PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS)

KAKINADA - 533 001, AP.

Affiliated to Adikavi Nannaya University

NAAC Accredited with "A" Grade (3.17 CGPA)

BOARD OF STUDIES
PHARMACEUTICAL CHEMISTRY

B.Voc. PHARMACEUTICAL CHEMISTRY under CBCS

Meeting Minutes/Resolutions

Convened on 31 August 2023

AY 2023-24

DEPARTMENT OF CHEMISTRY

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS)

Opp. Mc Laurin High School, Raja Ram Mohan Roy Road, Kakinada

www.prgc.edu.in; e-mail: chemistry@prgc.edu.in

VISIONAND MISSION OF THE COLLEGE:

Vision

To provide the right academic environment paving way for intellectual excellence, humane feelings and social commitment. The college believes in providing quality education for the socially disadvantaged, economically weaker sections of the society and thereby help them move up the ladder of success and social order.

Mission

- To impart holistic education with special emphasis on character, culture, updated knowledge and skill-oriented learning.
- To make the students enjoy the fruits of globalization without prejudice to theirlocal and cultural environment.
- To impart necessary life skills so as to make them face any challenge in thebigger world – Social, ethical, psychological or professional

P.R. GOVT.COLLEGE (A), KAKINADA

Department of Chemistry

B.Voc Pharmaceutical Chemistry

Minutes of board of studies (BOS) meeting 2023-24 conducted on 31-08- 2023

Meeting of Board of Studies in **B.Voc Pharmaceutical Chemistry** isconvened on **31-08-2023** through offline at P.R. Govt. College (A), Kakinada.
Venue: Conference Hall, Dt: **31-08- 2023**

The Principal:	**Dr. B.V. Tirupanyam**,
Chairman:	**Sri. V. Sanjeeva Kumar,**
	Chairman and lecturer in charge.
University Nominee:	**Prof. K.Deepthi,** Asst.Professor,
	Adikavi Nannaya University, Rajamahendravaram.
Industrialist:	**Dr. B. Ramesh Babu,** Founder & M.D.,
	BogaR laboratories, Peddapuram,
Subject Expert 1	**Sri.V. Mallikarjuna Sarma,**
	Lecturer in Chemistry,
	Government degree college. Jaggampeta.
Subject Expert 2	**Ms. K. Sruthi,**
	Lecturer in Pharmaceutical Chemistry
	Aditya college of pharmacy, Surampalem

All the faculty members of Chemistry Department and student alumniattended the meeting.

AGENDA:

- To discuss the Semester System and Choice Based Credit System (CBCS) being implemented for the past 06 years, i.e., w.e.f. 2018-19.
- To discuss and approve the Continuation/Modifications of the

syllabus for the Odd & Even Semesters of III, IV & V Years for 2023-24.

- Grant of Extra credits for Online SWAYAM MOOCs etc.
- Syllabus, Model Question Papers and Model Blue Prints for III,IV, V and VI Semesters.
- Teaching learning methodology for the present II- and III-Year Students and 50:50 (External: Internal) ratioI Year Students w.e.f. 2023-24.
- Panel of paper setters and examiners.
- Proposals for Community Service Projects/Extension activities for the benefit of the society.
- To make it mandate to possess 75% of attendance to allow the students for each mid Examination and Semester examinations.
- To make it flexible the semester academic schedule in V & VI semesters keepingin view of availability of Embeded Industrial Aprenticeship.
- Department action plan for 2023-24.
- Any other items with the permission of the chair.

RESOLUTIONS:

The Meeting Of Board Of Studies In B.Voc Pharmaceutical Chemistry is convenedon **31-08-2023** at LCD Hall-1 in P.R. Govt. College (A), Kakinada. The Principal Dr. B. V. Tirupanyam ,Dr. K. Deepthi, University Nominee, Subject Expert1 V.Mallikarjuna Sarma, GDC(W), Kakinada, Subject Expert2, Ms. K. Sruthi Aditya college of pharmacy, Surampalem, all members of the faculty of Chemistry and student representatives attended the meeting. Agenda items are discussed and the following resolutions were made.

1. It is resolved to follow the revised Choice Based Credit System for B. Voc Courses scrupulously as per the directions of Andhra Pradesh State Council of Higher Education(APSCHE), Vijayawada and also as per the directions of Adikavi Nannaya University, Rajamahendravaram with effect from the academic year 2023-24.
2. It is resolved to follow the revised curricular framework for B. Voc courses scrupulously as per the directions of Andhra Pradesh State Council of Higher Education (APSCHE), Vijayawada and also as per the directions of Adikavi Nannaya University, Rajamahendravaram with effect from the academic year 2023-24.
3. It is resolved to choose Life Skill courses and Skill Development Courses in concurrence with the vocational course.
4. It is resolved to conduct industrial visits for B. Voc students to make them acquainted with the industrial environment.
5. It is resolved to admit both Intermediate (MPC) stream and Intermediate (Bi.P.C) stream students into B.Voc courses and design the curriculum accordingly.
6. It is resolved to run B.Voc(Pharmaceutical Chemistry) in two streams namely

i. B.Voc Pharmaceutical Chemistry Maths stream and

ii. B.Voc Pharmaceutical Chemistry Biology stream.

7. It is resolved to organize Guest lectures by eminent professors and Industrial Experts.
8. It is resolved to implement a pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.
9. It is resolved to submit proposals to conduct a faculty development programme in instrumentation techniques/advanced topics with the assistance of industry representatives and university representatives.
10. It is resolved to conduct Industrial Internship for a period of two months during the summer after completion of semester end examinations.
11. It is resolved to make it mandatory for the students in the entire V semester to undergo industrial internship for a period of 6 months in a Pharma Industry.

It is resolved together students of B.Voc (Pharmaceutical Chemistry) registered NAPS (National Apprenticeship Promotion Scheme).

12. It is resolved that the B.Voc (Pharmaceutical Chemistry) course is restructured in B.Sc (Professional) (Pharmaceutical Chemistry). The proposal is put forward to Academic Council and General Body Meeting.

13. It is resolved to follow strictly the guidelines of UGC under NSQF scheme for the recruitment and engagement of faculty and non-teaching staff.

14. It is resolved to follow the same syllabi for English, Second Language, Life Skill Courses and Skill Development Courses as those prescribed for UG Courses by APSCHE, Vijayawada.

15. It is resolved to follow the same syllabi for main subjects namely Mathematics, Botany and Chemistry as it is , as they prescribed for UG Courses by APSCHE,Vijayawada, and as they are implementing in our College for other courses.

16. It is resolved to implement 50% external & 50% internal marks for theory & 100% external marks in practicals from the academic year 2020-21 for first second and third year students only.

17. It is resolved that the students should posses (maintain)75% attendance for both theory and practical in order to attend the mid and semester examination.

18. Resolved to reduce 50 marks of theory internal to 25 marks for mid exams and 25 marks for co-curricular activities (Seminar / Assignment / Quiz / GroupDiscussion.

19. Resolve to conduct practical examinations semester wise with external examiners in even semesters only

20. Resolved to conduct evaluation on project submitted Embedded Industrial apprenticeship in V/VI semester with internal examiners only.

21. Resolved to send the students to Embedded Industrial apprenticeship in semester V or in semester VI or even in middle of semester V/VI whenever opportunities available and that may be in continuation with Internship to be done at the end of 2 semester.

22. Resolved to follow the Action plan of Dept chemistry as the BVOC Pharmaceutical chemistry course is anchoring by Dept of chemistry.

23. Resolved to recommend the following faculty as paper setters.

i) Dr.D. S. V. N. N. Rama Murthy, GDC(A), Tuni

ii) K. Anand , GDC Pithapuram..,

iii) Sri V. Mallikarjuna Sarma, GDC(W),Kakinada

iv) Smt A. Sravani Ratnam, GDC, rajamahendravaram

About B.Voc Pharmaceutical chemistry

The University Grants Commission (UGC) had launched a scheme on 27 February, 2014 for skillsdevelopment based higher education as part of college/university education, leading to Bachelor of Vocational (B.Voc.) degree with multiple entry and exit points. Considering the implementationmodalities, the guidelines of the scheme have been revised in the year 2015. The B.Voc. Programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles and their NOS s along with broad based general education. Thiswould enable the graduates completing B. Voc to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

Objectives

1. To provide judicious mix of skills relating to a profession and appropriate content of general education.
2. To ensure that the students have adequate knowledge and skills, so that they are work ready a teach exit point of the programme.
3. To provide flexibility to students by means of pre-defined entry and multiple exitpoints.
4. To integrate NSQF with in the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global work force.
5. To provide vertical mobility to students coming out of (a) 10+2 with vocational subjects; and (b) Community Colleges.

