

#### BPharm

			Di nann						
Title of the Course	Fine art and M	Fine art and Music-I *							
Course Code	BP-113[T]	3P-113[T]							
			Part A						
Year	4.4	0	4-1	Credits	L	Т	Р	С	
rear	1st	st Semester 1st		Credits	1	0	0	1	
Course Type	Theory only								
Course Category	Generic Election	ve							
Pre-Requisite/s				Co-Requisite/s					
Course Outcomes & Bloom's Level		CO1- Drawing exercises are to learn accurate observation and skills of graphic presentation in free hand drawing exercises from objects and nature to study proportion, volume and visual perspective, suggestion of solidity by line, mass, value and texture; emphasis on variety of visual experiences(BL3-Apply)							
	Skill Developm Entrepreneurs								

Coures Elements	Entrepreneurship ✓ Employability ✓ Professsonal Ethics × Gender × Human Values × Environment ×	SDG (Goals)	SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)
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	Part B		
Modules	Contents	Pedagogy	Hours
1	)Study of proportion, line, colour, form, tone, texture and graphic representation	Lecture based learning	10
2	Nature Drawing: study of various natural forms.	class out of classroom	08
3	Drawing from various man-made objects.	class out of classroom	07
4	d)Drawing from memory- to develop the sense of observation and the capacity to retain and recall images and their co-ordination.	active learning	05

	Part C				
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours	
Nature drawings:1 Drawing from man-made object:1 Drawing from Memory-1 Free-hand sketching: 5	No. of assignments: 2	PBL	BL3-Apply	10	

	Part D(Marks Distribution)							
	Theory							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation			
			Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation			
0	0	0	0	0	0			

	Part E					
Books	Color and Light: A Guide for the Realist Painter (Volume 2) (James Gurney Art)					
Articles	https://shepherd.com/best-books/art-references-for-drawing-the-human-figure					
References Books	Let's Draw! Illustrating With Copic Book by Ran; KAOPPE; Kirishima Mutsuki (shelved 1 time as drawing-reference)					
MOOC Courses	https://www.nifafinearts.com/course.php?id=29					
Videos	https://www.youtube.com/results?search_query=drawing					

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Part C



#### BPharm

Title of the Course	Computer Applica	ations in Pharmacy *						
Course Code	BP205T							
			Part A					
Year	1st	Semester	2nd	Credits	L	т	Р	с
Tear	151	Semester	2110	Creats	3	0	0	3
Course Type	Theory only		I					1
Course Category	Discipline Core							
Pre-Requisite/s				Co-Requisite/s				
Course Outcomes & Bloom's Level	CO2- To illustrate CO3- Application CO4- To evaluate pharmacy etc.,(E	e the applications of computers in pharma	ers. ( <b>BL2-Understand)</b> L, CSS, programming languages, Wel cy such as drug information services, p	armacy.(BL2-Understand) o servers and pharmacy drug database. (BL3- pharmacokinetics, mathematical model in drug		hospital	and clinic	al
Coures Elements	Skill Developmer Entrepreneurship Employability ✓ Professsonal Eth Gender X Human Values X Environment X	p√ nics ×	SDG (Goals)	SDG4(Quality education) SDG5(Gender equality)				

		Part B	
Modules	Contents	Pedagogy	Hours
UNIT 1	Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division Concept of Information Systems and Software: Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 2	Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 3	Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring. Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 4	Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 5	Computers as data analysis in Preclinical development: Chromatographic dada analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06

	Par	t C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	CADD	Simulation	BL2-Understand	3

		Part	D(Marks Distribution)						
	Тһеоту								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
75	38	50	25	25	13				
		·	Practical	·					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
	0								

	Part E		
Books	1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330. 2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA		
Articles	https://copbela.org/downloads/2020/SELF%20LEARNING%20MATERIAL%20BPHARMA/semester%202/BP205T/MODULE%2003.PDF		
References Books 1. Bioinformatics (Concept, Skills and Applications) – S.C. Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA) 2. Microsoft office Access - 2003, Application Development Using VBA, SQLServer, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New 110002			
MOOC Courses https://www.edx.org/certificates/professional-certificate/harvardx-data-science?index=product&results_level=first-level- results&term=COMPUTER+PHARMACY%22&objectID=program-3c32e3e0-b6fe-4ee4-bd4f. 210c6339e074&campaign=Data++Science&source=edx&product_category=professional-certificate&placement_url=https%3A%2F%2Fwww.edx.org%2Fsearc			
Videos	https://www.youtube.com/watch?v=vRDswGc2wyM		

							Cours	e Articulatio	on Matrix						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	1	-	1	-	-	3	2	1	1	1
CO2	-	1	-	-	1	1	-	1	-	-	2	2	1	1	1
CO3	-	1	-	-	1	1	-	1	-	-	2	1	1	1	1
CO4	-	1	-	1	1	-	-	-	-	-	3	1	-	-	-
CO5	-	-	-	1	-	1	-	-	-	-	1	1	-	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Computer Applic													
Course Code	BP210P													
Course Code     BP210P       Part A       Year     1st     Semester       1st     Semester       Course Type     Lab only       Course Category     Discipline Core       Pre-Requisite/s     Co-Requisite/s       Course Outcomes & Bloom's Level     Col - To demonstrate and make use of MS Office, MS Word, MS Excel, MS Access and MS Power point. (BL1-Remember) CO2- To understand the paradigms of program languages and be exposed to at least one language from each model, C and SQL.(BL2-Understand) CO3- To summarize the report and printing the report from patient database(BL2-Understand) CO3- To summarize the report and printing the report from patient database(BL3-Apply)														
Veer	1.01	Semester	Ond	Cradita	L	т	Ρ	С						
Tear	ISL	Credits	0	0	1	1								
Course Type	Lab only			-										
Course Category	Discipline Core													
Pre-Requisite/s				Co-Requisite/s										
	CO2- To underst CO3- To summa CO4- To design	tand the paradigms of program languages rrize the report and printing the report from	and be exposed to at least one language patient database(BL2-Understand) ackage to gather information about a p	ge from each model, C and SQL.(BL2-Under	stand)									
Coures Elements	Skill Developme Entrepreneurshi Employability ✓ Professsonal Ett Gender X Human Values > Environment X	p ✓ hics X	SDG (Goals)	SDG4(Quality education)										

# Part B

Contents

Hours

Pedagogy

Modules

	Pa	tC		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Design a questionnaire using a word processing package to gather information about a particular disease	Experiments	BL2-Understand	4
2	Create a HTML web page to show personal information.	Experiments	BL2-Understand	4
3	Retrieve the information of a drug and its adverse effects using online tools	Experiments	BL2-Understand	4
4	Creating mailing labels Using Label Wizard, generating label in MS WORD	Experiments	BL2-Understand	4
5	Create a database in MS Access to store the patient information with the required fields Using access	Experiments	BL6-Create	4
6	Design a form in MS Access to view, add, delete and modify the patient record in the database	Experiments	BL2-Understand	4
7	Generating report and printing the report from patient database	Experiments	BL3-Apply	4
8	Creating invoice table using – MS Access	Experiments	BL3-Apply	4

#### Part D(Marks Distribution)

			Theory						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
			Practical						
Total Marks         Minimum Passing Marks         External Evaluation         Min. External Evaluation         Internal Evaluation         Min. Internal Evaluation									
25	13	15	8	10	5				

	Fail E
Books	1. Computer Application in Pharmacy - William E.Fassett -Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
Articles	NA
References Books	1. Computer Application in Pharmaceutical Research and Development -Sean Ekins - Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
MOOC Courses	NA
Videos	NA

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	-	-	-	-	1	2	-	1	1	1
CO2	-	1	-	-	1	-	-	-	-	-	1	-	1	1	1
CO3	-	1	-	-	2	-	-	-	-	-	1	-	1	1	1
CO4	-	1	-	-	1	1	-	-	-	-	2	-	1	2	-
CO5	-	1	-	-	2	-	-	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Pharmaceutic	al Engineering											
Course Code	BP304T												
	Part A												
Yeer								С					
Tear	210	Semester	3rd Credits		3	1	0	4					
Course Type	Theory only												
Course Category	Discipline Cor	re											
Pre-Requisite/s				Co-Requisite/s									
Course Outcomes & Bloom's Level	CO2- To unde CO3- To perfo CO4- To carry	out various test to prevent e	techniques(BL2-Understan ed in pharmaceutical manufa environmental pollution(BL3-	d) acturing process(BL3-Apply)	derstand)								
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics × Gender × Human Values × Environment ×		SDG (Goals)	SDG4(Quality education) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure SDG12(Responsible consuption and produc									

		Part B	
Modules	Contents	Pedagogy	Hours
UNIT-I	Flow of fluids: Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer. Size Reduction: Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill. Size Separation: Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Heat Transfer: Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers. Evaporation: Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator. Distillation: Basic Principles and methodology of simple distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Drying: Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve, principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer. Mixing: Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Peer tutorial	10
UNIT 4	Filtration: Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter. Centrifugation: Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Peer tutorial	08
UNIT 5	Materials of pharmaceutical plant construction, Corrosion and its prevention: Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non-metals, basic of material handling systems.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

