



G. Pulla Reddy College of Pharmacy

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M.Pharm Pharmaceutical Analysis Programme outcome

M.Pharm Pharmaceutical Analysis Programme outcome	
PO1(MPA)	Gain appreciable knowledge about the theoretical and practical aspects of modern analytical techniques and their application in analysis of drug substances, formulations, excipients and food products and about different validation procedures according to guidelines
PO2(MPA)	Understand the advancements in major instrumental analytical techniques used in bio-analysis, herbal and cosmetic analysis and also about QA practices
PO3(MPA)	Attain knowledge in research methodologies, biostatistical tools and article writing in Journals.
PO4(MPA)	Able to develop new analytical methods by using various instrumental techniques for application in different fields of science

M.Pharm Pharmaceutical Analysis Course Outcomes

M.Pharm Pharmaceutical Analysis Course Outcome	
ID	OUTCOME
CO1(MPA)	Ability to give clear perspective of modern analytical techniques used in pharmaceutical analysis along with their applications
CO2(MPA)	Explain about advancements in pharmaceutical analysis in accordance with ICH and WHO guidelines.



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CO3(MPA)	Gain knowledge about analytical qualification and validation of analytical instruments, glassware, utility systems and intellectual property
CO4(MPA)	Learn detailed analysis of carbohydrates, proteins, lipids, vitamins, milk pesticides in food products and about regulatory legislations of food.
CO5(MPA)	Gain ability to perform various analytical techniques, estimations, assays, calibration and cleaning validation of instruments along with numerous determination of compounds.
CO6(MPA)	Ability to explore varied sources to accomplish the seminar/assignment topics. Gain knowledge and experience of verbal and non-verbal communication as well as presentations.
CO7(MPA)	Learn about advancements in instrumental analysis of major analytical techniques.
CO8(MPA)	Understand and get detailed information on bio-analytical techniques, method development and validation, regulations, pharmacokinetic and toxicokinetic protocols updated with modernisation of such techniques.
CO9(MPA)	Know in depth about QC/QA of pharmaceutical product from the raw material, in-process to finished goods. Also about documentation, manufacturing operations and controls in industry.
CO10(MPA)	Attain extensive knowledge of herbal medicines and their analysis in accordance to their regulatory requirements, stability, standards, interactions, adulterations and deterioration.
CO11(MPA)	get hands on practice to interpret various organic compounds, to perform bioanalytical techniques, IPQC/QC tests, qualitative and quantitative determination using various analytical techniques
CO12(MPA)	ability to practice designing professional presentations solely on their own to boost up their self-confidence and to overcome stage fear.
CO13(MPA)	Ability to get idea about research methodologies, biostatistical tools that can be employed in research, various medical care protocols, CPCSEA guidelines for laboratory animals.



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CO14(MPA)	Ability to understand the details of a journal and its importance along with protocols of writing a journal.
CO15(MPA)	Ability to express their ideas and thoughts of their perspective in choosing a project of their own interest under the supervision of respective guides.
CO16(MPA)	Ability to provide inputs from all concerned faculty and the principal, students in the area of their research
CO17(MPA)	Ability to publish papers in various national and international journals approved by UGC.
CO18(MPA)	Acquire knowledge to write their respective research projects and in drafting thesis
CO19(MPA)	Ability to explain their research projects through seminars, along with their thesis, in partial fulfilment for the award of their post-graduation degree
CO20(MPA)	Ability to compete with others by presenting in various national and international seminars/conferences with innovative research ideas.



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M.Pharm Pharmaceutical Analysis Programme and Course outcome Map

M.Pharm Pharmaceutical Analysis Programme and Course outcome Map						
	PO1	PO2	PO3	PO4	PO5	PO6
SEMESTER- I						
C01	X					
C02	x					
C03	x					
C04	x					
C05	x					
C06	x					
SEMESTER- II						
C07		x				
C08		x				
C09		x				
C010		x				
C011		x				
C012		x				
C013			x			
SEMESTER- III						



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CO14			x			
CO15			x			
CO16			x			
SEMESTER- IV						
CO17				x		
CO18				x		
CO19				x		
CO20				x		



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SPECIFIC LEARNING OUTCOMES (SLO)-- I Semester