Course Objectives:

To make student

1. Understand the basic concepts of Organic Chemistry
2. Understand different types of organic reactions
3. Acquire knowledge on qualitative and quantitative chemical analysis
4. Develop skills in the usage and application of laboratory instruments
5. Understand the mechanisms of various organic reactions
6. Acquire knowledge on various types of Pharmacopoeia.
7. Understand various forms of medicines and the role of additives informulations
8. Acquire knowledge on different types of instrumentation techniques inchemical analysis.
9. Understand stereochemistry of carbon compounds its importance in organicchemistry

10. Acquire knowledge on the basic concepts of computers
11. Develop skills in MS word, MS Excel and MS PowerPoint applications.
12. Develop communication and soft skills.
13. Visit pharmaceutical industries and understand the functioning of plant

Course Outcomes:

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

1. Acquire competence and skills in various techniques in chemical analysis.
2. Ready to get a suitable position or job role such as Quality Control Chemist,Quality Assurance Chemist, Production Chemist in a Pharmaceutical Industry
3. Choose for an academic progression under vertical mobility for higher studies.
4. Eligible for various competitive examinations in various posts recruited byState and Central Governments.

Members who invited for the Board of studies meeting in Pharmaceutical Chemistryto be held On 31st August 2023

Mode of Conduct of meeting: **Offline & online**

S.No	Name of the Nominee	Designation
1	Sri. V. Sanjeeva kumar	Chairman& Lecturer Incharge.
2	Prof .K.Deepthi	University Nominee Assit. Professor & Head of the Department of Chemistry,AKNU, Rajamahendravaram.
3	Sri .V. Mallikarjuna Sarma	Subject Expert & Lecturer in Chemistry Government degree college. Jaggampeta.
4	Ms. K. Sruthi	Subject Expert & Lecturer in Pharmaceutical Chemistry Aditya college of pharmacy, Surampalem.
5	Dr. B. Ramesh Babu	Representative from IndustryFounder & MD BogaR laboratories, Peddapuram.
6	T.V.V. Satya Narayana	Member
7	P. Vijay Kumar	Member
8	V. Rambabu	Member
9	G. Pavani	Member
10	Dr. N. Bujji Babu	Member
11	Dr. Ch. Praveen	Member
12	V. Venkateswara Rao	Member
13	U.S.N Prasad	Member
14	M.S.S.V. Uma Gayathri	Member
15	Ch. Mohana Siddick	Student Alumni Member
16	T. Sada	Student Member

PROCEEDINGS OF THE PRINCIPAL, P.R. GOVERNMENT COLLEGE (A) KAKINADA- A.P

Present: Dr. B. V. Tirupanyam, M. Sc; Ph.D.

R.C.No.1/A.C./BOS/2023-24, Dated: 29.08.2023

SUB: P.R. Government College (A), Kakinada-UG Board of Studies (BOS)- B.Voc-Pharmaceutical Chemistry- Nomination of Members-Orders issued.

REF: 1. UGC Guidelines for Autonomous Colleges-2018.

ORDERS:

The Principal, P.R. Government College (A), Kakinada is pleased to constitute UG Boards of Studies in PHARMACEUTICAL CHEMISTRY for framing the syllabi in respective Subject for all Semesters duly following the norms of the UGC Autonomous guidelines.

S. No	Name of the Person	Designation
1	V. Sanjeeva Kumar	Chairman & Lecturer Incharge
2	Prof. K. Deepthi, Asst. Professor & Head of the Department of Chemistry,AKNU, Rajahmahendravaram.	University Nominee
3	Sri. MS.A.SRAVANI RATNAM, Faculty in Pharma Chemistry Government college (A)Rajamahendravaram.	Subject Expert -I
4	Ms. K. Sruthi, Lecturer in Pharmaceutical Chemistry Aditya college of pharmacy, Surampalem	Subject Expert - II
5	Dr. B. Ramesh Babu Founder & M.D., BogaR laboratories, Peddapuram.	Representative from Industry
6	T.V.V. Satya Narayana	Member
7	P. Vijay Kumar	Member
8	V. Rambabu	Member
9	G. Pavani	Member
10	Dr. N. Bujji Babu	Member
11	Dr. Ch. Praveen	Member
12	V. Venkateswara Rao	Member
13	U.S.N Prasad	Member
14	M.S.S.V. Uma Gayathri	Member
15	Ch. Mohana Siddick	Student Alumni Member
16	T. Sada	Student Member

The above members are requested to attend the BoS meeting on 31-08-2023 and share their valuable reviews, and suggestions on the following functionaries.

- Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and National requirement for consideration and approval of the IQAC and Academic Council.
- Suggested methodologies for innovative teaching and evaluation techniques.
- Suggest the panel of Names to the academic council for appointment of Examiners.
- Coordinate research, teaching, extension and other activities in the Department of the college.

PRINCIPAL
P. R. Government College(A), Kakinada

Signatures of the members who attended the Board of studies in Pharmaceutical ChemistryOn 31st August 2023

Mode of Conduct of meeting: **Offline & online**

S.No	Name of the Member	Signature of the Member	Mobile number
1	Sri. V. Sanjeeva kumar	V. S	9849324986
2	Prof .K. Deepthi	K Deepthi	9985469607
3	MS.A.Sravani Ratnam.	A. Sravani Ratnam	8886653337
4	Ms. K. Sruthi	K Sruthi	9133791971
5	Dr. B. Ramesh Babu	B Ramesh Babu	9701712028
6	T.V.V. Satya Narayana		9490876913
7	P. Vijay Kumar	Vijay	9652023082
8	V. Rambabu	31/8	9948985537
9	G. Pavani		9912526493
10	Dr. N. Bujji Babu	31/8/23	9441394792
11	Dr. Ch. Praveen	31/8/23	9491185518
12	V. Venkateswara Rao	V. Venkateswara Rao 31/8/23	9885165588
13	U.S.N Prasad	USN P 31/8/23	6300882584
14	M.S.S.V. Uma Gayathri	M. Uma Gayathri	7396789819
15	Ch. Mohana Siddick	Ch Mohana Siddick	9000831299
16	T. Sada	T Sada	9963517679

P.R.GOVERNMENT COLLEGE(A), KAKINADA , DEPARTMENT OF CHEMISTRY

B.VOC (PHARMACEUTICAL CHEMISTRY)

CURRICULAR FRAMEWORK

(CREDITS TABLE)

Semester–III

Category	Subject/Paper	Course	Theory /Practical	No. of Hrs ./ Week	No of credits	Evaluation		
						Internal	External	TOTAL
First language	ENGLISHPRAXISCOURSE-III		Theory	4	3	50	50	100
Second Language	Telugu/Sanskrit/Hindi		Theory	4	3	50	50	100
Life Skill Course-I	Environment Education		Theory	2	2	-	50	50
Life Skill Course-II	Personality Development AndLeadership		Theory	2	2	-	50	50
Skill Development Course	Environment Audit		Theory	2	2	-	50	50
MajorSubject-1	Mathematics/ botany	C3	Theory	6	5	50	50	100
MajorSubject-2	Chemistry	C3	Theory	4	4	50	50	100
	Chemistry		Practical	2	1		50	50
Vocational	Advanced Pharmaceutics-I	C5	Theory	4	4	50	50	100
	Advanced Pharmaceutics-I		Practical	2	1		50	50
	Advanced Pharmaceutics-II	C6	Theory	2	2	-	50	50
	Advanced Pharmaceutics-II		Project	2	1	-	50	50
			TOTAL	36	30	200	650	850

P.R. GOVERNMENT COLLEGE(A), KAKINADA DEPARTMENT OF CHEMISTRY
B.VOC (PHARMACEUTICAL CHEMISTRY)
CURRICULAR FRAME WORK
(CREDITS TABLE)
Semester–IV

Category	Subject/Paper	Course	Theory /Practical	No.of Hrs./ Week	No ofcredits	Evaluation		
						Internal	External	TOTAL
MajorSubject-1	Mathematics/ botany	C4	Theory	6	5	50	50	100
	Mathematics/ botany	C5	Theory	6	5	50	50	100
MajorSubject-2	Chemistry	C4	Theory	4	4	50	50	100
	Chemistry		Practical	2	1		50	50
	Chemistry	C5	Theory	4	4	50	50	100
	Chemistry		Practical	2	1		50	50
Vocational	Basic Analytical Chemistry-II	C7	Theory	4	4	50	50	100
	Basic Analytical Chemistry-II		Practical	2	1		50	50
	Industrial Safety and Management	C8	Theory	4	4	50	50	100
	Industrial Safety and Management		Practical	2	1		50	50
			TOTAL	36	30	300	500	800

P.R. GOVERNMENT COLLEGE(A),

KAKINADA

DEPARTMENT OF CHEMISTRY

B.VOC (PHARMACEUTICALCHEMISTRY)

CURRICULAR FRAME WORK

(CREDITS TABLE)