	Part	C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To understand the basics principle of distillation	Experiments	BL3-Apply	2

		Part	D(Marks Distribution)									
Theory												
Total Marks         Minimum Passing Marks         External Evaluation         Min. External Evaluation         Internal Evaluation         Min. Internal Evaluation												
100	50	75	38	25	13							
		·	Practical	·								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							

	Part E
Books	1. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition. 2. Remington practice of pharmacy-Martin, Latest edition. 3. Theory and practice of industrial pharmacy by Lachmann., Latest edition
Articles	NA
References Books	1. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition. 2. Unit operation of chemical engineering – Mcabe Smith, Latest edition 3. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.
MOOC Courses	https://nptel.ac.in/
Videos	https://www.youtube.com/watch?v=Ey9M1neDgx0&list=PLNiSYvRcckSxtpOvMxwzQlnhwmXt8tzpU

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	2	-	-	-	-	-	3	-	2	-	1
CO2	2	2	1	-	-	2	-	-	-	-	3	-	2	-	2
CO3	2	3	-	-	1	2	-	-	-	-	2	-	2	-	1
CO4	3	2	2	-	-	2	-	-	-	-	2	-	1	1	1
CO5	2	1	-	1	1	2	-	-	-	-	1	-	1	-	1
CO6	-	-	-		-	-	-	-	-	-	-	-	-	-	-



#### BPharm

	1											
Title of the Course	Pharmaceutica	I Organic Chemistry II										
Course Code	BP305P											
			Part A									
Year	2nd	0	3rd	0	L	т	Р	С				
rear	∠na	Semester	3rd	Credits	0	0	4	4				
Course Type	Lab only	ab only										
Course Category	Discipline Core	Discipline Core										
Pre-Requisite/s		Co-Requisite/s										
Course Outcomes & Bloom's Level	CO2- To remer CO3- To identif CO4- To analyz	mber and recall the different lab fy the purity of fats and oils by a ze named reactions like perkin a	oratory techniques used in pha cid value, saponification value and claisen schmidt reactions b	n techniques.( <b>BL2-Understand)</b> rmaceutical chemistry.( <b>BL1-Remember</b> ) and iodine value and perform various reactior y using carbonyl compounds( <b>BL4-Analyze</b> ) aactions like bromination, nitration in monosub								
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics × Gender × Human Values × Environment ×			SDG4(Quality education) SDG8(Decent work and economic growth)								

Part B

Pedagogy

Hours

Contents

Modules

		Indicative-ABCA/PBL/		
Modules	Title	Experiments/Field work/ Internships	Bloom's Level	Hours
1	I Experiments involving laboratory techniques • Recrystallization • Steam distillation	Experiments	BL3-Apply	8
2	II Determination of following oil values (including standardization of reagents) • Acid value • Saponification value • Iodine value	Experiments	BL5-Evaluate	8
3	III Preparation of compounds • Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.	Experiments	BL3-Apply	8
4	2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/ • Acetanilide by halogenation (Bromination) reaction. • 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction	Experiments	BL3-Apply	8
5	Benzoic acid from Benzyl chloride by oxidation reaction. • Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction. • 1-Phenyl azo-2-napthol from Aniline by diazotization and coupling reactions.	Experiments	BL3-Apply	8
6	Benzil from Benzoin by oxidation reaction. • Dibenzal acetone from Benzaldehyde by Claison Schmidt reaction • Cinnammic acid from Benzaldehyde by Perkin reaction • P- lodo benzoic acid from P-amino benzoic acid	Experiments	BL4-Analyze	

Part D(Marks Distribution)										
	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
			Practical							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
50	25	35	18	15	8					

	Part E								
Books	1. Practical Organic Chemistry by Mann and Saunders. 2. Vogel's text book of Practical Organic Chemistry								
Articles	NA								
References Books	1. Advanced Practical organic chemistry by N.K.Vishnoi. 2. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz								
MOOC Courses	NA								
Videos	You tube, simulation								

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	1	-	-	-	-	-	3	-	1	-	3
CO2	2	3	-	2	1	-	-	-	-	-	2	-	2	-	3
CO3	3	1	-	-	2	-	-	2	-	-	2	-	1	1	1
CO4	2	2	-	1	-	-	-	-	-	-	3	-	1	1	1
CO5	3	1	-	1	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Pharmaceutical Er	ngineering								
Course Code	BP308P									
			Part A							
Neer	0	0	0-4	Orre d'Ite	L	т	Р	С		
Year	2nd	Semester	3rd	Credits	0	0	4	4		
Course Type	Lab only									
Course Category	Discipline Core									
Pre-Requisite/s			Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To demonstr freeze dryer.(BL3- CO3- To experime CO4- To determine		vorking and applications of pharmaceu evaporation and infer the same (BL3-/ exchanger and calculate the efficiency	of steam distillation(BL4-Analyze)	∙y mixer,	fluidized I	oed dryer	and		
Coures Elements	Skill Development Entrepreneurship Employability ✓ Professsonal Ethic Gender X Human Values X Environment X	$\checkmark$	SDG (Goals)	SDG4(Quality education)						

Part B

Pedagogy

Hours

Contents

Modules

	Par	t C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I. Determination of radiation constant of brass, iron, unpainted and painted glass	Experiments	BL2-Understand	6
2	II. Steam distillation - To calculate the efficiency of steam distillation	Experiments	BL3-Apply	6
3	III. To determine the overall heat transfer coefficient by heat exchanger. IV. Construction of drying curves (for calcium carbonate and starch).	Experiments	BL2-Understand	6
4	V. Determination of moisture content and loss on drying. VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method	Experiments	BL3-Apply	6
5	VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier. VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots	Experiments	BL3-Apply	6
6	IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill. X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment	Experiments	BL3-Apply	6
7	XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity XII. To study the effect of time on the Rate of Crystallization	Experiments	BL3-Apply	6
8	XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.	Experiments	BL3-Apply	6

Part D(Marks Distr	ibution)
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	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
	Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
50	25	35	18	15	8					

Books	1. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition. 2. Remington practice of pharmacy-Martin, Latest edition.
Articles	NA
References Books	1. Theory and practice of industrial pharmacy by Lachmann., Latest edition. 2. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition
MOOC Courses	NA
Videos	NA

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	1	1	-	-	-	-	-	3	-	2	-	2
CO2	2	3	2	2	2	-	-	-	-	-	3	-	2	-	2
CO3	3	2	1	1	1	-	-	-	-	-	2	-	1	-	3
CO4	2	2	1	1	2	-	-	-	-	-	2	-	3	1	2
CO5	3	1	1	-	1	-	-	-	-	-	1	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Medicinal Che	mistry I										
Course Code	BP402T											
Part A												
Year	0		4th	Credits	L	т	Р	С				
Tear	2nd	Semester	401	Credits	3	1	0	4				
Course Type	Theory only	eory only										
Course Category	Discipline Cor	Discipline Core										
Pre-Requisite/s				Co-Requisite/s								
Course Outcomes & Bloom's Level	CO2- To expla CO3- To ident CO4- To cate	tify the structural requirement	perties, steric aspects of drug ts of drugs to elicit biological eir mechanism of action and	s and their metabolic pathways(BL2-Underst response(BL4-Analyze) clinical uses(BL2-Understand)	and)							
Coures Elements	Skill Developr Entrepreneurs Employability Professsonal Gender X Human Values Environment	ship ✔ ✔ Ethics X s X	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) sDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production)								

		Part B	
Modules	Contents	Pedagogy	Hours
UNIT-I	Introduction to Medicinal Chemistry History and development of medicinal chemistry Physicochemical properties in relation to biological action Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism. Drug metabolism Drug metabolism principles. Phase I and Phase II. Factors affecting drug metabolism including stereo chemical aspects	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-II	Drugs acting on Autonomic Nervous System Adrenergic Neurotransmitters: Biosynthesis and catabolism of catecholamine. Adrenergic receptors (Alpha & Beta) and their distribution. Sympathomimetic agents: SAR of Sympathomimetic agents Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine, Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline. • Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine. • Indirect acting agents: Hydroxyamphetamine, Metaraminol Adrenergic Antagonists: Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide. Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Methysanolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-III	Cholinergic neurotransmitters: Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (Muscarinic & Nicotinic) and their distribution. Parasympathomimetic agents: SAR of Parasympathomimetic agents Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine. Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Paratine, Malathion. Cholinesterase reactivator: Pralidoxime chloride, antorine tydrochloride, and the choline, Solanaceous alkaloids and analogues: Atropine sulphate, Hyotoxyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*, Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate, Mahartine bromide, Prozyanthesulphate, Bentropine hydrochloride, Orphenatrine citrate, Biperidine hydrochloride*, Tridihexethyl chloride, Isopropazine hydrochloride, Stropine sulphate, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropazine hydrochloride, Isopropazine hydrochloride*, Isopropazine hydrochloride, Isopropazine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropazine hydrochloride*, Tridihexethyl chloride, Isopropazine hydrochloride*, Tridihexethyl chloride, Isopropazine hydrochloride*, Ethopropazine	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-IV	Drugs acting on Central Nervous System A. Sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem Barbiturtes: SAR of barbiturates, Barbital*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital Miscelleneous: Amides & imides: Glutethmide. Alcohol & their carbamate derivatives: Meprobomate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde. B. Antipsychotics Phenothiazeines: SAR of Phenothiazeines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Trilupromazine, Thioridazine hydrochloride, Ring Analogues of Phenothiazeines: Chlorprothivene, Thiothivene, Loxapine succinate, Clozapine. Fluro buterophenones: Haloperidol, Droperidol, Risperidone. Beta amino ketones: Molindone hydrochloride. Brozamides: Sulpieride. C. Anticorvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action Barbiturates: Phenobarbitone, Ethosinis, Thendharbine, Phanothiase Ethotoin Oxazolidine diones. Trimethadione, Paramethadione Succinimides: Phensuximide, Methsuximide, Ethosuximide* Urea and monoacylureas: Phenacemide, Carbamazepine* Benzodiazepines: Clonazepam Miscellaneous: Primidone, Valproic acid, Gabapentin, Felbamate	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-V	Drugs acting on Central Nervous System General anesthetics: Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane. Ultra short acting barbitutrates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium. Dissociative anesthetics: Ketamine hydrochloride.*	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part	С

