



SIR C.R.REDDY COLLEGE OF PHARMACEUTICAL SCIENCES

(An ISO 9001 : 2015 Certified Institution)

(Affiliated to Andhra University, Visakhapatnam; Recognized by Dept.of Technical Education, Govt.of A.P)

(Approved by AICTE & PCI, New Delhi)

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M PHARM COURSE OUTCOMES

PROGRAMME: M.PHARMACY-PHARMACOLOGY (COURSE OUTCOMES)

Course Name: Modern Pharmaceutical Analytical Techniques (Theory) Course
Code: MPL 101 T, I M Pharmacy, First Semester.

MPL 101 T.1	Understand the UV-Visible spectroscopy, IR, flame and atomic absorption spectroscopy.
MPL 101 T.2	Know principles of NMR spectroscopy, instrumentation and applications.
MPL 101 T.3	Understand the principles of mass spectroscopy, different ionization techniques and applications of mass spectroscopy.
MPL 101 T.4	Know the principles and procedures of paper and capillary electrophoresis; XRD and its applications.
MPL 101 T.5	Understand the principles and procedures of immunoassays like radioimmunoassay, ELISA and bioluminescent assays.

Course Name- Advanced Pharmacology-I (Theory) Course code: MPL 102-T,
I.M.Pharm, First Semester.

MPL 102 T-1	To Understand the basic concepts of pharmacokinetics, structural & functional quantification of drug receptors
MPL 102 T-2	To gain knowledge on drugs acting on peripheral nervous system based on its mechanism of action & pharmacology of local anesthetics
MPL 102 T-3	To describe about concept of drugs acting on central nervous system with receptor pathways & pharmacological study of general anesthetics, opioids & non-opioids
MPL 102 T-4	To improve knowledge on cardiovascular system and drugs which are used in the treatment of its disorders as Angina, arrhythmia, hyperlipidemics
MPL 102 T-5	To study the concept of neurodegenerative disorders & free radical induced disorders

**Course Name- Pharmacology-I (Practical) Course code: MPL 105-P,
I.M.Pharm, First Semester.**

MPL 105 P-1	To study the enzyme based In-Vitro assays pharmacological experiments
MPL 105 P-2	To understand the techniques involved in animal handling & various routes of drug administration
MPL 105 P-3	To study & observe the theory involved in enzyme induction & inhibition activity.
MPL 105 P-4	To study the effect of pharmacokinetics & data analysis of drug by different routes of drug administration in software method
MPL 105 P-5	To gain knowledge on predictions involved of drug-drug interactions by pharmacological software
MPL 105 P-6	To estimate the effect of drug extraction from various biological samples by using different analytical techniques

**Course Name- Pharmacology-II (Practical) Course code: MPL 106-P,
I.M.Pharm, First Semester.**

MPL 106 P-1	To Understand physiological observation effects of battery tests
MPL 106 P-2	To evaluate the effects of drugs which are used as CNS Stimulants, anti-convulsant activity
MPL 106 P-3	To study & evaluate the effects of pharmacological drugs like analgesics & anti inflammatory
MPL 106 P-4	To improve knowledge on estimation of the strength of lipid parameter in blood sampling _& tissues.
MPL 106 P-5	To study the evaluation of anti-diuretic activity & anti- ulcer activity

Course Name- Pharmacological & Toxicological Screening Methods (Theory) Course code: MPL 202-T, I.M.Pharm Second Semester.

MPL 202 T-1	To justify the rules and regulations pertaining to animal studies like CPCSEA, OECD, ICH, EPA guidelines, Good laboratory practice
MPL 202 T-2	To understand various screening techniques involved in CNS drugs
MPL 202 T-3	To justify the Pharmacological screening procedures of drugs acting on Respiratory and gastrointestinal systems.
MPL 202 T-4	To know about Preclinical screening of new substances for the pharmacological activity related to cardio vascular drugs
MPL 202 T-5	To gain knowledge on Teratogenicity, genotoxicity (Ames test, in vitro, in vivo micronucleus, chromosomal aberrations) carcinogenicity