Semester–V

Category	Subject/Paper	Course	Theory /Practical	No.of Hrs./ Week	No of credits	Evaluation		
						Internal	External	TOTAL
Vocational	Pharma Regulatory Affairs	C9	Theory	4	4	50	50	100
	Pharma Regulatory Affairs		Practical	2	1		50	50
	Pharmaceutical Inorganic Chemistry	C10	Theory	4	4	50	50	100
	Pharmaceutical Inorganic Chemistry		Practical	2	1		50	50
	Advanced Analytical Chemistry	C11	Theory	4	4	50	50	100
	Advanced Analytical Chemistry		Practical	2	1		50	50
	Basic Quality Control and Quality Assurance	C12	Theory	4	4	50	50	100
	Basic Quality Control and Quality Assurance		Practical	2	1		50	50
	Documentation for Quality Control	C13	Theory	4	4	50	50	100
	Documentation for Quality Control		Practical	2	1		50	50
	Pharmaceutical and Medicinal Chemistry	C14	Theory	4	4	50	50	100
	Pharmaceutical and Medicinal Chemistry		Practical	2	1		50	50
			TOTAL	36	30	240	660	900

P.R. GOVERNMENT COLLEGE(A), KAKINADA

DEPARTMENTOFCHEMISTRY

B.VOC (PHARMACEUTICAL CHEMISTRY)

CURRICULAR FRAME WORK

(CREDITS TABLE)

Semester-VI

Subject/Paper	Theory /Practical	No of credits	Evaluation
First Phase of Apprenticeship between n 1st and 2nd year (Summer Vacation)		**04**	**100**
Second Phase of Apprenticeship between 2nd and 3rd year (Summer Vacation)		**04**	**100**
INDUSTRIALINTERNSHIP		**12**	**200**
TOTAL		**20**	**400**

P.R.GOVERNMENTCOLLEGE(AUTONOMOUS)KAKINADA

CURRICULAR FRAME WORK FOR B.VOC COURSES UNDER NSQF FOR THE YEAR 2023-24

B.Voc Pharmaceutical Chemistry(Maths stream/ Biology stream)

SUBJECT/SEMESTER		I		II		III		IV		V		VI			
		H/W	C	H/W	C	H/W	C	H/W	C	H/W	C	H/W	C		
English		4	3	4	3	4	3					**Third Phase of Apprenticeship for the entire V/VI Semester**		**rstandSecondPhase(2Spells)ofApprenticeshipbetween1stand2ndyearandbetween2ndand3rdyearSummer Vacation**	
Second Language(Telugu/Hindi/Sanskrit)		4	3	4	3	4	3								
Life Skill Courses		2	2	2	2	2+2	2+2								
Skill Development Courses		2	2	2+2	2+2	2	2								
Core Subjects															
MajorSubject-1	C1 to C5Maths/Botany (Theory&Practicals)	6/4+2	4+1	6/4+2	4+1	6/4+2	4+1	4+2 4+2	4+1 4+1						
MajorSubject-2	C1 to C5Chemistry (Theory&Practicals)	4+2	4+1	4+2	4+1	4+2	4+1	4+2 4+2	4+1 4+1						
Vocational	C1toC14includingSECPharmaceuticalChemistry(Theory&Practicals)	4+2	4+1	4+2	4+1	4+2	4+1	 4+2 4+2	 4+1 4+1	4+2 4+2 4+2	4+1 4+1 4+1				

	C2, C4, C6 (Theory and Lab/Institutional/IndustrialTraining PharmaceuticalChemistry	2+2	2+1	2+2	2+1	2+2	2+1			4+2 4+2 4+2	4+1 4+1 4+1				
TotalHrs/Week(AcademicCredits)		34	**28**	36	**30**	36	**30**	36	**30**	36	**30**		**12**	**4**	**4**
ExtensionActivities															
NCC/NSS/Sports/ExtraCurricular									**2**						
Yoga							**1**		**1**						
ExtraCredits															
Hrs/W(TotalCredits)		34	**28**	36	**30**	36	**31**	36	**33**	36	**30**		**12**	**4**	**4**

Marks and Credits distribution

S.No.	Course Type	No. of Courses	Course wise Teaching Hrs/Week	Credits for each Course	Total Credits	Each Course Evaluation				Total (Theory +Practical)	TotalMarks (Maths Stream/ Biology Stream
						Theory			Practical (Maths Stream/ Biology		
						Continuous Assessment	End Semester	Total			
1	English	3	4	3	9	50	50	100		100	300
2	Second Language	3	4	3	9	50	50	100		100	300
3	Life Skill Courses	4	2	2	8	0	50	50		50	200
4	Skill Development Courses	4	2	2	8	0	50	50		50	200
5	Core/SE–I Maths/Botany	5	6/4+2	4+1	25	50	50	100	0/50	100/150	500/750
6	Core/SE–II Chemistry	5	4+2	4+1	25	50	50	100	0/50	100/150	750
7	Vocational Courses (C1toC14) Pharmaceutical Chemistry	11	4+2	4+1	55	50	50	100	50	150	1650
	Vocational Courses C2,C4,C6 Pharmaceutical Chemistry	3	2+2	2+1	9		50	50	50	100	300
8	Summer Vacation Internship	2		4	8					100	200

9	Industrial Internship for one Full Semester	1		12	12					200	200
10	Extension Activities (Non Academic Credits)										
	NCC/NSS/Sports/Extra Curricular			2	2						
	Yoga	2		1	2						
	Extra Credits										
	Hrs/W(Total Credits)&Marks	**43**			**172**						**4600/4850**

PITHAPURRAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS),KAKINADA			
B.VOC COURSES UNDER NSQF SCHEME			
STUDENTS ELIGIBILITY AND FACULTY ELIGIBILITY			
S.NO.	NAMEOFTHECOURSE	STUDENTS ELIGIBILITY (10+2OEQUIVALENTWITHSPECIFICGROUPIFANY)	FACULTY ELIGIBILITY WITH SPECIALIZATION
1	B.VOC(COMMERCIAL AQUACULTURE)	Intermediate/10+2or Equivalent with Bi.P.C/Biology	M.Sc Aquaculture/Marine Biology/ Zoology with fishery biologyspecialization
2	B.VOC(HORTICULTURE)	Intermediate/10+2 or Equivalent with Bi.P.C/Biology	M.Sc Horticulture/Biology/Botany with Horticulture Specialization
3	B.VOC(PHARMACEUTICAL CHEMISTRY)	Intermediate or10+2 withMPC/BiPC group	M.Pharm/M.Sc (Pharmaceutical Chemistry) /M.Sc(Chemistry)
4	B.VOC(FOOD TECHNOLGY)	Intermediate or 10+2withMPC/BiPC group	M.Sc (Food Technology)/ M.Sc (Food Processing) /M.Sc (Food and Nut rition)
5	B.VOC(JOURNALISM AND MASS COMMUNICATION)	Intermediate or 10+2 or equivalent	M.A(Journalism)
6	B.VOC(HOTEL MANAGEMENT)	Intermediate/ 10+2 or equivalent	MBA(Hotel Management/ M.Com Hotel Management /M.Com orMBA with Diploma in Hotel Management

QUESTION PAPER SETTERS FOR B.VOC (PHARMACEUTICAL CHEMISTRY)

The following paper setters for Vocational (Pharmaceutical Chemistry) papers are recommended.

S. No.	Name of the Faculty	Designation	Address for Correspondence	Mobile Number	E-mail ID
1	Sri V.Sanjeev Kumar	Lecturer in Chemistry	P.R. Government Degree College ,Kakinada ,East Godavari District.	9849324966	skvudi1972@gmail.com
2	V.Mallikarjuna Sarma	Lecturer in Chemistry	Governent degree college. Jaggampeta	9676822550	V.mallikarjunasarma@gmail.com
3	Sri V.Sridhar	Lecturer in Chemistry	Government arts college (A), RAJAMUNDRY, East Godavari District	8919262964, 7386048119	sridhar.vegi07@gmail.com
4	Dr.B. Mallikarjuna	Lecturer in Chemistry	Government College(Autonomous), Rajahmundry	8985503523	mallik.chem@gmail.com
5	Sri B.Venkata Rao	Lecturer in Chemistry	Government arts college (A), RAJAMUNDRY, East GodavariDistrict	9948195459	venkatbasa@gmail.com
6	Smt. Manchiraju Padmaja	Lecturer in Chemistry	Government arts college (A), RAJAMUNDRY, East Godavari District	9441653995	padmaja717@gmail.com

SEMESTER- III

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (III Semester)			
Course Code	**TITLE OF THE COURSE** **ADVANCED PHARMACEUTICS –I**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:		**60**	**10**	**30**	**4+2**

Course Objectives:

After the successful completion of this course, the student will be able to

i. Size reduction methods in the manufacture of tablets
ii. Size separation methods in the manufacture of tablets
iii. Different sterilization processes
iv. Manufacture of Parenterals

COURSE OUTCOMES

On Completion of the course, the students will be able to	
CO1	Understand the concept of size reduction and illustration of variousequipment'sUsed
CO2	Understand the concept of mixing and homogenizations and variousequipments used for the process
CO3	Apply the sterilization process in the pharma industry using varioustypes of sterilization process
CO4	Perform the manufacturing and evaluation of parenterals in an asepticenvironment to prevent contamination

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		**Employability**		**Entrepreneurship**	

Syllabus:

UNIT: I

Size reduction, objectives, and factors affecting size reduction, methods of sizereduction- studyof Hammer mill, ball mill, Fluid energy mill and Disintegrator.