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Receptor binding of drug simulation	Simulation	BL2-Understand	10

Theory										
Total Marks	al Marks Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	50	75	38	25	13					
	Practical									
Total Marks	Total Marks Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					

# Part D(Marks Distribution)

Part E								
Books								
Articles	NA							
References Books	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia 4. Indian Pharmacopoeia							
MOOC Courses	https://nptel.ac.in/							
Videos	You tube							

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	-	1	-	-	-	2	-	3	-	2	-	3
CO2	2	2	2	-	2	-	-	-	1	-	2	-	2	-	2
CO3	3	1	1	-	1	-	-	-	1	-	2	-	3	-	3
CO4	3	-	-	-	1	-	-	-	1	-	2	-	2	-	2
CO5	3	-	-	-	2	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Pharmacognos	armacognosy and Phytochemistry II									
Course Code	BP504T	- 504T									
	Part A										
Year	3rd	Semester	5th	Credits	L	т	Р	С			
Tear	310	Semester	501	Credits	3	1	0	4			
Course Type	Theory only										
Course Category	Discipline Core										
Pre-Requisite/s				Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To the ph CO3- To demor Understand) CO4- To plan th	nstrate the different types and steps ne industrial production, estimation a	etabolites like alkaloids, glycoside involved in isolation, identification nd utilization of Phytoconstituents.	s, tannins, volatile oils etc, ( <b>BL2-Understand)</b> and analysis of Phytoconstituents like terpeno	ids, glycosi	des, alkaloid	s and resins.	BL2-			
Skill Development ✓         Entrepreneurship ✓         Employability ✓         Professsonal Ethics ×         Gender ×         Human Values ×         Environment ✓			SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)							

# Part B

Modules	Contents	Pedagogy	Hours
1	Metabolic pathways in higher plants and their determination a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway. b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
2	General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites: Alkaloids: Vinca, Rauwolfia, Belladonna, Opium, Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis Volatile olis: Mentha, Clove, Cinnamon, Fennel, Coriander, Tannins: Catechu, Pterocarpus Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony Glycosides: Senna, Aloes, Bitter Almond Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	14
3	Isolation, Identification and Analysis of Phytoconstituents a) Terpenoids: Menthol, Citral, Artemisin b) Glycosides: Glycyrhetinic acid & Rutin c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine d) Resins: Podophyllotoxin, Curcumin	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	6
4	Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
5	Basics of Phytochemistry Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8

	Part C										
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours							
1	Extraction method of Given drugs	PBL	BL2-Understand	8							

Part D(Marks Distribution)										
	Theory									
Total Marks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation										
100	50	75	38	25	13					
			Practical							
Total Marks	Minimum Passing Marks	External Evaluation Min. External Evaluation		Internal Evaluation	Min. Internal Evaluation					

Part E									
Books	1. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi. 2 Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.								
Articles	https://www.phytojournal.com/								
References Books	1. W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009. 2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers& Distribution, New Delhi.								
MOOC Courses	https://nptel.ac.in/								
Videos	https://www.youtube.com/watch?v=v1vqV7YHKWg&list=PLtEqsPSBZIXtxeljdkyrwrPiMHidH07G6								

#### Course Articulation Matrix COs PO1 PO2 PO3 PO4 PO5 P06 P07 PO9 PO10 PO11 PO12 PSO1 PSO2 PSO3 PO8 CO1 2 1 3 2 2 3 3 CO2 2 2 3 2 1 2 ---CO3 3 2 2 1 1 1 --\_ -\_ CO4 2 1 2 1 1 1 -------1 CO5 2 1 -----------CO6 ------------



#### BPharm

Title of the Course	Industrial Phar	ndustrial Pharmacy I										
Course Code	BP506P											
	Part A											
Year	01	Semester	5th	Credits	L	Т	Р	С				
Year	3rd	Semester	อเท	Credits	0	0	2	2				
Course Type	Lab only											
Course Category	Discipline Cor	e										
Pre-Requisite/s				Co-Requisite/s	Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To expla CO3- To desig CO4- To illust	oret the pre-formulation studies of ain the preparation, evaluation ar gn parenteral and ophthalmic pro rate the formulation and evaluation ate glass containers as per phar	nd coating of tablets.(BL2-Und iducts.(BL6-Create) on of capsules.(BL5-Evaluate)	)								
Coures Elements	oures Elements Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics × Gender × Human Values × Environment ×			SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)								

Part B

Mod	ules	Contents		He		ours	
		Par	C				
Modules		Title	Indic: Experi	Bloom's Level		Hours	
1	1. Preformulation stud evaluation of Paraceta	ies on paracetamol/aspirin/or any other drug 2. Preparation and amol tablets	Experiments		BL3-Apply		8
2	3. Preparation and eva tables/granules	aluation of Aspirin tablets 4. Coating of tablets- film coating of	Experiments		BL4-Analyze		8
3	5. Preparation and eva Gluconate injection	aluation of Tetracycline capsules 6. Preparation of Calcium	Experiments		BL3-Apply		8
4	7. Preparation of Asco tablets and capsules	rbic Acid injection 8. Quality control test of (as per IP) marketed	Experiments		BL3-Apply		8
5	9. Preparation of Eye vanishing cream)	drops/ and Eye ointments 10. Preparation of Creams (cold /	Experiments		BL3-Apply		8
6	11. Evaluation of Glass	s containers (as per IP)	Experiments		BL5-Evaluate		8

Part D(Marks Distribution)									
Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
			Practical						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
50	25	35	18	15	8				

	Part E
Books	3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman 4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition 5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
Articles	NA
References Books	1. Theory and Practice of Industrial Pharmacy by Liberman & Lachman 2. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill Livingstone, Latest edition
MOOC Courses	NA
Videos	NA

							Cours	e Articulatio	on Matrix		•				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	-	-	-	-	-	-	3	-	1	3	3
CO2	2	2	3	1	-	-	-	-	-	-	3	-	1	2	3
CO3	3	1	3	-	-	-	-	-	-	-	3	-	3	-	2
CO4	3	1	1	1	-	-	-	-	-	-	3	-	2	-	2
CO5	3	1	2	1	-	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Pharmacology II													
Course Code	BP507P													
	Part A													
Year	3rd	Semester	5th	Credits	L	т	Р	С						
Teal	Ju	Semester	501	Credits	0	0	2	2						
Course Type	Lab only													
Course Category	Discipline Core													
Pre-Requisite/s	All laboratory technic and videos	ues and animal experiments are demonstrated	by simulated experiments by softwares	Co-Requisite/s										
Course Outcomes & Bloom's Level	CO2- To illustrate the CO3- To identify the (BL4-Analyze) CO4- To categorize t	portance of physiological salt solutions and to ic diurelic activity of drugs in miceirats(BL3-App) dose response relationship, effect of drugs on D he PA2 and PD2 value of drugs using rat anoco e effect of spasmogens and spasmolytics using r	ly) IRC and to construct the drug concentration ccygeus muscle and guinea pig ileum.( <b>BL2</b> -	s by various bioassay methods using animal s										
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics Gender × Human Values × Environment ×	×	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)										
L			•	·										