**Course Name- CLINICAL RESEARCH AND PHARMACOVIGILANCE (Theory)
Course code: MPL 204-T, I.M.Pharm Second Semester.**

MPL 202 T-1	To justify Clinical trials Regulatory perspectives like Good Clinical Practice (ICH-GCP) guidelines, - Schedule Y. ICMR
MPL 202 T-2	To understand Cohort, case control, cross sectional clinical trial study - Team roles and responsibilities of clinical trial personnel
MPL 202 T-3	To understand Clinical trial documentation like preparation of documents protocol, Investigator Brochure, Case Report Forms, Clinical Study Report etc. To study Clinical trial monitoring Safety, adverse drug reactions, Severity and seriousness assessment.
MPL 202 T-4	To know about Basic terminologies of pharmacovigilance, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, Statistical methods for evaluating medication safety data
MPL 202 T-5	To gain knowledge on Pharmacoepidimology and pharmaco-economic Definition and scope, outcomes, evaluation and applications methods

Course Name: Pharmacokinetics and Drug Metabolism (Theory); Course code: MPL

103T, I M.PHARM, First Semester

MPL 103T.1	To understand more about biological membranes, role of P-glycoprotein, factors affecting drug absorption and distribution kinetics.
MPL 103T.2	To gain more knowledge on Microsomal, non-microsomal biotransformation of drugs, cytochrome P450 enzymes substrates, inducers and inhibitors. Stressing on Physiological, pathological and genetic factors affecting drug metabolism
MPL 103T.3	To elaborate the concept of excretion, its factors and information related to enterohepatic recirculation, significance of elimination rate constant, elimination half-life
MPL 103T.4	To clear the concepts related to pharmacokinetics, population pharmacokinetic, PK-PD modeling and therapeutic drug monitoring.
MPL 103T.5	To understand the concept of drug-drug interactions and factors which causes drug food interactions
MPL 103T.6	To update knowledge on alternative methods to animal toxicity studies and know more on evaluation in pre-clinical studies and its importance.

Course Name: CELLULAR AND MOLECULAR PHARMACOLOGY (Theory)

Course Code: MPL 104T, I M.PHARM, First Semester.

MPL 104T.1	To emphasize the concept on genome organization, regulation mapping and more on Cell cycles regulation, apoptosis program, Necrosis and autophagy
MPL 104T.2	To explain the various receptors and their secondary messengers and focusing on various signaling pathways.
MPL 104T.3	To update the knowledge on recombinant DNA technology, techniques involved in gene therapy, applications and advances in it.
MPL 104T.4	To elaborate Genetic variation and its effects in drug metabolism, Gene mapping and cloning of disease gene.
MPL 104T.5	To comprehends the concept of cell cultures, basic equipment used in cell culture and their applications.
MPL 104T.6	To gain the knowledge on different assays like cell viability, glucose uptake, calcium influx and know more on Biosimilars and applications of flow cytometry.

Course Name: ADVANCED PHARMACOLOGY II (Theory) Course Code:
MPL 201T, I M.PHARM, Second Semester.

MPL 201T.1	To give more explanation for antibacterial resistance and different antibiotics β – lactams, aminoglycosides, tetracyclins, chloramphenicol, macrolide, antibacterial and anthelmintics.
MPL 201T.2	To elaborate more on Drugs acting on cancer, viral and fungal diseases. Imparting knowledge on immunosuppressants, and disorders related to Immune system.
MPL 201T.3	To provide updated concepts on Endocrine hormones, drugs acting on hormonal abnormalities. Stressing role of corticosteroids and calcium regulation.
MPL 201T.4	To gain knowledge on drugs acting on intestinal disorders, points related to Respiratory disorders namely asthma and COPD
MPL 201T.5	To know more on Physiological and pathological role of Autacoids namely histamines, serotonin, prostaglandins, kinins, interleukins, substance P, neuropeptides and NF κ β.
MPL 201T.6	To interpret the concepts of chronopharmacology, histamines, 5 HT antagonists circadian rhythm and its applications.

Course Name: PRINCIPLES OF DRUG DISCOVERY (Theory)

Course Code: MPL 203T, I M.PHARM, Second Semester.