Size separation-size separation by sifting. Official standards for powders. Sedimentation methods ofsize separation. Construction and working of Cycloneseparator.

UNIT : II

Mixing and Homogenization-Liquid mixing and powder mixing, Mixing of semisolids. Study o Propeller mixer, planetary mixer, sil erson Mixer-Homogenizer, Hand homogeniser; double cone mixer; Triple Roller Mil

Clarification and Filtration –Theory of filtration, Filter media; Filter aids and selection of filters. Study of the following filtration equipments–Filter Press, SinteredFilters, Filter Candles, Metafilter.

UNIT: III

Sterilization–Concept of sterilization and its differences from disinfection–Thermal resistance ofmicro–organisms. Detailed study of the following sterilization process. (i) Sterilization with moist heat, (ii) Dry heat sterilization,(iii) Sterilization by radiation,(iv) Sterilization by filtration and (v) Gaseous sterilization.

UNIT : IV

Parenterals Preparations- Routes of administration of parental products-Types ofparental products-Formulation of parental products-Aseptic work to prevent contamination-Manufacturingof Parenterals-Evaluation of Parenteral

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Cooper and Gunn's	Dispensing for Pharmaceutical Students	CBS publishers, Delhi
2	Remington	Tutorial Pharmacy	Mack Publishing Co. Easton.
3	Lachman	Theory and practice of Industrial Pharmacy	S.J. Carter.

Web Links

https://www.youtube.com/watch?v=Z_Mf Yn9X9ts
https://www.youtube.com/watch?v=eEiueLYpajQ
https://www.youtube.com/watch?v=53Q4QKDAi7o
https://www.youtube.com/results?search_query=mixing+pharmaceutical+engineering

Course outcome & Program outcome mapping

COURSE OUTCOMES	
On Completion of the course, the students will be able to	
CO1	Understand the concept of size reduction and illustration of variousequipment's Used
CO2	Understand the concept of mixing and homogenizations and variousequipments used for the process
CO3	Apply the sterilization process in the pharma industry using varioustypes of sterilization process
CO4	Perform the manufacturing and evaluation of parenterals in an asepticenvironment to prevent contamination

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3

Program Outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problemsand designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legal issues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change new drug investigations for new diseases.

PROGRAMME SPECIFIC OUTCOMES

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, record the observations and results and present the inference/conclusion

P.R.GOVERNMENTCOLLEGE(A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

FIRST YEAR SEMESTER-III

COURSE- 5 ADVANCED PHARMACEUTICS-I

WEIGHTAGE TO CONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, Understanding
	Total	6	7	95	

P.R. GOVERNMENT COLLEGE (A), KAKINADA

B. Voc (PHARMACEUTICAL CHEMISTRY)

FIRST YEAR III SEMESTER

Course – 5: ADVANCED PHARMACEUTICS-I

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTION BANK
ESSAY QUESTIONS

UNIT -I

1. Write the factors affecting size reduction.
2. Explain the construction and working of hammer mill and ball mill.
3. Explain sedimentation methods for size separation.

UNIT-II

1. Describe working of silverson mixer homogenizer and hand homogeniser
2. Write an essay on (i) Filter press and (ii) Sintered filters.
3. Write an essay on (i) double cone mixer and (ii) Triple Roller mill.

UNIT-III

1. Explain the following.

i. Sterilization by filtration

ii. Sterilization by moist heat

2. Explain the following.

iii. Sterilization by radiation.

iv. Sterilization by Gas

UNIT-IV

1. Describe different routes of administration of Parenterals.
2. Describe the formulation of Parenterals.
3. Explain the steps involved in the manufacture of Parenteral preparations.

(SHORT QUESTIONS)

UNIT-I

1. Write a note on objectives of size reduction.
2. Write a note on construction and working of fluid energy mill.

3. Write about official standards for powders.

UNIT-II

1. Write a note on homogenization and mixing.
2. Define clarification and filtration and write about filter media
3. write about filter candles and metafilter
4. write about propeller mixer and planetary mixer

UNIT-III

1. Explain the concept of sterilization. How does it differ from disinfection?
2. Write about thermal resistance of micro organisms.
3. Write a short note on dry heat.

UNIT-IV

1. What are the essential qualities of a parental product.

2.Define parental preparation and types of parental preparation

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (III Semester)			
Course Code	**TITLE OF THE COURSE** **ADVANCED PHARMACEUTICS-I PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge on different conventionaldosage forms.	-	-	30	4+1

PRACTICALS

1. Evaluation of factors effecting rate of filtration
2. Preparation and submit zinc starch dusting powder
3. Determination of particle size distribution by sieving method
4. Evaluate the Ibuprofen tablet by dissolution & disintegration method
5. Preparation of ascorbic acid injection

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE ADVANCED PHARMACEUTICS-II	B. Voc., Pharmaceutical chemistry (III Semester)			
Teaching	Hours Allocated: 30hrs (Theory)	L	T	P	C
Pre-requisites	fundamental knowledge on different ophthalmicand parenteral dosage forms.	30	10	30	2+1

Course Objectives: After the successful completion of this course, the student will be able to

i. Learn about different semi solid dosage forms
ii. Learn about different opthalamic dosage forms
iii. Different sterilization processes
iv. Manufacture of Parenterals

COURSE OUTCOMES

On Completion of the course, the students will be able to	
CO1	Understand the concept and different types of semi-solid dosage forms
CO2	Illustrate about routes of admistration and different types of parenteral preparations
CO3	Formulate different kinds of ophthalmic preparations like eyedrops, eye lotions andeye ointments
CO4	Understand the concept of different kinds of cosmetics that we use in daily life.

Course with focus on employability / entrepreneurship / Skill Development Modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT – I:

SEMI SOLID DOSAGE FORMS

Definition, Types of semi solid dosage forms, Characteristics of an ideal ointment, classification of ointments, types of ointment bases ,Advantages & Disadvantages ofointment bases, preparation of ointments-trituration method, fusion

method, storage of ointments, evaluation tests of ointment

UNIT-II

STERILE DOSAGE FORMS

Definition of Parenterals, Advantages & Disadvantages of Parenterals, routes of administration of Parenterals , types of Parenteral preparation , formulation of Parenteral preparations. Processing of Parenteral preparations. Evaluation of Parenteral preparations.

UNIT-III

OPHTHALMIC PRODUCTS

Definition, Characteristics of ideal ophthalmic products, types of ophthalmic products-eye drops-factors effecting formulation of eye drops, containers for eyedrop. Eye lotions-sodium chloride and sodium bicarbonate eye lotions. eyeointments-characteristics of .eye ointments –atropine. Eye suspension characteristics of .eye suspension. Contact lens-types of contact lens, storagesolution ofcontact lens

UNIT-IV

DENTAL & COSMETIC PRODUCTS

Definition of Dentifrices, Characteristics of ideal Dentifrices, ingredients ofDentifrices, tooth paste, tooth powder.

Definition of cosmetics, classification of cosmetics

cold creams, lipsticks, deodorants, shampoos, shaving cream, sunscreen productsand baby care products

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	A.K.Gupta	Introduction to pharmaceutics II	CBS publishers, Delhi
2	S.S.Bajaj	pharmaceutics II	CBS publishers, Delhi
3	Dr.S.Sambathkumar	Industrial Pharmacy II	Nirali Prakashan

Web Links

https://www.youtube.com/watch?v=zrlsZ3g5Wak
https://www.youtube.com/watch?v=3TSeFbJxoXQ
https://www.youtube.com/watch?v=sSRn0rHRXU8
https://www.youtube.com/watch?v=QFUGirYiuGg

Course outcome & Program outcome mapping

COURSE OUTCOMES

On Completion of the course, the students will be able to	
CO1	Understand the concept and different types of semi-solid dosage forms
CO2	Illustrate about routes of admistration and different types of parenteral preparations
CO3	Formulate different kinds of ophthalmic preparations like eyedrops, eye lotions andeye ointments
CO4	Understand the concept of different kinds of cosmetics that we use in daily life.

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problems and designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legalissues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability toengage in independent and lifelong learning in the broadest context of technological change new drug investigations for new diseases.