Part B

Pedagogy

Hours

Contents

Modules

	Par	t C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Introduction to in-vitro pharmacology and physiological salt solutions. 2. Effect of drugs on isolated frog heart	Experiments	BL3-Apply	8
2	3. Effect of drugs on blood pressure and heart rate of dog. 4. Study of diuretic activity of drugs using rats/mice	Experiments	BL5-Evaluate	8
4	<ol> <li>DRC of acetylcholine using frog rectus abdominis muscle. 6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.</li> </ol>	Experiments	BL3-Apply	8
5	<ol> <li>Bioassay of histamine using guinea pig ileum by matching method. 8. Bioassay of oxytocin using rat uterine horn by interpolation method.</li> </ol>	Experiments	BL3-Apply	8
6	9. Bioassay of serotonin using rat fundus strip by three-point bioassay. 10. Bioassay of acetylcholine using rat ileum/colon by four-point bioassay	Experiments	BL4-Analyze	8
7	11. Determination of PA2 value of prazosin using rat anococcygeus muscle (by Schilds plot method). 12. Determination of PD2 value using guinea pig ileum	Experiments	BL3-Apply	8
8	13. Effect of spasmogens and spasmolytics using rabbit jejunum. 14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.	Experiments	BL3-Apply	8

#### Part D(Marks Distribution)

	Theory										
Total Marks	rks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation										
			Practical								
Total Marks	Total Marks         Minimum Passing Marks         External Evaluation         Min. External Evaluation         Internal Evaluation         Min. Internal Evaluation										
50	25	35	18	15	8						

Part E

Books	1. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata. 2. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan
Articles	NA
References Books	1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier 2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
MOOC Courses	NA
Videos	NA

							Cours	e Articulatio	n Matrix						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	2	3	-		-	-	3	-	1	2	3
CO2	2	1	-	-	1	3	-	-	-	-	3	-	1	2	2
CO3	3	2	-	-	3	3	-	-	-	-	3	-	-	-	2
CO4	2	-	-	-	2	2	-	-	-	-	3	-	-	-	2
CO5	3	-	-	-	2	2	-	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Pharmacognosy	y and Phytochemistry II								
Course Code	BP508P	2508P								
Part A										
Year	3rd	Semester	5th	Credits	L	т	Р	С		
Tear	310	Semester	501	Creats	0	0	2	2		
Course Type	Lab only	L		·						
Course Category	Discipline Core	scipline Core								
Pre-Requisite/s				Co-Requisite/s						
Course Outcomes & Bloom's Level	CO2- To identify CO3- To analyz CO4- To isolate	nber the wide variety of the crude dru y the powder mixture and to report the te and evaluate the powdered crude the drug from the given crude drug t the crude drug by performing chron	e types of adulterants and substit drug samples by morphological an sample.	gical characteristics.( <b>BL1-Remember)</b> uents present. nd microscopical characteristics.						
Coures Elements	Skill Developme Entrepreneursh Employability ✓ Professsonal Ei Gender X Human Values Environment X	hip ✓ ′ thics X X	SDG (Goals)	SDG3(Good health and well-being)						

Part B

Contents

Hours

Pedagogy

Modules

Part C										
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours						
1	1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander	Experiments	BL2-Understand	8						
3	3. Separation of sugars by Paper chromatography	Experiments	BL2-Understand	8						
4	4. TLC of herbal extract	Experiments	BL3-Apply	8						
5	5. Distillation of volatile oils and detection of phytoconstituents by TLC	Experiments	BL5-Evaluate	8						
6	6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh	PBL		8						

# Part D(Marks Distribution)

	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Internal Evaluation	Min. Internal Evaluation						
	Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
50	25	35	18	15	8					

	Part E
Books	1.W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009. 2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers& Distribution, New Delhi. 3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi. 4. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4204033/#:~:text=Pharmacognosy%20deals%20with%20the%20natural,model%20molecules%20in%20drug%20discovery.
References Books	5. Essentials of Pharmacognosy, Dr.SH.Ansari, Ilnd edition, Birla publications, New Delhi, 2007 6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi. 7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
MOOC Courses	NA
Videos	kcl tutorial

	Course Articulation Matrix														
COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	1	-	-	-	3	-	2	2	1
CO2	2	-	-	-	-	-	1	-	-	-	3	-	1	2	2
CO3	3	-	-	-	-	-	1	-	-	-	3	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	3	-	2	-	1
CO5	2	-	-	-	-	-	1	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

#### Theory



#### BPharm

Title of the Course	Pharmaceutical	I Product Development								
Course Code	BP511ET									
			Part A							
Year	3rd	Semester	5th	Credits	L	т	Р	С		
Tear	310	Semester	501	Credits	3	1	0	4		
Course Type	Theory only	y only								
Course Category	Discipline Spec	Discipline Specific Elective								
Pre-Requisite/s	Co-Requisite/s									
Course Outcomes & Bloom's Level	CO2- To outline CO3- To select CO4- To classi	the formulation development of differ e the role of different pharmaceutical t the excipients for a specific drug pro fy different of packaging for the drug se optimization technique in the devel	excipients in product developmen oduct( <b>BL5-Evaluate</b> ) product and materials used for prin	t(BL2-Understand) mary and secondary packaging.(BL3-Apply)						
Coures Elements	Skill Developm Entrepreneursh Employability v Professsonal E Gender X Human Values Environment X	hip ✓ / thics × ×	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)						

		Part B	
Modules	Contents	Pedagogy	Hours
UNIT 1	Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT4	Optimization techniques in pharmaceutical product development. A study of various optimization techniques for pharmaceutical product development with specific examples. Optimization by factorial designs and their applications. A study of QbD and its application in pharmaceutical product development.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Par	t C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Evaluation of suspending and emulsifying agent	Experiments		

	Part D(Marks Distribution)								
Тһеоту									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	50	75	38	25	13				
		·	Practical						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				

	Part E						
Books	Books 1. Pharmaceutical Statistics Practical and Clinical Applications by Stanford Bolton, Charles Bon; Marcel Dekker Inc.						
Articles	Articles https://www.ema.europa.eu/en/documents/scientific-guideline/note-guidance-pharmaceutical-development_en.pdf						
References Books 3. Pharmaceutical Dosage Forms – Tablets Vol 1 to 3, A. Liberman, Leon Lachman and Joseph B. Schwartz							
MOOC Courses	https://www.coursera.org/courses?query=pharmaceutical						
Videos	https://www.youtube.com/watch?v=sesDthMPRC0&list=PLkxD16eG21tVre8GBj-LbjfUUuq1qghVM						

# Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	1	1	-	-	-	-	-	3	-	2	1	1
CO2	2	2	1	1	1	-	-	-	-	-	1	-	1	1	1
CO3	3	1	2	1	1	-	-	-	-	-	3	-	2	2	2
CO4	2	1	2	1	1	-	-	-	-	-	1	-	1	1	1
CO5	1	1	2	2	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Introduction to	oduction to intellectual property rights								
Course Code	BP513ET									
			Part A							
Year	3rd	Semester	5th	Credits	L	т	Р	С		
Tear	310	Semester	501	Credits	3	1	0	4		
Course Type	Theory only	ory only								
Course Category	Skill Enhance	ment Courses								
Pre-Requisite/s				Co-Requisite/s	ite/s					
Course Outcomes & Bloom's Level	CO2- To make CO3- Develop CO4- To know	te awareness of IPR among phar e the pharmacy students aware a o the understanding of the Intelle v the database of intellectual prop y the Knowledge of IPR in draftin	about the pharmaceutical R & I ctual Property Rights necessar perty and TKDL( <b>BL2-Underst</b> a	O and the activities therein (BL2-Understand) y for research activities in the pharmaceutical and)	industry. <b>(BL</b> 3	i-Apply)				
Coures Elements	Skill Developn Entrepreneurs Employability Professsonal Gender X Human Values Environment X	ship ✓ ✓ Ethics ✓ s √	SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)						

		Part B	
Modules	Contents	Pedagogy	Hours
UNIT 1	The pharmaceutical business and The pharmaceutical R & D	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Module 3 – Intellectual Property Rights: Introduction about patents, copyright, trademark, Industrial Designs, Geographical Indications, Trade Secrets, Module 4 – IPR: With specific reference to pharma	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	IPR: Indian patent scenario and Patent commercialization and licensing	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Patent drafting and Patent searches, patent filing, registration, granting World Intellectual Property Organization (WIPO) and its functions	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	IP in Traditional Knowledge, TKDL database in medicinal plants, INDIAN WEB- PORTALS FOR PATENTS AND TECHNOLOGIES	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

	Par	t C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	patent drafting and filing	Case Study	BL3-Apply	5

	Part D(Marks Distribution)								
Theory									
Total Marks	Minimum Passing Marks	External Evaluation Min. External Evaluation		Internal Evaluation	Min. Internal Evaluation				
100	50	75	38	25	13				
	Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				

#### Part E

Books	Cockburn IM. Intellectual property rights and pharmaceuticals: challenges and opportunities for economic research. The economics of intellectual property. 2009 Jan: 150.
Articles	Savale SK, Savale VK. Intellectual property rights (IPR). World J Pharm Pharm Sci. 2016 Apr 22;5:2559-92.
References Books	Prabu SL, Tnk S, editors. Intellectual property rights. BoD–Books on Demand; 2017 Jun 21.
MOOC Courses	NEPTEL
Videos	NA

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	1	-	-	-	3	-	2	3	-	1	1	1
CO2	-	1	-	-	-	-	-	3	-	-	2	-	1	-	1
CO3	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