Code:101T- MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES (MPAT)		
		The students will be able to get knowledge on
ID	Unit / Topic	Outcome statement
SLO1(MPAT)	Unit I	Principles and instrumentation of UV-Vis, IR, Flame emission spectroscopy along with spectrofluorometry and their applications
SLO2(MPAT)	Unit II	Principles, Instrumentation, Solvent requirements, chemical shifts of NMR; briefly about FT-NMR and ¹³ CNMR
SLO3(MPAT)	Unit III	Understanding Mass Spectroscopy, Ionization techniques, Fragmentation Rules, Mass Analysers, Applications
SLO4(MPAT)	Unit IV	Detailed study of various types of Chromatographies (TLC, HPLC, HPTLC, GC, UPLC, etc), Electrophoresis, X-ray Crystallography
SLO5(MPAT)	Unit V	Advanced Instrumentation of Potentiometry and Thermal techniques (DSC, DTA, TGA)
Code:102T- ADVANCED PHARMACEUTICAL ANALYSIS (APA)		
ID	Unit/ Topic	Outcome statement
SLO6(APA)	Unit I	Impurity and stability studies along with Impurities in new drug substances and residual solvents according to ICH guidelines
SLO7(APA)	Unit II	Structured understanding of Elemental Impurities and stability testing protocols
SLO8(APA)	Unit III	Impurity profiling and degradant characterization in accordance to ICH and WHO



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		guidelines. Biological products stability.
SLO9(APA)	Unit IV	Stability testing of phytopharmaceuticals and various biological tests and assays
SLO10(APA)	Unit V	Types of Immunoassays, quantification and Applications
Code:103T- PHARMACEUTICAL VALIDATION (PV)		
ID	Unit/Topic	Outcome statement
SLO11(PV)	Unit I	Elaborated introduction of Qualification and Validation involving Validation Master Plan, DQ, IQ, OQ, PQ, RQ, FAT, SAT
SLO12(PV)	Unit II	Qualification of analytical instruments and glassware
SLO13(PV)	Unit III	Advanced Validation of Utility Systems (Water, HVAC, Compressed air and Nitrogen) and Cleaning Validation
SLO14(PV)	Unit IV	Analytical Method Validation according to USP and ICH guidelines
SLO15(PV)	Unit V	Rigorous detailing of General principles of Intellectual Property
Code:104T- FOOD ANALYSIS (FA)		
ID	Unit/Topic	Outcome statement
SLO16(FA)	Unit I	Classification, analysis, absorption, digestion and metabolism of Carbohydrates and Proteins.
SLO17(FA)	Unit II	Study of Lipids and Vitamins in detail (classification, types, analysis, assays, refining, etc)
SLO18(FA)	Unit III	Understanding Food additives, Pigments and Synthetic dyes along with their analysis techniques
SLO19(FA)	Unit IV	General analysis of Milk, its constituents, products, adulterants, contaminants and analysis of Fermentation products



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SLO20(FA)	Unit V	Characteristic analysis of Pesticides and Legislation regulations of food products according to BIS, Agmark, FDA and USFDA
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SPECIFIC LEARNING OUTCOMES (SLO)- M.PHARM PHARMACEUTICAL ANALYSIS – II Semester

ADVANCED INSTRUMENTAL ANALYSIS (AIA)

Code:201T	Unit/Topic	Outcome statement
ID		The students will be able to get knowledge on
SLO25(AIA)	Unit I	Advanced instrumental analysis of HPLC, Chiral analysis of pharmaceuticals, Preparative HPLC, Applications
SLO26(AIA)	Unit II	Detailed instrumentation of Biochromatographies, GC and HPTLC
SLO27(AIA)	Unit III	Overview of Super critical fluid chromatography and Capillary electrophoresis with method development, CE-MS hyphenation
SLO28(AIA)	Unit IV	Mass spectroscopy: overview, instrumental advancements in analysis like Tandem, LTQ-Orbitrap etc
SLO29(AIA)	Unit V	NMR: overview, analytical advancements like 1D NMR, 2D NMR, COSY, NOESY, LC-NMR hyphenation techniques
Code:202T- MODERN BIO ANALYTICAL TECHNIQUES (MBT)		
Id	Unit/Topic	Outcome statement
SLO30(MBT)	Unit I	Extraction of drugs and metabolites from biological matrices and Bioanalytical method validation