Programme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, record the observations and results and present the inference/conclusion

P.R.GOVERNMENT COLLEGE(A),KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

SECOND YEAR SEMESTER-III

COURSE-6

ADVANCED PHARMACEUTICS-II

WEIGHTAGE TO CONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

FIRST YEAR III SEMESTER

Course – 6: ADVANCED PHARMACEUTICS-II

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTION BANK

ESSAY QUESTIONS (10M)

UNIT – I

1. Explain the classification of ointment bases.
2. Explain the preparation of ointments by Trituration method.
3. Explain the preparation of ointments by Fusion method.

UNIT – II

1. Explain the formulation of Parenteral preparations.
2. Explain the processing of parenteral preparations.
3. Explain the evaluation aspects of Parenteral preparations.

UNIT – III

1. Explain the factors affecting the formulation of eye drops.
2. Describe different types of containers for eye drops.

UNIT – IV

1. Explain the ingredients of dentifrices.
2. Define cosmetics. Explain the classification of cosmetics.
3. Write briefly on the following.

i. Deodorants

ii. Shampoos

SHORT ANSWER QUESTIONS (5M)

UNIT – I

1. Write the characteristics of an ideal ointment.
2. Write the advantages of ointment bases.
3. Explain the storage of ointments.

UNIT – II

1. Define Parenterals. Write advantages and disadvantages of Parenterals.
2. Write different types of Parenteral preparations.
3. Write different routes of administration of Parenterals.

UNIT – III

1. What are ophthalmic preparations? Write different types of ophthalmic products.
2. Write the characteristics of ideal ophthalmic products.
3. What are contact lens solutions? Write different types of contact lens.

UNIT – IV

1. Write the characteristics of ideal dentifrices.
2. Write the preparation of toothpaste.
3. Write the preparation of tooth powder

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (III Semester)			
Course Code	**TITLE OF THE COURSE** **ADVANCED PHARMACEUTICS-II PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge on different ophthalmicand parenteral dosage forms.	-	-	30	2+1

PRACTICALS

1. Preparations involving ophthalmic preparation
2. Preparation of cold Creams
3. Preparation of vanishing cream
4. Preparation of benzoic acid Ointment (whitfield's ointment)
5. Preparation of shampoo

SEMESTER- IV

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester I B. Voc., Pharmaceutical chemistry (III Semester)			
Course Code	**TITLE OF THE COURSE** **BASIC ANALYTICAL CHEMISTRY-II**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:		**60**	**10**	**30**	**4+2**

Course Objectives:

After the successful completion of this course, the student will be able to

Understand the theory and applications of different types of titrations.

Understand the principle and steps involved in gravimetric analysis.

Compare precision and accuracy

COURSE OUTCOMES

On Completion of the course, the students will be able to	
CO1	Understand various techniques used in drug analysis and quality control
CO2	Illustrate different types of methods used in the precipitatation titrations
CO3	Learn about different types of errors and their correction to restorethe accuracy and precision.
CO4	Learn about various types of reagents and their classification based on themechanism of action

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			**Employability**			**Entrepreneurship**	

Syllabus:Unit I:

Theoretical considerations and application in drug analysis and quality control of the following analytical techniques

1. Non-aqueous titrations
2. Complexometric titrations
3. Miscellaneous Methods of Analysis: Diazotization titrations, Kjeldahl method of nitrogen estimation, Karl-Fischer titration.

Unit–II:

Precipitationtitration

Introduction, Mohr's method, Volhard's method, adsorption indicators and its use in precipitation titrations.

Gravimetric analysis-principle and steps involved in gravimetric analysis, co-precipitation and postprecipitation. Limitations of gravimetric analysis.

Unit–III:

Errors and evaluation of analytical data

Error definition classification of errors (determinate and indeterminate errors), propagation of errors, absolute and relative error, accuracy and precision -methods of expressing accuracy and precision, confidence limits,significant figures and rules for computation of significant figures

Unit–IV:

Reagents & Solvent

Reagents, Solvents and their Classification:-Reagents: classification of reagents according to their action as Acids, Bases, Salts, oxidizing, reducing, complexing, chelating and precipitating reagents with suitable examples.

Solvents: Classification of solvents as protic, aprotic and amphoteric solvents, Acidic basic and neutral solvents, polar and non polar solvents,aqueous and non-aqueous solvents. Explanation with suitable examples

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Kazasoma sekhara Rao,Ch.Venkata Suresh.	Pharmaceutical inorganic chemistry	CBS publishers, Delhi
2	G.R. Chatwal.	Pharmaceutical inorganic chemistry	CBS publishers, Delhi

Web Links

https://www.youtube.com/watch?v=hdHi3f-LgfQ
https://www.youtube.com/watch?v=wdqq5ahVOCE
https://www.youtube.com/watch?v=dLv5eTw9VFw
https://www.youtube.com/watch?v=vh8_pUHu_6I

Course outcome & Program outcome mapping

COURSE OUTCOMES

On Completion of the course, the students will be able to	
CO1	Understand various techniques used in drug analysis and quality control
CO2	Illustrate different types of methods used in the precipitatation titrations
CO3	Learn about different types of errors and their correction to restorethe accuracy and precision.
CO4	Learn about various types of reagents and their classification based on themechanism of action

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problemsand designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legal

issues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change new drug investigations for new diseases.

Programme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, record the observations and results and present the inference/conclusion

P.R.GOVERNMENTCOLLEGE(A) ,KAKINADA

B.Voc(PHARMACEUTICALCHEMISTRY)

SECOND YEAR SEMESTER-IV

COURSE-7

BASIC ANALYTICALCHEMISTRY-II

WEIGHTAGE TO CONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, Understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

SECOND YEAR IV SEMESTER

Course – 7: BASIC ANALYTICAL CHEMISTRY-II

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTION BANK
(ESSAY QUESTIONS)

UNIT –I

1. Write the theory and applications of complexometric titrations.
2. Explain the estimation of nitrogen by Kjeldahl method.
3. Explain karl Fisher titrations.

UNIT-II

1. Explain Mohr's method for the determination of chloride.
2. Explain Volhard's method for the determination of chloride.
3. What is gravimetric analysis? Write the steps involved in gravimetric analysis.

UNIT-III

1. Explain significant figures. Write rules for computation of significant figures.
2. Define errors. Explain different types of errors.
3. Define accuracy and precision. Write different ways of expressing accuracy and precision.

UNIT-IV

1. Explain the classification of solvents with examples.
2. Explain the classification of reagents with examples.

SHORT ANSWER QUESTIONS(5M)

UNIT-I

1. Write a note on diazotization titrations.
2. Write different types of complexometric titrations.

UNIT-II

1. Explain post precipitation.
2. Explain co-precipitation.
3. What are the advantages and disadvantages of gravimetric analysis?

UNIT-III

1. Write the differences between accuracy and precision.
2. Explain propagation of errors.
3. Write a note on confidence limits.

UNIT-IV

1. Explain Acidic basic and neutral solvents with examples.
2. Explain oxidizing, reducing, complexing reagents with examples

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (IV Semester)			
Course Code	**TITLE OF THE COURSE** **BASICANALYTICAL CHEMISTRY –II PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	Study of various titrations.	-	-	30	4+1

PRACTICALS

1. Preparation of standardization of 0.02 M EDTA
2. Determination of Ca using EDTA
3. Determination of Ni using EDTA
4. Determination of chloride by Mohr's method
5. Determination of chloride by Volhard's method

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (IV Semester)			
Course Code	**TITLE OF THE COURSE INDUSTRIAL SAFETY AND MANAGEMENT**				
Teaching	Hours Allocated: 60hrs (Theory)	L	T	P	C
Pre-requisites	Fundamentals of industrial safety andmanagement	60	10	30	4+2

Course Objectives: After the successful completion of this course, the student will be able to

i. Understand the different types of hazards
ii. Understand the different types of explosives.
iii. Understand the different types of toxic gases

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COURSE OUTCOMES

On Completion of the course, the students willbe able to	
CO1	Learn the occupational health & safety
CO2	Learn the industrial safety & best practices.
CO3	Learn about toxic gases and explosions caused by them
CO4	Learn about the safety aspects in industry and quality management system

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		**Employability**		**Entrepreneurship**	

Syllabus:

UNIT1:

Industrial hazards

Definition, examples –types of hazards- fire ,fire triangle concept, mechanism of fire ,Flash point ,fire point ,auto ignition temperature – lower and upper flammable limits – ignition source of major fires – classification of fires and exhaustion to deal them, fire protection

measures, fire and emergency.

UNIT- II:

Toxicgases–classification, remedial measures, classification and hazardous materials. Noise and Vibration – effects and hazards of noise -control methods of noise-generation, nature & types of vibration- effects of vibration –control methods

Explosions:

Definition and classification of explosions. Mechanism Of explosion, incidents responsible for onset and hazards and accidents with flammable liquids and precautions.