#### Articulation Matrix



#### BPharm

Title of the Course	Herbal Drug Te	chnology									
Course Code	BP603T	803T									
	-		Part A	۱.							
Year	3rd	Semester	6th			т	Р	С			
Tear	310	Semester	601	Credits	3	1	0	4			
Course Type	Theory only	Theory only									
Course Category	Discipline Core	Discipline Core									
Pre-Requisite/s				Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To Know CO3- To know CO4- To Appre	the WHO and ICH guideling the herbal cosmetics, nature ciate patenting of herbal dru	ce of herbal drugs from cultives for evaluation of herbal dr al sweeteners, nutraceuticals ugs, GMP <b>(BL2-Understand</b> ) spects of the herbal drug inc	s(BL2-Understand)	d)						
Coures Elements	Skill Developm Entrepreneursh Employability v Professsonal E Gender X Human Values Environment v	hip√ ∕ Ethics X X	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and produc	tion)						

		Part B	
Modules	Contents	Pedagogy	Hours
1	Herbs as raw materials Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation Source of Herbs Selection, identification and authentication of herbal materials Processing of herbal raw material Biodynamic Agriculture Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides. Indian Systems of Medicine a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	11
2	Nutraceuticals General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases. Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
3	Herbal Cosmetics Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products. Herbal excipients: Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes. Herbal formulations: Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs. Patenting and Regulatory requirements of natural products: a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem. Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
5	General Introduction to Herbal Industry Herbal drugs industry: Present scope and future prospects. A brief account of plant-based industries and institutions involved in work on medicinal and aromatic plants in India. Schedule T – Good Manufacturing Practice of Indian systems of medicine Components of GMP (Schedule – T) and its objectives Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation and standardization of Ayurvedic formulations	Research Paper Presentation	BL2-Understand	8

	Part D(Marks Distribution)								
	Theory								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	50	75	38	25	13				
			Practical						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				

	Part E
Books	1. Textbook of Pharmacognosy by Trease & Evans. 2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
Articles	https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future
References Books	3. Pharmacognosy by Kokate, Purohit and Gokhale 4. Essential of Pharmacognosy by Dr.S.H.Ansari 5. Pharmacognosy & Phytochemistry by V.D.Rangari 6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
MOOC Courses	https://nptel.ac.in/
Videos	kcl tutorial

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO2	3	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO3	1	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO4	2	2	-	-	-	-	1	-	-	-	2	-	2	-	1
CO5	3	2	-	-	-	-	1	-	-	-	2	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

	1									
Title of the Course	Medicinal Chem	nistry III								
Course Code	BP607P	2607P								
Part A										
Year	3rd	Semester	6th	Credits	L	т	Р	с		
rear	3rd	Semester	ы	Credits	0	0	2	2		
Course Type	Lab only	i								
Course Category	Discipline Core									
Pre-Requisite/s				Co-Requisite/s						
Course Outcomes & Bloom's Level	CO2- To explain CO3- To choos CO4- To compa	and select the method for preparation n principle underlying the preparation e the method for assay of drugs by of are the advantages of microwave teor t the relation between physicochemi	n of drugs( <b>BL2-Understand)</b> quantitative analysis( <b>BL3-Apply)</b> hnique over conventional synthes	is of drugs(BL5-Evaluate)						
Coures Elements	Skill Developm Entrepreneursh Employability ↓ Professsonal E Gender × Human Values Environment ×	hip ✓ ′ thics X X	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)						

# Part B

Hours

Pedagogy

Contents

Modules

	Par	tC		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I Preparation of drugs and intermediates 1 Sulphanilamide 2 7-Hydroxy, 4-methyl coumarin 3 Chlorobutanol 4 Triphenyl imidazole 5 Tolbutamide 6 Hexamine	Experiments	BL3-Apply	9
2	II Assay of drugs 1 Isonicotinic acid hydrazide 2 Chloroquine 3 Metronidazole 4 Dapsone 5 Chlorpheniramine maleate 6 Benzyl penicillin	Experiments	BL6-Create	8
3	III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique	Experiments	BL3-Apply	8
4	IV Drawing structures and reactions using chem draw®	Experiments	BL4-Analyze	8
5	V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)	Experiments	BL5-Evaluate	8

	Part D(Marks Distribution)									
Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
			Practical							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
50	25	35	18	15	8					

	Part E
Books	1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry. 2. Foye's Principles of Medicinal Chemistry. 3. Burger's Medicinal Chemistry, Vol I to IV.
Articles	https://pubs.acs.org/journal/jmcmar
References Books	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia.
MOOC Courses	https://nptel.ac.in/
Videos	Pharmacy India

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	1	-	-	-	-	-	3	-	1	2	1
CO2	3	2	-	3	1	-	-	-	-	-	2	-	1	2	2
CO3	2	1	-	2	2	-	-	-	-	-	3	-	1	2	2
CO4	2	2	-	1	1	-	-	-	-	-	2	-	-	-	2
CO5	3	1	-	1	1	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Herbal Drug Te	echnology									
Course Code	BP609P										
Year	3rd	Semester	6th	Credits	L	т	Р	С			
Tear	310	Semester	001	Credits	0	0	2	2			
Course Type	Lab only										
Course Category	Discipline Core										
Pre-Requisite/s				Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To evalu CO3- To apply CO4- To evalu	mber different preliminary phyto- iate the various herbal formulatic v monographic analysis of herbal iate parameters such as aldehyc ss the total alkaloid and other co	ons( <b>BL4-Analyze</b> ) drugs as per pharmacopoeias le and phenol contents( <b>BL5-E</b> v	(BL3-Apply)							
Coures Elements	Skill Developr Entrepreneurs Employability Professsonal Gender X Human Values Environment	ship ✓ ✓ Ethics X	SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)							

# Part B

Мос	dules	Contents		Pedagogy	H		ours
		Pai	t C				
Modules		Title	Experi	ative-ABCA/PBL/ iments/Field work/ Internships	Bloom'	s Level	Hours
1	1. To perform prelimin the alcohol content of	ary phytochemical screening of crude drugs. 2. Determination of Asava and Arista	Experiments		BL3-Apply		12
2		ients of natural origin 4. Incorporation of prepared and n cosmetic formulations like creams, lotions and shampoos and	Experiments		BL5-Evaluate		12
3	mixtures and tablets a	pared and standardized extract in formulations like syrups, and their evaluation as per Pharmacopoeial requirements. 6. f herbal drugs from recent Pharmacopoeias	Experiments		BL5-Evaluate		12
4	7. Determination of Al Determination of total	dehyde content 8. Determination of Phenol content 9. alkaloids	Experiments		BL4-Analyze		12

	Part D(Marks Distribution)													
	Theory													
Total Marks	Total Marks         Minimum Passing Marks         External Evaluation         Min. External Evaluation         Internal Evaluation         Min. Internal Evaluation													
			Practical											
Total Marks	Total Marks         Minimum Passing Marks         External Evaluation         Min. External Evaluation         Internal Evaluation         Min. Internal Evaluation													
50	25	35	18	15	8									

	Part E
Books	1. Textbook of Pharmacognosy by Trease & Evans. 2. Textbook of Pharmacognosy by Tyler, Brady & Robber. 3. Pharmacognosy by Kokate, Purohit and Gokhale
Articles	https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future
References Books	5. Pharmacognosy & Phytochemistry by V.D.Rangari 6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy) 7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
MOOC Courses	https://nptel.ac.in/
Videos	Pharmacy India

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	1	2	-
CO2	1	2	1	-	-	-	-	-	-	-	-	-	1	-	1
CO3	1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	1	2	1
CO5	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