MPL 203T.1	To give a clear concepts over drug target identification, validation and drug discovery. Stressing point on lead Optimization and Economics of drug discovery
MPL 203T.2	To impart knowledge on Genomics, bioinformatics, zinc finger proteins, siRNAs and antisense oligonucleotides. Indeed explanation on role of transgenic animals in target validation, combinatorial chemistry & high throughput screening in silico lead discovery techniques
MPL 203T.3	To give clarity on Traditional and rational drug design. Methods followed in it and High throughput screening,
MPL 203T.4	To elaborate the concepts of different docking like rigid, flexible and manual, Quantitative analysis of structure activity relationship
MPL 203T.5	To provide more information on prodrugs, drug solubility, absorption, distribution and specific drug delivery
MPL 203T.6	To emphasize the concept of prodrug design, sustained drug action and practical consideration of prodrug design

**Course Name: PHARMACOLOGY PRACTICAL III (Practical) Course Code: MPL
205P, I M.PHARM, Second Semester.**

MPL 205P.1	To record the rat BP, ECG, heart rate
MPL 205P.2	To study drug absorption by averted rat ileum preparation and toxicity studies for acute oral, dermal as per OECD guidelines.
MPL 205P.3	To analyze Serum biochemical, hematological, urine and histological parameters. And study the Protocol design for clinical trials.
MPL 205P.4	To record the DRC of agonist, antagonist/potentiating DRC of agonist using suitable isolated tissue preparations.
MPL 205P.5	To determine the strength of unknown sample by interpolation, matching, bracketing and multiple point bioassays, using suitable isolated tissue preparations.
MPL 205P.6	To estimate PA ₂ values of various antagonists using suitable isolated tissue preparations and study the effects of various drugs on isolated heart preparations

**Course Name: Research Methodology and Biostatistics (Theory) Course Code:
MRM 301 T, II M Pharmacy, Third Semester.**

MRM 301T.1	Identify the concepts of medical research and values in medical ethics. Define the CPCSEA guidelines for laboratory animal facility.
MRM 301T.2	Understand Basic statistical methods which are used in collecting data study and analyze. Observe Errors relating experimentation
MRM 301T.3	Know testing of the hypothesis and understand how far population parameter significant based on estimator with the help of parametric tests. Non parametric tests can also observed.
MRM 301T.4	Know application of Analysis in field or lab experimental to design and factorial experiments. Apply the knowledge in research objects about reliability and validity experimental study.

Course Name: Journal Club
Course Code: MPL 302, II M Pharmacy, Third Semester.

MPL 302.1	Critically appraise the research article of their specialization published in reputed journals. Students are trained for inquiry based learning and critical thinking skills.
MPL 302.2	Access journals by adopting search engines and made to collect relevant data, analyze and comment on the findings with the submission of the document evidence and present on the same for assessment

Course Name: Project Work
Course Code: MPA 402 & 403, II M Pharmacy, Fourth Semester.

MPL 402.1	Prepare the presentation based on the results obtained in the research work.
MPL 402.2	Explain outcome of their project along with further scope for research. This develops their oratory and leadership skills.

PROGRAMME: M. PHARMACY- PHARMACEUTICS (COURSE OUTCOMES)

**Course Name: Modern Pharmaceutical Analytical Techniques (Theory)Course
Code: MPH 101 T, I M Pharmacy, First Semester.**

MPH 101 T.1	Understand the UV-Visible spectroscopy, IR, flame and atomic absorption spectroscopy.
MPH 101 T.2	Know principles of NMR spectroscopy, instrumentation and applications.
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MPH 101 T.4	Know the principles and procedures of paper and capillary electrophoresis; XRD and its applications.
MPH 101 T.5	Understand the principles and procedures of immunoassays like radioimmunoassay, ELISA and bioluminescent assays.

**Course Name: Advanced Biopharmaceutics & Pharmacokinetics (Theory)Course Code:
MPH 102 T, I M Pharmacy, First Semester.**

MPH 102 T.1	The basic concepts in biopharmaceutics and pharmacokinetics.
MPH 102 T.2	The use of raw data and derive the pharmacokinetic models and parameters that describe the process of drug absorption, distribution, metabolism and excretion.
MPH 102 T.3	To critically evaluate biopharmaceutics studies involving drug product equivalency.
MPH 102 T.4	To design and evaluate dosage regimens of the drugs using pharmacokinetic parameters.
MPH 102 T.5	The potential clinical pharmacokinetic problems and application of basics of pharmacokinetics.