UNIT–III

Occupational health and safety– elements of occupational health – industrial hygiene fundamental principles and industrial hygiene – housekeeping – Methods of good housekeeping
–Housekeeping contests - the 5 ‘s’ concept – ergonomic –definition–impact of poor ergonomics and good ergonomics.

Loss Prevention - Classification of Losses - Losses in a manufacturing plant –reasons and suggested measures to minimize them

UNIT–IV

Industrial safety: Elements of industrial safety – unsafe act and unsafe condition-accidents–cause of accidents–remedial measures–personal protective equipment.

Effective Systems– Best Practices

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Ratan Raj Tatiya	Elements of industrial hazards	CRC press
2	Dr.K.U.Mistry	Fundamentals of industrial safety &health	siddarth prakashan publishers, 2008.

Web Links

https://www.youtube.com/watch?v=rub7lclQbzw
https://www.youtube.com/watch?v=ARQftOs-bG8
https://www.youtube.com/watch?v=ooVXDYzrMA8

Course outcome & Program outcome mapping

COURSE OUTCOMES

On Completion of the course, the students willbe able to	
CO1	Learn the occupational health & safety
CO2	Learn the industrial safety & best practices.
CO3	Learn about toxic gases and explosions caused by them
CO4	Learn about the safety aspects in industry and quality management system

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problemsand designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legal issues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technologicalchange new drug investigations for new diseases.

Programme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, record the observations and results and present the inference/conclusion

P.R. GOVERNMENT COLLEGE(A),KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)
SECOND YEAR SEMESTER-IV

COURSE-8 INDUSTRIAL SAFETY & MANAGEMENT

WEIGHTAGE TO CONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

SECOND YEAR IV SEMESTER

Course – 8: INDUSTRIAL SAFETY AND MANAGEMENT

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTION BANK

ESSAY QUESTIONS (10M)

UNIT-I

1. Explain the terms

A) Flash point B)Fire point

2. Explain ignition sources of major fires.
3. Classification of fires.

UNIT-II

1. Explain the classification of explosion.
2. Explain the incidents responsible for onset of hazards & accidents
3. Write about classification of toxic gases.

UNIT-III

1. Explain the 5'S'concept.
2. What are ergonomics. Write the impact of poor & good ergonomics.
3. Explain the classification of losses.

UNIT-IV

1. What are the elements of industrial safety.
2. Explain the principles of management.
3. Define management & Explain nature and importance of management.

SHORT ANSWER QUESTIONS(5M)

UNIT-I

1. Write a short note on industrial hazards with examples.
2. Explain types of hazards.
3. Write a short note on mechanism of fire 'Fire triangle concept'

UNIT-II

1. What are the remedial measures for prevention of toxic gases.
2. Write a short note on noise control techniques.
3. What are the effects of noise pollution.

UNIT-III

1. Define OHS. What are the elements involved in OHS.
2. Write a short note on house keeping.
3. Write the reasons & suggest the measures to minimize the losses.

UNIT-IV

1. Write a note on personnel protective equipment.
2. What are the remedial measures to minimize the accidents

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (IV Semester)			
Course Code	**TITLE OF THE COURSE** **INDUSTRIAL SAFETY AND MANAGEMENT PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamentals of industrial safety andmanagement.	-	-	30	2+1

PROJECT WORK

SEMESTER-V

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE** **PHARMA REGULATORY AFFAIRS**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites	fundamental knowledge about regulatory affairs	60	10	30	4+1

Course Objectives:

To make the student

I. Understand the different types of hazards
II. Understand the Good laboratory practices.
III. Understanding the Investigation of new drug.

On Completion of the course, the students will be able to	
CO1	The Pharmaceutical legislations and their implications in thedevelopment and marketing of pharmaceuticals.
CO2	The regulatory authorities and agencies governing themanufacture and sale of Laws pharmaceuticals
CO3	Know different and Acts that regulate pharmaceutical industry.
CO4	Learn marketing of pharmaceuticals

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		**Employability**		**Entrepreneurship**	

Syllabus:

UNIT :1

Good laboratory Practice, responsibilities of personnel Standard operating procedure, StandardTestingprocedure, Certificate of Analysis, Method of Analysis, good receipt note.

UNIT - II

Approval of new drugs-Investigational New Drugs (IND) submission, format & content of IND, content of investigator Brochure, general consideration of new drugApproval (NDA), specific requirements, content & format of NDA, manufacturing control requirement of NDA,

UNIT-III

GMP, TQM, ICH ,CGMP

UNIT:IV

Occupational Health and Hazards, Safety at workplace, Accident preventiontechniques, Safety Management system, list of hazardous chemicals and handling of toxic andhazardous chemicals,acids,ether & etc.

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	ISO 9000	K_3, K_6	5%
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	J.A Dean	analytical chemistry handbook	McGrew hill Inc., 1st Ed,. 1995.
2	LE Limbard	Goodman & Gilman:	siddarth prakashan publishers, 2008.
3	JG Hardman	Central Drugs Standard Control Organization. Good Clinical Practices-Guidelines forClinical Trials on pharmaceutical Products in India.	New Delhi: Ministry of Health; 2001.

Web Links

https://www.youtube.com/watch?v=2gxTcaAP1PI
https://www.youtube.com/watch?v=DQ7JPNgU8Wg
https://www.youtube.com/watch?v=TG3bEni1CiM
https://www.youtube.com/watch?v=OvRSlJ8YsKU

Course outcomes and programme outcomes mapping

On Completion of the course, the students will be able to	
CO1	The Pharmaceutical legislations and their implications in thedevelopment and marketing of pharmaceuticals.
CO2	The regulatory authorities and agencies governing themanufacture and sale of Laws pharmaceuticals
CO3	Know different and Acts that regulate pharmaceutical industry.
CO4	Learn marketing of pharmaceuticals

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problems and designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legalissues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability toengage in independent and lifelong learning in the broadest context of technological change new drug investigations for new diseases.

Progarmme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms

of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, recordthe observations and results and present the inference/conclusion

P.R.GOVERNMENTCOLLEGE(A),KAKINADA

B.Voc (PHARMACEUTICALCHEMISTRY)

THIRD YEAR V SEMESTER

Course–9 PHARMAREGULATORY AFFAIRS

WEIGHTAGE TO CONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, Understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course – 9 PHARMAREGULATORY AFFAIRS

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTION BANK
(ESSAY QUESTIONS)

UNIT-1

1. Write about GLP
2. Why are the reserve samples maintained.
3. State the contents of S O P on handling of the rejecting material.

UNIT-II

1. What are the content of NDA.
2. What are the content of IND.
3. Explain the submission of IND.

UNIT-III

1. Write about ICH guidelines
2. Write about GMP and CGMP

UNIT-IV

1. Write a note on first aid
2. List out the hazardous chemicals in pharmaceuticals.
3. Describe various safety rules at work place.

SHORT QUESTIONS

UNIT-I

1. Write about certificate of Analysis
2. Write the prinicples of GLP
3. Write about generating STP

UNIT-II

1. Explain the content of investigator Brochure.
2. What are the specific requirements, content & format of NDA
3. 3.What are the manufacturing control requirement of NDA.

UNIT-III

1. Define GMP protocol
2. Write a note on TQM

UNIT-IV

1. Write about personnel protective equipment
2. Write about fire extinguishers
3. Write about safety signs and signal

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE** **PHARMAREGULATORY AFFAIRS PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge about regulatory affairs	-	-	30	4+1

Practicals:

1. Fraibility test for different solid dosage forms
2.Disintegration test for different solid dosage forms
3.Dissolution test for different solid dosage forms
4 Give the application & format of IND
5. Give the application & format of INDA

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	**Program & Semester** B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE** **PHARMACEUTICAL INORGANIC CHEMISTRY**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites	fundamental knowledge about impurities	60	10	30	4+1

Course Objectives:

Upon completion of this course the student should be able to:

i. Understand the different types of impurities.
ii. Understand the different types of anti-oxidants.
iii. Understanding the radiopharmaceuticals

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Learn about various types of impurities in pharmaceutical substances
CO2	Understand the concept of pharmaceutical aids
CO3	Learn about various types of anti-oxidants and compounds that are used asThem
CO4	Illustrate about the effects and precautions to be taken while using the radioactive agents

Course with focus on employability / entrepreneurship / Skill Developmentmodules

Skill Development			**Employability**			**Entrepreneurship**	

Syllabus:

UNIT I

Impurities in pharmaceutical substances: Impurities commonly found in medicinal preparations. Sources of impurities in pharmaceutical chemicals, effect of impurities on

pharmaceutical preparations. Permissible impurities in pharmaceutical Substances. Methods used to purify inorganic substances. Principle and method involved in the limittest for Chlorides, Sulphate, Iron, Lead.