1	Title of the Course	Pharmacy Prac	tice									
	Course Code	BP703T										
L				Dort A								
				Part A		1	т	Р	с			
	Year	4th	Semester	7th	Credits	3	1	0	4			
	Course Type	Theory only				Ũ		Ű	-			
	Course Category	Discipline Core				-						
	Pre-Requisite/s				Co-Requisite/s							
	Course Outcomes & Bloom's Level	Remember) CO2- To outline CO3- To demon Understand) CO4- categoriz programmes in	e the organization and structure of con strate the knowledge of therapeutic d e and evaluate the role of hospital pha hospitals. ( <b>BL1-Remember</b> )	imunity pharmacy and to build a rug monitoring, patient medication rmacist in pharmacy and therap	ibution and hospital formulary in hospitals ar bility to design and run own community phar in history interview and to apply the knowler eutic committee, drug information services, atient centered service. ( <b>BL4-Analyze</b> )	macy. <b>(BL1</b> lge on asse	Remember) ssment of dru	g related prob	lems.(BL2-			
	Coures Elements	Skill Developm Entrepreneursh Employability J Professsonal E Gender J Human Values Environment X	ip ✓ thics ✓	SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation)							
				Part B								
Modules		Conten	ts		Pedagogy				Hours			
UNIT 1	and Tertiary hospitals, Classifi Organization Structure of a H functions. b) Hospital pharmac pharmacy, Organization structure Responsibilities and functions Classifications - Excessive phi idiosyncrasy, allergic drug rea sudden withdrawal of drugs. L interactions, spontaneous cas reaction reporting and manag structure of retail and wholesa establishment and maintenan maintenance of records of ret a) Drug distribution system in distribution systems, charging patients, and Dispensing of cc hospital formulary, Differentiat revision, and addition and deli	cation based on r spital, and Medic y and its organiz ure, Location, La of hospital pharm armacological effi- ditions, genetically urug interaction- t etic drug interact etic drug interact e reports and rec ement. d) Commu- le drug store, typp ce of a drug store all and wholesale a hospital Dispeme policy and labelii pntrolled drugs. b) ion of hospital for hospital for to no fina g from	al staffs involved in the hospital and ti ation Definition, functions of hospital yout and staff requirements, and acists. c) Adverse drug reaction ects, secondary pharmacological effect determined toxicity, toxicity following eneficial interactions, adverse ons, Methods for detecting drug ord linkage studies, and Adverse drug milty Pharmacy Organization and es and design, Legal requirements for Dispensing of proprietary products, drug store. sing of drugs to inpatients, types of dr ng, Dispensing of drugs to ambulatory Hospital formulary Definition, content Mospital formulary. c) Therapeutic dru	Lecture based learning, in	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board							
UNIT 2	Therapeutic Drug Monitoring, Medication adherence Causes medication adherence, and m medication history interview N	and Indian scena s of medication no onitoring of patier eed for the patier	rg, Factors to be considered during th rio for Therapeutic Drug Monitoring, d on-adherence, pharmacist role in the tt medication adherence. e) Patient it medication history interview, medica gement Financial, materials, staff, and	tion	teractive class, Peer tutorial, Class using IC	T tool/PPT/	white board		10			
UNIT 3	pharmacy and therapeutic cor outpatient prescription, autom Drug information services Dru information, Computerized see counseiling Definition of patier Special cases that require the hospital Role of pharmacist in training program, Services to pharmacy, and Role of pharm community health education.	nmittee in includia atic stop order, an g and Poison infor vrices, and storag it counseling; step pharmacist c) Ec the education an the nursing home acist in the interd d) Prescribed meri interpretation and	ization, functions, Policies of the g drugs into formulary, inpatient and d emergency drug list preparation. b) rmation center, Sources of drug e and retrieval of information. Patient so involved in patient counseling, and ucation and training program in the d training program, Internal and exterr s/clinics, Code of ethics for community partmental communication and dication order and communication skill legal requirements, and Communicat ants.	Lecture based learning, in	teractive class, Peer tutorial, Class using IC	T tool/PPT/	white board		10			
UNIT 4	Pharmacy Introduction to Clin responsibilities of clinical phar clinical review, pharmacist inte Pharmaceutical care. Dosing	ical Pharmacy, Co macist, Drug ther ervention, Ward ro pattern and drug ounter (OTC) sale	ation and implementation b) Clinical oncept of clinical pharmacy, functions apy monitoring – medication chart revi unud participation, Medication history herapy based on Pharmacokinetic & is Introduction and sale of over the counter medications.	ew,	teractive class, Peer tutorial, Class using IC	T tool/PPT/	white board		08			
UNIT 5	materials stocked and storage purchase procedure, purchase quantity, Reorder quantity leve expenditure b) Investigational	e conditions, Purc e order, procurem el, and Methods u use of drugs Des	ol Organization of drug store, types of nase and inventory control: principles, ent and stocking, Economic order sed for the analysis of the drug cription, principles involved, bital pharmacist, advisory committee.		teractive class, Peer tutorial, Class using IC	T tool/PPT/	white board		07			

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Visit of ITM Hospital	Internships	BL2-Understand	3
2	Visit of ITM Hospital	Field work	BL2-Understand	2

		Part	D(Marks Distribution)										
Theory													
Total Marks         Minimum Passing Marks         External Evaluation         Min. External Evaluation         Internal Evaluation         Min. Internal Evaluation													
100	50	75	38	25	13								
		•	Practical		·								
Total Marks         Minimum Passing Marks         External Evaluation         Min. External Evaluation         Internal Evaluation													

	Part E
Books	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, 1st ed. Chennai: Orient Longman Private Limited; 2004.
Articles	6. Therapeutic drug monitoring. ISSN: 0163-4356 7. Journal of pharmacy practice. ISSN: 0974-8326 8. American journal of health system pharmacy. ISSN: 1535-2900 (online) 9. Pharmacy times (Monthly magazine)
References Books	3. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career Publications; 2008. 4. Scott LT. Basic skills in interpreting laboratory data, 4thed. American Society of Health System Pharmacists Inc; 2009. 5. Parmar N.S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.
MOOC Courses	https://nptel.ac.in/, https://www.udemy.com/
Videos	You tube

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	2	-	-	-	-	3	-	1	2	1
CO2	3	1	-	1	-	2	-	-	-	-	3	-	1	1	1
CO3	2	2	-	-	-	1	-	-	-	-	3	-	1	1	1
CO4	3	1	-	1	-	2	-	-	-	-	2	-	1	1	1
CO5	2	1	-	1	-	1	1	-	-	-	2	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

1											
Title of the Course											
Course Code	BP705P	P									
Part A         Year       Ath       Semester $Ph$ $Credits$ $L$ $T$ $P$ $C$ Course Type       Lab only $I$ <											
Need	Interview     BP705P       Part A       ear     4th     Semester       7th       se Type     Lab only       Category     Discipline Core       quisite/s     Theory of Respective Experiments       Outcomes     CO1- Understand selected instrumental analytical techniques (spectroscopic and chromatog       Outcomes     CO2- Gain Knowledge on interaction of EMR with matter and to build the analytical understand compounds with different functional groups and their applications in pharmacy(BL2-Understand compounds with different vith stationary phase and mobile phase, physical and chemic CO3- Characterization and estimation of ions by spectroscopical techniques(BL3-Apply)       CO4- Simplify affinity of matter with stationary phase and mobile phase, physical and chemic CO5- Categorize different organic and inorganic compounds using suitable spectroscopic and SIGG4(Quali SDG4(Quali SDG	0	L	т	Р	С					
fear	410	Semester	701	Credits	0	0	2	2			
Course Type	Lab only	L									
Course Category	Discipline Cor	scipline Core									
Pre-Requisite/s	Theory of Res	pective Experiments		Co-Requisite/s	equisite/s						
Course Outcomes & Bloom's Level	CO2- Gain kn compounds w CO3- Charact CO4- Simplify	owledge on interaction of EMR wit ith different functional groups and erization and estimation of ions by affinity of matter with stationary pt	h matter and to build the analy their applications in pharmacy spectroscopical techniques( <b>B</b> nase and mobile phase, physic	tical understanding at the level of atom, group BL2-Understand) L3-Apply) al and chemical properties of matter (BL3-App	and molecula	tric analysis.(I ar structure of	BL3-Apply) organic and ine	organic			
Coures Elements	Entrepreneurs Employability Professsonal Gender X	ship √ √ Ethics X s X	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)							

#### Part B

BL3-Apply

8

8

		1 8	ILD					
Me	odules	Contents		Pedagogy	Но		ours	
		Pa	rt C					
Modules		Title		ative-ABCA/PBL/ iments/Field work/ Internships	Bloom's Level		Hours	
1		sorption maxima and effect of solvents on absorption maxima of Estimation of dextrose by colorimetry	Experiments		BL2-Understand		8	
2	3 Estimation of sulfani paracetamol by UV sp	lamide by colorimetry 4 Simultaneous estimation of ibuprofen and ectroscopy	Experiments		BL4-Analyze		8	
3	5 Assay of paracetamo fluorimetry	ol by UV- Spectrophotometry 6 Estimation of quinine sulfate by	Experiments		BL4-Analyze		8	
4	7 Study of quenching	of fluorescence 8 Determination of sodium by flame photometry	Experiments		BL4-Analyze		8	
5	9 Determination of pot sulphates by nephelo-	assium by flame photometry 10 Determination of chlorides and turbidometry	Experiments		BL4-Analyze		8	
6	11 Separation of amine layer chromatography	o acids by paper chromatography 12 Separation of sugars by thin	Experiments		BL3-Apply		8	
7	13 Separation of plant experiment on HPLC	pigments by column chromatography 14 Demonstration	Experiments		BL3-Apply		8	

# Part D(Marks Distribution)

PBL

15 Demonstration experiment on Gas Chromatography

	Theory											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
50	25 35		18	15	8							
			Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							

Books	Vogel's Textbook of Quantitative Chemical Analysis by A.I. Vogel 2. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake							
Articles	NA							
References Books	1. Organic Chemistry by I. L. Finar 2. Organic spectroscopy by William Kemp 3. Quantitative Analysis of Drugs by D. C. Garrett							
MOOC Courses	NA							
Videos	NA							

#### Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	1	1	-	1	-	-	-	3	-	1	1	1
CO2	3	1	2	1	1	-	1	-	-	-	3	-	1	1	1
CO3	2	2	2	1	1	-	1	-	-	-	3	-	1	1	1
CO4	2	1	3	1	1	-	1	-	-	-	2	-	1	2	1
CO5	2	1	1	2	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