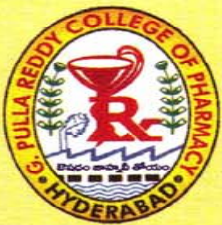
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SLO31(MBT)	Unit II	Understanding of Biopharmaceutical considerations in bioanalytical techniques
SLO32(MBT)	Unit III	Detailed study of Pharmacokinetics and Toxicokinetics
SLO33(MBT)	Unit IV	Cell Culture Techniques, cell viability assays, flow cytometry
SLO34(MBT)	Unit V	Modern metabolite identification procedures with in vivo drug product performance (BE/BA)
Code:203T		QUALITY CONTROL AND QUALITY ASSURANCE (QAQC)
Id	Unit/Topic	Outcome statement
SLO35(QAQC)	Unit I	Understanding concepts of QC/QA, GLP, ICH Guidelines Q-Series
SLO36(QAQC)	Unit II	cGMP guidelines in accordance to USFDA including CDER, CBER, PIC, WHO, EMEA for industrial management and CPCSEA guidelines
SLO37(QAQC)	Unit III	Detailed analysis of raw materials, IPQC, finished products and developing specifications according to ICH Q6 and Q3
SLO38(QAQC)	Unit IV	Characteristic Documentation in pharmaceutical industry
SLO39(QAQC)	Unit V	Clear perspective of Manufacturing operations and controls
Code:204T- HERBAL AND COSMETIC ANALYSIS (HCA)		
ID	Unit/Topic	Outcome statement
SLO40(HCA)	Unit I	Introduction to Herbal remedies, toxicity and regulations: WHO and AYUSH guidelines
SLO41(HCA)	Unit II	Detailed information of Adulteration and deterioration along with Regulatory requirements



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		for setting herbal drug industry
SLO42(HCA)	Unit III	Stability testing protocols and monographs of herbal drugs
SLO43(HCA)	Unit IV	Understanding herbal drug-drug interactions
SLO44(HCA)	Unit V	Complete analytical evaluation of cosmetic products according to BIS
Code:204T - PHARMACEUTICAL ANALYSIS PRACTICAL II (PAP II)		
ID	Unit/Topic	Outcome statement
SLO45(PAP II)		Learn about interpretation of IR, NMR and mass spectra of organic compounds.
SLO46(PAP II)		Able to perform analysis of biological samples and bioanalytical method validation
SLO47(PAP II)		Able to perform analysis of cosmetic products
SLO48(PAP II)		Get knowledge in protocol writing for BA/BE studies.

SPECIFIC LEARNING OUTCOMES (SLO)- M.PHARM PHARMACEUTICAL ANALYSIS – III Semester

Code:301T- RESEARCH METHODOLOGY AND BIO STATISTICS (RMB)		
		The students will be able to get knowledge on
Id	Unit/Topic	Outcome statement
SLO49(RMB)	Unit I	Understanding of General research methodology
SLO50(RMB)	Unit II	Introduction to Biostatistics



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SLO51(RMB)	Unit III	Detailed study on protocols of Medical research
SLO52(RMB)	Unit IV	Clear perspective of CPCSEA guidelines for laboratory animal facilities
SLO53(RMB)	Unit V	Importance of declaration of Helsinki rule, additional principles combined with medical care

M.Pharm Pharmaceutical Analysis Course outcome and Specific Learning Outcome Map

M.Pharm Pharmaceutical Analysis - I SEMESTER						
	CO1(MPA)	CO2(MPA)	CO3(MPA)	CO4(MPA)	CO5(MPA)	CO6(MPA)
SLO1(MPAT)	X					
SLO2(MPAT)	X					
SLO3(MPAT)	X					
SLO4(MPAT)	X					
SLO5(MPAT)	X					
SLO6(APA)		X				
SLO7(APA)		X				
SLO8(APA)		X				
SLO9(APA)		X				
SLO10(APA)		X				
SLO11(PV)			X			
SLO12(PV)			X			
SLO13(PV)			X			



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SLO14(PV)			X			
SLO15(PV)			X			
SLO16(FA)				X		
SLO17(FA)				X		
SLO18(FA)				X		
SLO19(FA)				X		
SLO20(FA)				X		

M.Pharm Pharmaceutical Analysis - II SEMESTER

	CO7(MPA)	CO8(MPA)	CO9(MPA)	CO10(MPA)	CO12(MPA)	CO12(MPA)
SLO21(AIA)	X					
SLO22(AIA)	X					
SLO23(AIA)	X					
SLO24(AIA)	X					
SLO25(AIA)	X					
SLO26(MBT)		X				
SLO27(MBT)		X				
SLO28(MBT)		X				
SLO29(MBT)		X				
SLO30(MBT)		X				
SLO31(QAQC)			X			



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SLO32(QAQC)			X			
SLO33(QAQC)			X			
SLO34(QAQC)			X			
SLO35(QAQC)			X			
SLO36(HCA)				X		
SLO37(HCA)				X		
SLO38(HCA)				X		
SLO39(HCA)				X		
SLO40(HCA)				X		

M.Pharm Pharmaceutical Analysis - III SEMESTER

	C013(MPA)	CO14(MPA)	CO15(MPA)	CO16(MPA)
SLO41(RMB)	X			
SLO42(RMB)	X			
SLO43(RMB)	X			
SLO44(RMB)	X			
SLO45(RMB)	X			



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