UNIT II

Pharmaceutical aids: definition and classification-Role of different pharmaceutical aids (acidifiers, alkalizing agents, buffers, anti-oxidants and preservatives, desiccants,emulsifiers, coloring, flavoring, and sweetening agents, solvents) in pharmaceutical preparations.

Unit III

Antioxidants: Definition, criteria for a substance to act as antioxidant. Compounds used as antioxidants (Sodium metabisulphite, Nitrogen, Sodium thiosulphate, sodium bisulphite, sodium nitride) and their uses.

Gastrointestinal agents: Definition, examples. Acidifying reagents or Acidifiers and their types. Antacids- Definition, antacid therapy, role and criteria and side effects of antacids, examples of compounds used as antacids
Cathartics, purgatives and laxatives: Definition and examples.

Unit IV

Radio pharmaceuticals: Radio activity, radioactive rays (Alfa, beta and gamma rays), isotopes definition and examples, units of radioactivity, biologicaleffects of radiation, precautions to be taken while handing and storage of radioactive isotopes ,applications of radioactive in research, diagnosis and medicines.

Water: Water as universal pharmaceutical vehicle. Water: official water (water, purified water, water of injection, bacteriostatic water for injection, sterile water for injection).

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Kaza somasekhara Rao,Ch.VenkataSuresh	Pharmaceutical inorganic chemistry	McGrew hill Inc., 1st Ed,. 1995.
2	G.R.Chatwal.	Pharmaceutical inorganic chemistry:	siddarth prakashan publishers, 2008.

¶ **Web Links**

https://www.youtube.com/watch?v=nVz37y5LREA

https://www.youtube.com/watch?v=AJdAbL0HnqE

https://www.youtube.com/watch?v=i7lfOyhvDuE

Course outcomes and programme outcomes mapping

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Learn about various types of impurities in pharmaceutical substances
CO2	Understand the concept of pharmaceutical aids
CO3	Learn about various types of anti-oxidants and compounds that are used asThem
CO4	Illustrate about the effects and precautions to be taken while using the radioactive agents

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problems and designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legalissues.

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PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability toengage in independent and lifelong learning in the broadest context of technological change new drug investigations for new diseases.

Programme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, recordthe observations and results and present the inference/conclusion

P.R.GOVERNMENTCOLLEGE(A),KAKINADA

B.Voc(PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–10: PHARMACEUTICAL INORGANIC CHEMSTRY

WEIGHTAGETOCONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course – 10: PHARMACEUTICAL INORGANIC CHEMSTRY

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

Question bank

Essay questions (10M)

Unit-I

1. Explain different sources of impurities in medicinal preparations.
2. Explain principle and method involved in the limit test for a) chloride b) iron.
3. Explain principle and method involved in the limit test for a) sulphate b) lead

Unit-II

1. Explain the role of acidifiers,buffers,and anti oxidants in pharmaceuticalpreparations.
2. Explain the role of preservatives,emulsifiers and solvents in pharmaceutical preparations.
3. Explain the role of coloring, flavoring, sweetening agents and desiccants in pharmaceutical preparations.

Unit-III

1. Define anti oxidants. Explain the uses of sodium thiosulphates sodiumbisulphate and nitrogen as anti oxidants.
2. Define antacids. Explain the criteria ,uses and side effects of antacids.
3. Define gastrointestinal agents. Explain different types of acidifiers withexamples.

Unit-IV

1. Explain the precautions to be taken while handling radioactive meterials.
2. Write the applications of radioactive isotopes in medicine and research.
3. Explain different types of water used in pharmaceutical preparations.

Short answer questions (5M)

Unit-I

1. Explain some common impurities found in medicinal preparation.
2. Write effect of impurity on pharmaceutical preparations.
3. Write some permissible impurities in pharmaceutical substances.

Unit-II

1. Define pharmaceutical aids and classify them.
2. Explain the role of preservatives in pharmaceutical preparations.
3. Explain the role of anti oxidants in pharmaceutical preparations.

Unit-III

1. Define anti oxidants and write the criteria for a substances to act as antioxidants.
2. Write the uses of sodium nitride as anti oxidant.
3. Define gastrointestinal agents give examples.

Unit-IV

1. Define isotopes and give examples write the units of radioactivity.
2. Write the biological effects of radiation.

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE** **PHARMACEUTICAL INORGANICCHEMISTRY PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge about limit tests	-	-	30	4+1

PRACTICALS :

1. Limit tests for chlorides
2. Limit tests for sulphate
3. Limit test for iron
4. Preparation of basic buffer
5. Preparation of acidic buffer

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE ADVANCED ANALYTICAL CHEMISTRY**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites	fundamental knowledge about chromatography	60	10	30	4+1

Course Objectives:

Upon completion of this course the student should be able to:

i. Understand the chromatography techniques.

ii. Understand the solvent extraction process.

iii. Understand the common separation techniques

Understanding the common separation techniques

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Understand the concept of some common separation techniques
CO2	Learn about the principle and process involved in solvent extraction
CO3	Learn about the principles and development of chromatogram
CO4	Learn about the principles and applications of gas- liquid chromatography and highperformance liquid chromatography.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		**Employability**		**Entrepreneurship**	

Syllabus:

Unit – I:

Some common separation techniques: Principles and applications Crystallization, Filtration, Decantation, Sublimation, Evaporation, Simple distillation, Fractional distillation, Centrifugation

Unit – II:

Solvent Extraction- definition- principle and process – Nernst distribution law andits limitations- Types of solvent extraction- batch extraction and continuous extraction- applications of solvent extraction

Unit – III:

Chromatography- definition- classification –paper chromatography- principle and experimental details- R_f value definition and factors affecting R_f factor- development of chromatogram- ascending, descending, two dimensional and radial chromatography- applications of paperchromatography.

Thin Layer chromatography- principle and experimental details- superiority of thin layerchromatography over paper chromatography- applications of thin layer chromatography.

Unit – IV:

Column chromatography- principle and experimental details- applications of column chromatography.

Gas- Liquid Chromatography: Principle, Experimental details, Instrumentation and applications.

High Performance Liquid Chromatography: Principle, Experimental details,Instrumentation andapplications

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Skoog andMiller	Analytical Chemistry	CBS publishers
2	A.I.Vogel	A textbook of qualitative inorganic analysis:	CBS publishers
3	Geoffrey Ozin	Nanochemistry	AndreArsenault

¶ Web Links

https://www.youtube.com/watch?v=M6lMHwCShkg

https://www.youtube.com/watch?v=ABwhvhA5sTI&list=PLOxj- B 7rZRao709ygAzF3xbugxDL9MASOv

https://www.youtube.com/watch?v=0KqaIKHzHE8

Course outcomes and programme outcomes mapping

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Understand the concept of some common separation techniques
CO2	Learn about the principle and process involved in solvent extraction
CO3	Learn about the principles and development of chromatogram
CO4	Learn about the principles and applications of gas- liquid chromatography and highperformance liquid chromatography.

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problems and designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legal issues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change new drug investigations for new diseases.

Programme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanismsof chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, recordthe observations and results and present the inference/conclusion

P.R.GOVERNMENTCOLLEGE(A),KAKINADA

B.Voc(PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–11: ADVANCED ANALYTICAL CHEMISTRY

WEIGHTAGETOCONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course – 11: ADVANCED ANALYTICAL CHEMISTRY

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

ESSAY QUESTIONS
(10 MARKS)

Unit – I:

1. Write the principle and application of simple distillation
2. Write the principle and application of fractional distillation.
3. Write the principles and applications of crystallization.

Unit – II:

1. Explain Nernst distribution law with limitations.
2. What are types of solvent extraction? Explain in detail.

Unit – III:

1. Explain the principle and experimental details of paper chromatography.
2. Write the classification of paper chromatography.
3. Explain the principle and experimental details of thin layer chromatography.

Unit – IV:

1. Explain the principle and experimental details of column chromatography.
2. Explain the principle and experimental details of gas-liquid chromatography.
3. Explain The principle and experimental details of high performance liquid chromatography.

Short answer questions (5M)

Unit-I:

1. Write the principle of centrifugation.
2. What are applications of sublimation?
3. What are applications of filtration?

Unit – II

1. Write the principle of solvent extraction with examples.
2. Write the applications of solvent extraction

Unit – III:

1. Define R_f value. What factors affecting R_f value?
2. Explain the superiority of thin layer chromatography over paper chromatography.
3. Write the applications of paper chromatography.
4. Write the applications of thin layer chromatography

Unit – IV:

1. Write the applications of column chromatography.
2. Write the applications of gas-liquid chromatography
3. the instrumentation of gas-liquid chromatography.
4. Write the instrumentation of high performance liquid chromatography.