Title of the Course	Pharma Market	na Marketing Management											
Course Code	BP803ET												
			Part A										
Year	4th	Semester	8th	Credits	L	т	Р	С					
Tear	401	Semester	oui	Creats	3	1	0	4					
Course Type	Theory only	reory only											
Course Category	Discipline Elect	Discipline Electives											
Pre-Requisite/s				Co-Requisite/s									
Course Outcomes & Bloom's Level	CO2- To identif CO3- To classi CO4- To exami	stand different concepts of marketing fy marketing mix for pharmaceutical p fy different types of sales promotion.( ine pharmaceutical marketing channe are pricing of the pharmaceutical pro-	roducts.(BL2-Understand) (BL2-Understand) els(BL2-Understand)										
Coures Elements	Skill Developm Entrepreneursh Employability v Professsonal E Gender X Human Values Environment X	hip ✓ / £thics ✓ ×	SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)									

		Part B	
Modules	Contents	Pedagogy	Hours
UNIT 1	Marketing: Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior. Pharmaceutical market: Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation& targeting Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist. Analyzing the Market; Role of market research.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Product decision: Classification, product line and product mix decisions, product life cycle, product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, and Product management in the pharmaceutical industry.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Promotion: Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Pharmaceutical marketing channels: Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management. Professional sales representative (PSR): Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 5	Pricing: Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority). Emerging concepts in marketing; Vertical & Horizontal Marketing; Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Λ			

	Par	t C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Market survey about drugs, OTC, Antibiotic etc	PBL	BL5-Evaluate	10

		Part	D(Marks Distribution)		
			Theory		
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
)	50	75	38	25	13
		·	Practical		
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

100

Part E
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Books	1.Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi 2.Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC Graw Hill, New Delhi.
Articles	NA
References Books	1. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India 2. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition) 3. Ramaswamy, U.S & Nanakamari, S: Marketing Management: Global Perspective, Indian Context, Macmilan India, New Delhi.
MOOC Courses	https://nptel.ac.in/ https://www.udemy.com/course/pharmaceutical-sales-and-marketing/
Videos	

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	2	2	1	1	-	2	1	-	2	1	1
CO2	2	2	1	-	1	2	1	1	-	1	1	-	1	1	1
CO3	3	1	1	-	1	2	1	1	-	2	1	-	1	1	1
CO4	3	1	2	-	1	1	1	1	-	1	2	-	1	1	1
CO5	2	2	1	-	1	2	1	1	-	2	1	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### BPharm

r		1									
	Title of the Course	Cosmetic Scie	ence								
	Course Code	BP809ET									
					Part A						
				8th		<b>a</b>	L	Т	Р	С	
	Year 4th Seme					Credits	3	1	0	4	
	Course Type	Theory only					1				
	Course Category	Discipline Ele	ctives								
	Pre-Requisite/s					Co-Requisite/s					
Course Outcomes & Bloom's Level CO4- To remember classification and historical evolution associated with skin, hair and oral cavity(BL1-Remembe CO2- To understand the principles of formulation and bui CO3- To describe the role of herbs in cosmetics and anal CO4- To evaluate various cosmetics using analytical CO5- To apply the knowledge gained and develop cosme					er) ilding blocks of various lytical methods for cos ruments.(BL1-Remen	s skin care products and hair care products. metics <b>(BL1-Remember)</b> 1 <b>ber)</b>	(BL1-Reme	ember)	nctions and comm	on problems	
	Coures Elements	Skill Developr Entrepreneurs Employability Professsonal Gender X Human Value Environment	ship ✓ ✓ Ethics X s X		SDG (Goals)	Dats) SDG4(Quality education) SDG8(Decent work and economic growth)					
					Part B						
Modules		Conten	ts		Pedagogy						
UNIT 1	Indian and EU regulations, Evol quasi and OTC drugs Cosmetic emollients, preservatives. Class	lution of cosme excipients: Sur sification and ap icture of hair. Ha	oducts Definition of cosmetics as ceuticals from cosmetics, cosmetic factants, rheology modifiers, hume plication Skin: Basic structure and air growth cycle. Oral Cavity: Comr	ectants,	s, Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board						
UNIT 2	and building blocks of Hair care dandruff shampoo. Hair oils. Ch	n, Vanishing cre these products i ctives & mechan products: Conc nemistry and for on and building	am and their advantages and n formulation of cosmecuticals. ism of action. Principles of formula litioning shampoo, Hair conditione mulation of Para-phylene diamine- blocks of oral care products: Tooth	r, anti- -based	d						
UNIT 3	Care: Aloe and turmeric Hair ca	re: Henna and a	d SPF.Role of herbs in cosmetics: amla. Oral care: Neem and clove lytical methods for shampoo, skin-		Lecture based learning interactive class. Rear tutorial. Class using ICT tool/RRT/white based						
UNIT 4	Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps, and syndet bars. Evolution and skin benefits.										
UNIT 5	Oily and dry skin, causes leading to dry skin, skin moisturization. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp:										

	Part	C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preapartion of some cosmetics	Experiments	BL3-Apply	10

Part D(Marks Distribution)										
	Theory									
Total Marks Minimum Passing Marks		External Evaluation Min. External Evaluation		Internal Evaluation	Min. Internal Evaluation					
100	50	75	38	25	13					
			Practical							
Total Marks Minimum Passing Marks		External Evaluation Min. External Evaluation		Internal Evaluation	Min. Internal Evaluation					

Books	1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin. 2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi. 3) Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.				
Articles	International Journal of Cosmetic Science				
	1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin. 2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandan Publications Pvt. Ltd., Delhi. 3) Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.				
MOOC Courses	https://nptel.ac.in/				
Videos	NA				

#### Course Articulation Matrix PO12 PO1 PO2 PO3 PO4 PO5 PO10 PO11 PSO1 PSO2 PSO3 COs PO6 PO7 PO8 PO9 CO1 1 1 1 3 1 1 2 1 1 ------CO2 1 1 1 2 1 2 1 1 1 ---\_ --CO3 1 1 2 1 1 ---------1 CO4 1 1 1 -1 -----1 1 1 1 1 -1 CO5 1 1 1 -----1 CO6 --------



#### BPharm

Title of the Course	Project Work	# Work									
Course Code	BP813PW	W									
			Part A								
No on		<b>.</b> .			L	т	Р	С			
Year	4th	Semester	8th	Credits	0	0	6	6			
Course Type	Project										
Course Category	Discipline Core	pline Core									
Pre-Requisite/s				Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To apply CO3- To write CO4- To desig	rstand Review literature (BL2-U / knowledge into practical mann- and present thesis work (BL3-A in the drug product by using prir se optimization technique in the	er (BL3-Apply) Apply) nciples of Quality by Design(Bl								
Skill Development ×       Entrepreneurship ✓       Employability ✓       Professsonal Ethics ×       Gender ×       Human Values ×       Environment ×		ship ✓ ✓ Ethics X	SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)							

	Part B		
Modules	Contents	Pedagogy	Hours
1	1. The area of the project shall directly relate any one of the elective subject opted by the students 2. All the students shall undertake a project under the supervision of a teacher and submit a report. 3. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages). 4. The internal and external examinations of other semester(s). 5. Students shall be evaluate the project at the time of the Practical examinations of other semester(s). 5. Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of five students). 6. The projects shall be evaluated as per the criteria given below.	PBL	150

	Part C								
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours					
1	As per supervisor's instructions	PBL	BL2-Understand	10					

	Part D(Marks Distribution)										
	Theory										
Total Marks Minimum Passing Marks		External Evaluation Min. External Evaluation		Internal Evaluation	Min. Internal Evaluation						
			Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
150	75	100	50	50	25						

	Part E							
Books As per Given Topic								
Articles As per Given Topic https://www.sciencedirect.com/search NCBI/Pubmed Library								
References Books	As per Given Topic							
MOOC Courses	NA							
Videos	As per Given Topic							

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3	1	-	-	-	-	1	-	1	-	1
CO2	2	1	2	3	2	1	-	-	-	-	2	-	1	-	1
CO3	2	1	2	3	2	1	-	-	-	-	1	-	1	-	2
CO4	3	2	2	-	1	-	-	-	-	-	1	-	3	3	1
CO5	3	3	1	-	1	1	-	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### MPharm-PharmaCeutics

Title of the Course	Pharmaceutics	Practical I								
Course Code	MPH 105P	105P								
			Part A							
Year	4-4	0	4.4	Credits	L	Т	Р	С		
Year	1st	Semester	1st	Credits	0	0	6	6		
Course Type	Lab only	b only								
Course Category	Discipline Core	9								
Pre-Requisite/s				Co-Requisite/s						
Course Outcomes & Bloom's Level	CO2- The ana	als and Excipients( <b>BL4-Analyze)</b> lysis of various drugs in single and co cal and practical skills of the instrume	ombination dosage forms(BL5-Eva ents(BL3-Apply)	aluate)						
Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics × Gender × Human Values × Environment ×			SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)						