Course Name: Modern Pharmaceutics (Theory) Course Code: MPH 103 T, I
M Pharmacy, First Semester.

MPH 103 T.1	Learn about the science behind performing a Preformulation study before formulating a novel drug delivery system.
MPH 103 T.2	Understand the current good manufacturing practices that are implemented in various pharmaceutical industries.
MPH 103 T.3	Understand various validation protocols that are been followed in the pharmaceutical industries as per various regulatory guidelines.
MPH 103 T.4	Understand various optimization techniques that are used in prior to formulate any new dosage form. Understand how to run the optimization softwares (For ex: Design expert and Minitab).
MPH 103 T.5	Understand about the science between compaction and compression of a tablet. Understand about various dissolution parameters that have to be incorporated while performing dissolution studies.

Course Name: Regulatory Affairs (Theory) Course Code: MPH 104T, I M
Pharmacy, First Semester.

MP H 104 T.1	Comprehend regulations pertaining to drugs.
MP H 104 T.2	Describe the regulatory guidance and guidelines for filing and approval process.
MP H 104 T.3	Detail the preparation of dossiers and their submission to regulatory agencies in different countries.
MP H 104 T.4	Express the submission of global documents in CTD/eCTD formats.
MP H 104 T.5	Define the clinical trials for approvals for conducting clinical trials.

Course Name: Pharmaceutics – I (Practical) Course Code: MPH 105 P, I M
Pharmacy, First Semester.

MPH 105P.1	Know Variability and Operation of commonly used analytical instruments like UV Vis spectrophotometer, HPLC, Gas Chromatography, Fluorimetry and Flame photometry.
MPH 105P.2	Have knowledge as well as hands on training with respect to the principles of formulation science such as Preformulation studies and Micromeritics
MPH 105P.3	Possess the knowledge about effect of compressional force on tablets Properties.

Course Name: Pharmaceutics – II (Practical) Course Code: MPH 106 P, I M
Pharmacy, First Semester.

MPH 106P.1	Understand the role of Biopharmaceutics in bioavailability and calculation of pharmacokinetic parameters
MPH 106P.2	Improvement of dissolution studies on poorly soluble drugs
MPH 106P.2	Formulate and evaluate various novel drug delivery systems: Floating DDS, Muco adhesive tablets and Trans dermal patches

Course Name: Molecular Pharmaceutics (Nano Technology & Targeted DDS) (Theory)

Course Code: MPH 201 T, I M Pharmacy, Second Semester.

MPH 201 T.1	The concepts of nanotechnology-based drug delivery systems and targeted drug delivery systems
MPH 201 T.2	The criteria for selection of drugs and excipients for the development of nano pharmaceuticals and targeted drug delivery systems
MPH 201 T.3	Various approaches/ methods for the development of such formulations.
MPH 201 T.4	Evaluation tests for nano pharmaceuticals and targeted drug delivery systems

Course Name: Drug Delivery Systems (Theory) Course Code: MPH 202 T, I M

Pharmacy, Second Semester.

MPH 202 T.1	The basic concepts of modified release drug delivery systems.
MPH 202 T.2	The criteria for selection of drugs and excipients.
MPH 202 T.3	Various approaches/methods for the development of novel drug delivery systems.
MPH 202 T.4	The evaluation tests for the novel drug delivery systems.

Course Name: Computer Aided Drug Delivery System (Theory) Course Code: MPH 203 T, I M Pharmacy, Second Semester.

MPH 203 T.1	Explain about the role of computers in pharmaceutical research, various modeling approaches and parameters used in modeling.
MPH 203 T.2	Understand about basics and guidelines of Quality by Design (QbD). Understand about computation modeling techniques of ADME process for a drug.
MPH 203 T.3	Understand about the concept of optimization and they can design a formulation of emulsion a micro emulsion using software's like design expert.
MPH 203 T.4	Understand about using of computer aided designs in in-vitro dissolution studies. Understand the regulations involved in clinical data collection and management.

Course Name: Formulation Development of Pharmaceutical and Cosmetic Products (Theory) Course Code: MPH 204 T, I M Pharmacy, Second Semester.

