orient Longman Private Limited; 2004.
3. William E. Hassan. Hospital pharmacy, 5th ed. Philadelphia: Lea & Febiger; 1986.
4. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career

Publications; 2008.
5. Scott LT. Basic skills in interpreting laboratory data, 4thed. American Society of Health System Pharmacists Inc; 2009.
6. Parmar N.S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.

- **Journals:**

1. Therapeutic drug monitoring. ISSN: 0163-4356.
2. Journal of pharmacy practice. ISSN: 0974-8326.
3. American journal of health system pharmacy. ISSN: 1535-2900 (online).
4. Pharmacy times (Monthly magazine)

Course Description

Name of the Course: . Pharmacy Practice	
Course Code: BP703T	Semester: VII B.Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP703T1	To detect and assess adverse drug reactions and drug related problems.
BP703T2	To understand the concept of Rational drug therapy.
BP703T3	To understand the pharmacy stores management and inventory control.
BP703T4	To know various drug distribution methods in a hospital

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP703T1	3	-	-	-	-	-	-	-	2	-	2
BP703T2	2	-	2	2	-	-	-	-	2	-	2
BP703T3	3	-	3	-	-	2	-	-	-	-	3
BP703T4	3	-	-	-	-	-	-	-	-	-	2

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high

BP 704 T. NOVEL DRUG DELIVERY SYSTEM (Theory)

Credit Points	**04**	**Total Teaching Hours**	**45**
No. of lectures per week	**03**	**No. of tutorials per week**	**01**

Scope:

This subject is designed to impart basic knowledge on the area of Novel Drug Delivery Systems.

Objectives:

Upon completion of the course student shall be able

- To understand various approaches for development of Novel Drug Delivery Systems.
- To understand the criteria for selection of drugs and polymers for the development of Novel Drug Delivery Systems, their formulation and evaluation.

Course Content:

Unit I	**Controlled drug delivery systems**: Introduction, terminology/definitions and rationale,advantages, disadvantages, selection of drug candidates.Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations **Polymers:** Introduction, classification, properties, advantages and application ofpolymers in formulation of controlled release drug delivery systems.	**10 hours**
Unit II	**Microencapsulation:** Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications **Mucosal Drug Delivery system:** Introduction, Principles of bioadhesion /mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems **Implantable Drug Delivery Systems:** Introduction, advantages and disadvantages, concept of implants and osmotic pump	**10 hours**
Unit III	**Transdermal Drug Delivery Systems:** Introduction, Permeation through skin, factorsaffecting permeation, permeation enhancers, basic components of TDDS, formulation approaches **Gastroretentive drug delivery systems:** Introduction, advantages, disadvantages,approaches for GRDDS – Floating, high density	**10 hours**

	systems, inflatable and gastroadhesive systems and their applications **Nasopulmonary drug delivery system:** Introduction to Nasal and Pulmonary routes ofdrug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers	
Unit IV	**Targeted drug Delivery:** Concepts and approaches advantages and disadvantages,introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications	**08 hours**
Unit V	**Ocular Drug Delivery Systems:** Introduction, intra ocular barriers and methods toovercome –Preliminary study, ocular formulations and ocuserts **Intrauterine and Intravaginal Drug Delivery Systems:** Introduction, advantages and disadvantages,development of intra uterine devices (IUDs) and applications.	**07 hours**

Suggested Readings: (Latest Editions)

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of controlled delivery, Editor- Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York! Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.
6. Howard C. Ansel, Nicholas G. Popovich, Loyd V. Allen Pharmaceutical Dosage Forms and Drug Delivery Systems.

Journals

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian Drugs (IDMA)
3. Journal of Controlled Release (Elsevier Sciences)
4. Drug Development and Industrial Pharmacy (Marcel & Decker)
5. International Journal of Pharmaceutics (Elsevier Sciences)

Course Description

Name of the Course: Novel Drug Delivery System	
Course Code: BP704T	Semester: VI B.Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP704T1	Select a suitable drug delivery system on the basis of physicochemical and biological properties of drugs
BP704T2	Design, formulate and evaluate a drug delivery system using suitable approach and techniques
BP704T3	Describe the challenges and suggest the alternatives for delivery of drugs
BP704T4	Select suitable polymers for the development of Novel Drug Delivery Systems.

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP704T1	3	-	2	-	-	-	-	-	-	-	2
BP704T2	3	2	-	-	-	-	-	-	-	-	2
BP704T3	3	-	3	-	-	-	-	-	-	-	2
BP704T4	3	-	2	-	-	-	-	-	-	-	2

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high