			Part B	
N	lodules	Contents	Pedagogy	Hours
U	NIT-1	1. Sustained Release (SR) and Controlled Release (CR) formulations: Introduction & basic concepts, advantages/ disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. Polymers: introduction, definition, classification, properties and application Dosage Forms for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicine: Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, Telepharmacy	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	12

	Par	tC		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer 2. Simultaneousestimation ofmulti component containing formulations by UV spectrophotometry	Experiments	BL4-Analyze	8
2	3. Experiments based on HPLC 4. Experiments based on Gas Chromatography	Experiments	BL3-Apply	8
3	<ol> <li>Estimation of riboflavin/quinine sulphate by fluorimetry 6. Estimation of sodium/potassium by flame photometry</li> </ol>	Experiments	BL4-Analyze	8
4	7. To perform In-vitro dissolution profile of CR/ SR marketed formulation 8. Formulation and evaluation of sustained release matrix tablets	Experiments	BL5-Evaluate	8
5	9. Formulation and evaluation osmotically controlledDDS 10. Preparation and evaluation of Floating DDS- hydro dynamically balanced DDS	Experiments	BL6-Create	8
6	11. Formulation and evaluation of Muco adhesive tablets. 12. Formulation and evaluation of trans dermal patches	Experiments	BL6-Create	8
7	13. To carry out preformulation studies of tablets. 14. To study the effect of compressional force on tablets disintegration time.	Experiments	BL3-Apply	8
8	15. To study Micromeritic properties of powders and granulation. 16. To study the effect of particle size on dissolution of a tablet	Experiments	BL3-Apply	8

# Part D(Marks Distribution)

	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Min. Internal Evaluation						
	Practical									
Total Marks	Minimum Passing Marks	External Evaluation Min. External Evaluation Internal Evaluation		Internal Evaluation	Min. Internal Evaluation					
150	0	100	50	50	25					

	Part E							
Books	PRACTICAL MANUAL							
Articles	JOURNALS							
References Books	LAB MANUAL							
MOOC Courses	SWAYAM NPTEL							
Videos	YOUTUBE							

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	3	1	1	-	-	-	-	-	3	-	1	-	1
CO2	3	1	2	2	2	-	-	-	-	-	3	-	2	1	2
CO3	3	2	3	-	1	-	-	-	-	-	3	-	3	-	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### MPharm-PharmaCeutics

Title of the Course	Pharmaceutics	armaceutics Practical II									
Course Code	MPH 205P	IPH 205P									
	·		Part A								
Year	1st	Semester	2nd	Credits	L	Т	Р	С			
Tear	ist	Semester	210	Creats	7	0	0	7			
Course Type	Lab only	ab only									
Course Category	Discipline Core	Jiscipline Core									
Pre-Requisite/s	TO GAIN EXPE	RIMEMTAL KNOWLEDGE		Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To unders CO3- To prepar	stand and apply the practical knowledg stand the concepts of bioavailability ar e several herbal and cosmetic formula aining on new deug devlopment softwa	nd bioequivalence of drug products a ations (BL3-Apply)	and their significance(BL2-Understand)							
Coures Elements	Skill Developm Entrepreneursh Employability ↓ Professsonal E Gender ★ Human Values Environment ★	ip√ thics× ×	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)							

# Part B

Pedagogy

Hours

Contents

Modules

	Par	C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. To study the effect of temperature change, non-solvent addition, incompatible polymer addition in microcapsules preparation	Experiments	BL4-Analyze	4
2	2. Preparation and evaluation of Alginate beads	PBL	BL6-Create	4
3	3. Formulation and evaluation of gelatin /albumin microspheres	PBL	BL6-Create	4
4	4. Formulation and evaluation of liposomes/niosomes	PBL	BL6-Create	4
5	5. Formulation and evaluation of spherules	PBL	BL6-Create	4
6	<ol> <li>Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique.</li> </ol>	PBL	BL4-Analyze	4
7	7. Comparison of dissolution of two different marketed products /brands	PBL	BL5-Evaluate	4
8	8. Protein binding studies of a highly protein bound drug & poorly protein bound drug	PBL	BL4-Analyze	4

Part D(Marks Distribution)									
	Тнеоту								
Total Marks	Minimum Passing Marks	Minimum Passing Marks External Evaluation		Internal Evaluation	Min. Internal Evaluation				
	Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
150	75	100	50	50	25				

Books 7. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill Livingstone, Latest edition								
Articles	https://www.ipinnovative.com/journal-name/JPBS							
References Books	1 Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition 2.Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS) 3. Theory and Practice of Industrial Pharmacy by Liberman & Lachman							
MOOC Courses	https://nptel.ac.in/							
Videos	NA							

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	3	-	1	-	1
CO2	3	-	1	1	-	-	-	-	-	-	3	-	-	1	2
CO3	2	-	2	2	-	-	-	-	-	-	3	-	2	-	3
CO4	3	-	-	1	-	-	-	-	-	-	3	-	-	-	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### MPharm-PharmaCeutics

Title of the Course	Introduction to	Introduction to intellectual property rights									
Course Code	MPH 208ET	MPH 208ET									
	•		Part A								
Year	1st	Semester	2nd	Credits	L	т	Р	С			
Tear	ISL	Semester	2110	Ground	3	1	0	4			
Course Type	Theory only	Theory only									
Course Category	Skill Enhancen	Skill Enhancement Courses									
Pre-Requisite/s				Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To make CO3- Develop CO4- To know	C01- To create awareness of IPR among pharmacy students. (BL2-Understand) C02- To make the pharmacy students aware about the pharmaceutical R & D and the activities therein. (BL2-Understand) C03- Develop the understanding of the Intellectual Property Rights necessary for research activities in the pharmaceutical industry.(BL3-Apply) C04- To know the database of Intellectual property and TKDL(BL2-Understand) C05- To apply the Knowledge of IPR in drafting and filling of IPR(BL3-Apply)									
Coures Elements	Skill Developm Entrepreneursi Employability v Professsonal E Gender X Human Values Environment X	hip √ ✓ Ethics √ ::√	SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)	))						

		Part B					
Modules	Contents	Pedagogy					
UNIT 1	The pharmaceutical business and The pharmaceutical R & D	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10				
UNIT 2	Module 3 – Intellectual Property Rights: Introduction about patents, copyright, trademark, Industrial Designs, Geographical Indications, Trade Secrets, Module 4 – IPR: With specific reference to pharma	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10				
UNIT 3	IPR: Indian patent scenario and Patent commercialization and licensing	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10				
UNIT 4	Patent drafting and Patent searches, patent filing, registration, granting World Intellectual Property Organization (WIPO) and its functions	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08				
UNIT 5	IP in Traditional Knowledge, TKDL database in medicinal plants, INDIAN WEB- PORTALS FOR PATENTS AND TECHNOLOGIES	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07				

	Par	t C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	patent drafting and filing	Case Study	BL3-Apply	5

Part D(Marks Distribution)									
Theory									
Total Marks	Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	50	75	38	25	13				
Practical									
Total Marks	Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				

# Part E

Books	Cockburn IM. Intellectual property rights and pharmaceuticals: challenges and opportunities for economic research. The economics of intellectual property. 2009 Jan: 150.
Articles	Savale SK, Savale VK. Intellectual property rights (IPR). World J Pharm Pharm Sci. 2016 Apr 22;5:2559-92.
References Books	Prabu SL, Tnk S, editors. Intellectual property rights. BoD–Books on Demand; 2017 Jun 21.
MOOC Courses	NEPTEL
Videos	NA

							Cours	e Articulatio	on Matrix						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	1	-	-	-	3	-	2	3	-	1	1	1
CO2	-	1	-	-	-	-	-	3	-	-	2	-	1	-	1
CO3	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

#### Articulation Matrix



## MPharm-PharmaCeutics

Title of the Course	Research Work	esearch Work											
Course Code	MPH 304P	Н 304Р											
			Part A										
Year	2nd	Semester	3rd	Credits	L	т	Р	С					
Teal	2110	Serifester	310	Credits	0	0	14	14					
Course Type	Lab only				÷								
Course Category	Projects and Inter	nship											
Pre-Requisite/s				Co-Requisite/s									
Course Outcomes & Bloom's Level	CO2- To know abo	w to conduct a research( <b>BL2-Underst</b> a out different research methodolgies( <b>BL</b> of research principles and stastical princ	2-Understand)										
Coures Elements	Skill Development Entrepreneurship Employability ✓ Professsonal Ethic Gender X Human Values ✓ Environment X	$\checkmark$	SDG (Goals)	SDG4(Quality education)									
	·		Part B										

	Fail D		
Modules	Contents	Pedagogy	Hours
UNIT-I			

Part D(Marks Distribution)											
	Theory										
Total Marks	farks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Eval										
	175										
			Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
350	175	200	100	150	75						

	Part E
Books	NA
Articles	NA
References Books	NA
MOOC Courses	NA
Videos	NA

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	-	-	-	-	3	-	1	3	3
CO2	3	2	3	2	2	1	-	-	-	-	3	-	2	1	3
CO3	3	3	3	2	2	1	-	-	-	-	3	-	3	1	3
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-