MPH 204 T.1	Learn about the science behind performing a Preformulation study before formulating a novel drug delivery system. Learn about various pre-formulation parameters that have to be studied before formulating a novel drug delivery system.
MPH 204 T.2	Learn about the importance of solubility for a drug and methods to enhance the solubility.
MPH 204 T.3	Learn about basics of drug dissolution and various parameters involved in in vitro drug dissolution studies.
MPH 204 T.4	Understand about basics and legal aspects of cosmeticology and various formulations like dentifrices, lipsticks, nail polish and baby products etc.

**Course Name: Pharmaceutics – III (Practical) Course Code: MPH 205 P, I M
Pharmacy, Second Semester.**

MPH 205P.1	Know the effect of temperature, nonsolvent, incompatible polymer addition on preparation of microcapsules.
MPH 205P.2	Design and perform in-vitro evaluation studies for various novel drug delivery systems: Alginate beads, gelatin /albumin microspheres, liposomes / niosomes and spherules.
MPH 205P.3	Perform in-vitro dissolution of marketed products and interpretation of dissolution data.

**Course Name: Research Methodology and Biostatistics (Theory) Course Code:
MRM 301 T, II M Pharmacy, Third Semester.**

MRM 301T.1	Identify the concepts of medical research and values in medical ethics. Define the CPCSEA guidelines for laboratory animal facility.
MRM 301T.2	Understand Basic statistical methods which are used in collecting data study and analyze. Observe Errors relating experimentation
MRM 301T.3	Know testing of the hypothesis and understand how far population parameter significant based on estimator with the help of parametric tests. Non parametric tests can also observed.
MRM 301T.4	Know application of Analysis in field or lab experimental to design and factorial experiments. Apply the knowledge in research objects about reliability and validity experimental study.

Course Name: Journal Club
Course Code: MPH 302, II M Pharmacy, Third Semester.

MPH 302.1	Critically appraise the research article of their specialization published in reputed journals. Students are trained for inquiry based learning and critical thinking skills.
MPH 302.2	Access journals by adopting search engines and made to collect relevant data, analyze and comment on the findings with the submission of the document evidence and present on the same for assessment

Course Name: Project Work
Course Code: MPH 402 & 403, II M Pharmacy, Fourth Semester.

MPH 402.1	Prepare the presentation based on the results obtained in the research work.
MPH 402.2	Explain outcome of their project along with further scope for research. This develops their oratory and leadership skills.

PROGRAMME: M. PHARMACY- PHARMACEUTICAL ANALYSIS(COURSE OUTCOMES)

Course Name: Modern Pharmaceutical Analytical Techniques (Theory)Course Code: MPA 101 T, I M Pharmacy, First Semester.

MPA 101 T.1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments
MPA 101 T.2	Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals
MPA 101 T.3	To expand the theoretical knowledge on various instrumental techniques including microscopic methods available for analysis of organic substances
MPA 101 T.4	To apply the knowledge learnt in developing new procedures of their own design
MPA 101 T.5	Comparing various methods of analysis and their outcomes

Course Name: Advanced Pharmaceutical Analysis (Theory)Course Code: MPA 102 T, I M Pharmacy, First Semester.

MPA 102 T.1	The student Will understand the concepts of Impurity profiling
MPA 102 T.2	The students will gain appropriate knowledge about stability testing of bulk and various formulations.
MPA 102 T.3	Subject supply enough idea on the biological tests
MPA 102 T.4	It supports to understand the immunoassays.
MPA 102 T.5	The students learn the regulatory guidelines and their applications.

Course Name: Pharmaceutical Validation (Theory) Course Code: MPA 103

T, I M Pharmacy, First Semester.

MPA 103 T.1	The student learns on the importance of patent and intellectual property rights.
MPA 103 T.2	The students are trained on the qualification aspects of instruments.
MPA 103 T.3	The importance of calibration to be performed for the instruments.
MPA 103 T.4	The various validation aspects to be carried out in the industry.
MPA 103 T.5	The students gain knowledge on how validation are carried for various components. Such as instrument validation, cleaning validation and process validation.

Course Name: Food Analysis (Theory)

Course Code: MPA 104T, I M Pharmacy, First Semester.

MPA 104 T.1	Student shall be able to understand various determination methods for Food constituents
MPA 104 T.2	Student shall be able to understand various determination methods for Food additives.
MPA 104 T.3	Student shall be able to understand the determination procedures of Finished food products
MPA 104 T.4	Student shall be able to understand various analytical techniques in the determination of Pesticides in food
MPA 104 T.5	Student shall be able to understand various analytical techniques in the determination of knowledge on food regulations

Course Name: Pharmaceutical Analysis – I (Practical) Course Code: MPA

105 P, I M Pharmacy, First Semester.

MPA 105P.1	Calibration of UV-Visible spectrophotometer and FTIR spectrophotometer, Calibration of GC and HPLC.
MPA 105P.2	Assay of official compounds by different titrations and instrumental techniques
MPA 105P.3	Quantitative determination of hydroxyl group and amino group, and Colorimetric determination of drugs by using different reagents

Course Name: Pharmaceutical Analysis – II (Practical) Course Code: MPA

106 P, I M Pharmacy, First Semester.

MPA 106P.1	Learn about the determination of total reducing sugar, proteins, vitamins content in foods
MPA 106P.2	Understand the selection of analytical methods for analysis of synthetic colors in food products
MPA 106P.2	Understand the selection of various analytical methods for determining food additives

**Course Name: Advanced Instrumental Analysis (Theory) Course Code: MPA
201 T, I M Pharmacy, Second Semester.**

MPA 201 T.1	The detailed interpretation pattern for the organic substances
MPA 201 T.2	Practical aspects and troubleshooting techniques for HPLC and GC techniques for Bio-chromatographic analysis.
MPA 201 T.3	Knowledge and skills in advanced instrumentation techniques for drug analysis
MPA 201 T.4	Theoretical aspects of hyphenated analytical techniques
MPA 201 T.5	Critical analysis of analytical problem and selection of appropriate analytical tool for the quantification of chemicals and excipients

**Course Name: Modern Bio-Analytical Techniques (Theory) Course Code:
MPA 202 T, I M Pharmacy, Second Semester.**

MPA 202 T.1	It upgrade the method to conduct bio-equivalence study for formulations by utilising the proper regulatory guidelines
MPA 202 T.2	Get the knowledge on extraction procedures
MPA 202 T.3	Pupil will be exposed to both theoretical and practical knowledge on dissolution and release studies.
MPA 202 T.4	The subject content presents better understanding on metabolite identification process.
MPA 202 T.5	The class learns the drug product performance through bioavailability studies.

Course Name: Quality Control and Quality Assurance (Theory) Course Code:
MPA 203 T, I M Pharmacy, Second Semester.

MPA 203 T.1	Student shall be able to understand the importance of cGMP aspects of documentation
MPA 203 T.2	Student shall be able to understand the importance of analysis of packing materials
MPA 203 T.3	Student shall be able to understand the responsibilities of QA department
MPA 203 T.4	Student shall be able to understand the manufacturing operations and control.
MPA 203 T.5	Student shall be able to understand GLP and regulatory Affairs

Course Name: Herbal and Cosmetic Analysis (Theory) Course Code: MPA
204 T, I M Pharmacy, Second Semester.

MPA 204 T.1	Student shall be able to understand various herbal regulations
MPA 204 T.2	Student shall be able to understand various analytical techniques in the determination of herbal products
MPA 204 T.3	Student shall be able to understand the herbal monographs
MPA 204 T.4	Student shall be able to understand various herbal drug interactions
MPA 204 T.5	Student shall be able to understand various performance evaluation of cosmetic products

Course Name: Pharmaceutical Analysis – III (Practical) Course Code: MPA

205 P, I M Pharmacy, Second Semester.

MPA 205P.1	Know comparison of absorption spectra by UV and Wood ward – Fiesure rule and Interpretation of organic compounds by FT-IR
MPA 205P.2	Know protocol preparation and performance of analytical / bioanalytical method validation, and protocol preparation for the conduct of BA/BE studies according to guidelines.
MPA 205P.3	Understand determination of purity by DSC in pharmaceuticals and Identification of organic compounds using FT-IR, NMR, CNMR and Mass spectra

Course Name: Research Methodology and Biostatistics (Theory) Course Code:

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