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE** **ADVANCED ANALYTICAL CHEMISTRY PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge on different conventionaldosage forms.	-	-	30	4+1

PRACTICALS:

1. Separation of any two components by using simple distillation method.
2. Determination of Rf values of amino acid using paperchromatography
3. Determination of Rf value of amino acid using thin layer chromatography
4. Separation of methylene blue & methyl orange by using Column chromatography.

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester: B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE BASIC QUALITYCONTROL ANDQUALITYASSURANCE**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites	fundamental knowledge about QA and QC	60	10	30	4+1

Course Objectives:

Upon completion of this course the student should be able to:

1. Understand the cGMP aspects in a pharmaceutical industry.
2. Appreciate the importance of documentation
3. Understand the responsibilities of QA & QC departments

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Understand about various types of precautions to be taken during samplePreparation
CO2	Learn about the process of production in pharmaceutical industry
CO3	Correlate GLP with GMP in the documentation process
CO4	Learn about the practice of documentation in pharmaceutical industry

Course with focus on employability / entrepreneurship / Skill Developmentmodules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit –I

Basics of sample preparation, preservation & storage:

Sampling process-purpose of sampling-classes and types of pharmaceutical products-sampling facilities-sampling process-sampling procedure-sampling operation and precautions-Toxicity and carcinogenicity in handling critical samples-Standards and guidelines for sample handling- sample handling and stability-Good storage practices.

Unit –II

Over view of Production Process for Life Sciences Industry

Fundamental science of API Production API Definition-Role of APIs – Top API Manufactures Need for conversation of drugs into formulations-Principles of Manufacturing operations.

Unit –III

Validation in Pharmaceuticals

What is validation- Definition- difference between calibration- validation – Types of validation- Raw material validation & process validation - Change Control Management-Define change request

Unit –IV Documentation practices

Documents practices required by cGMP-Different types of documents,SOPs and records-Document preparation, document/record issuance and retrieval-Good Document practices-Documentation in line with GLP and GMP, Batch release documents

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Lachman L., Liberman H.A., and Kanig J.L	Theory and Practice of Industrial Pharmacy	USA., latest edition.
2	Sambhamurthy	Pharmaceutical Engineering	New Age Publishers, latestedition
3	Sethi PD	Quantitative analysis of drugs in pharmaceutical formulations	CBS publications, New Delhi, 2008

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¶ **Web Links**

https://youtu.be/7cYa_7GZjPU?si=3VBaK3B0xRLeStrg

https://youtu.be/vmfGukpcdjI?si=53juGc5n6J6R541N

https://youtu.be/ICcVaVhkM-g?si=FNsa5okOMH77Nv6p

https://youtu.be/L5mT8i8H8hE?si=1lUr-6OaxmreZhgM

Course outcomes and programme outcomes mapping

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Understand about various types of precautions to be taken during samplePreparation
CO2	Learn about the process of production in pharmaceutical industry
CO3	Correlate GLP with GMP in the documentation process
CO4	Learn about the practice of documentation in pharmaceutical industry

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problems and designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legalissues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

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Programme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, recordthe observations and results and present the inference/conclus

P.R.GOVERNMENTCOLLEGE(A),KAKINADA

B.Voc(PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–12: BASIC QUALITY CONTROL AND QUALITY ASSURANCE

WEIGHTAGETOCONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–12: BASIC QUALITY CONTROL AND QUALITY ASSURANCE

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTION BANK

ESSAY QUESTIONS

UNIT-I

1. What are the various sampling process involved in pharmaceutical Industry
2. Describe the sampling procedure for raw materials in pharmaceutical industry
3. Describe the sampling procedure for powdered starting materials
4.

UNIT-II

1. What is the need for conversion of drug into formulation.
2. What are the various prinicples of manufacturing

UNIT-III

1. Write short note on process validation.
2. Write about equipment validation.
3. Explain about concurrent validation.

UNIT IV

1. Write about good documentation practices.
2. Explain the guidelines for document preparation.

SHORT ANSWERS

UNIT-I

1. Differentiate toxicogenicity & carcinogenicity
2. Describe the five steps in sampling procedure
3. Describe the steps to weigh the sample

UNIT-II

1. Enlist the various types of SOPs and discuss them briefly
2. Write a short notes on MSDS preparation
3. Give a short notes on (a) Batch record documentation (b) Log Books

UNIT-III

1. Define calibration, valdation and qualification
2. Explain the change control procedure in pharmaceutical industry

UNIT IV

1. What are the various types of documents .
2. Write a short note on SOP
3. Explain the guidelines for document preparation.

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester			
Course Code	**TITLE OF THE COURSE** **BASIC QUALITY CONTROL AND QUALITY ASSURANCE PRACTICAL**	B. Voc., Pharmaceutical chemistry (V Semester)			
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge about QA and QC	-	-	30	4+1

PRACTICALS

1. Extraction of caffeine from tea powder.
2. Extraction of Lactose from milk.
3. Extraction of Lycopene from tomato.
4. Extraction of piperine from pepper.
5. Extraction of carotene from carrot.

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	**Program & Semester** B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE DOCUMENTATION FOR QUALITY CONTROL**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites	fundamental knowledge on different conventionaldosage forms.	60	10	30	4+1

Course Objectives:

Upon completion of this course the student should be able to:

1. understand the Quality management system.
2. appreciate the importance of documentation
3. 3.understand the advance R& D approaches

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Understand the concept of validation and qualification
CO2	Understand the concept of quality management system
CO3	Learn the rules and regulations for documentation in pharma industry as a partof quality control
CO4	Learn about the fundamentals of R&D

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			**Employability**			**Entrepreneurship**	

Syllabus:

Unit –I validation

What is validation?- Validation versus Qualification- what has to be validated- phases of validation

–validation time line-DQ,IQ-OQ-PQ-OQ-validation report-settingthe specification in DQ – Installation qualification (IQ) and operational qualification (OQ)-on going performance (PQ)-

Operating instruments like stability chambers- BOD incubators-stability programme for validation

Unit –II Quality Management System (OOS, OOT)

Definition-QbD system-Need for QbD-handling of market complaints-correctionactions- deviations and incidents-reporting, investigation and disposition of incidents,CAPA definition-flow chart of QA

Unit –III Documentation practices

Ten commandments of cGMP-cGMP enforcement and Guidelines-Code of FederalRegulation (CFR-210 & 211)- Audit & Self inspection-Quality audit-Documents practices required by cGMP- Different types of documents, SOPs and records-Document preparation, document/record issuanceand retrieval-Good Document practices-Documentation in line with GLP and GMP

Unit –IV Fundamentals of Advance R&D approaches

Method Transfer Process and how to manage the Quality Risk-Quality Risk Management (QRM)-Responding to an Audit/Process related Query-Change Management

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Lachman L., Liberman H.A., and Kanig J.L	Theory and Practice of Industrial Pharmacy	USA., latest edition.
2	Sambhamurthy	Pharmaceutical Engineering	New Age Publishers, latestedition
3	Sethi PD	Quantitative analysis of drugs in pharmaceutical formulations	CBS publications, New Delhi, 2008

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¶ **Web Links**

https://youtu.be/isR6T_paqUo?si=RewP977s6HdQGP8U
https://youtu.be/bEeZtyfE_BA?si=VW4SbWP8S2css6WV
https://youtu.be/0iXxoNlTxr8?si=7oIMqHPZiXegcsJ-
https://youtu.be/nNlySVarLQg?si=DbVMRb6EHC8Uu6Zk

Course outcomes and programme outcomes mapping

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Understand the concept of validation and qualification
CO2	Understand the concept of quality management system
CO3	Learn the rules and regulations for documentation in pharma industry as a partof quality control
CO4	Learn about the fundamentals of R&D

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

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CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

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PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

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P.R.GOVERNMENTCOLLEGE(A),KAKINADA

B.Voc(PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–13: DOCUMENTATION FOR QUALITY CONTROL

WEIGHTAGETOCONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–13: DOCUMENTATION FOR QUALITY CONTROL

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTION BANK

ESSAY QUESTIONS

UNIT I

1. Define validation; write its importance and types. Write about validation master plan
2. Explain the validation protocol for cleaning process
3. How to perform Analytical method validation

UNIT-II

1. What are the salient features of CAPA
2. Explain different types of documents.
3. What are incidents? Explain reporting, investigation and deposition ofincidents.

UNIT-III

1. Enumerate 10 principles of cGMP
2. What are Standard Operating Procedures (SOP)
3. What do you understand by master formula record. Write a brief note.

UNIT-IV

1. Explain quality risk management system.
2. What is method transfer process. Write the process related query.

SHORT ANSWER TYPE QUESTIONS (5M)

UNIT-I

1. Write about validation master plan
2. Validation timeline for DQ and IQ.
3. What are phases of validation?

UNIT-II

1. Write a short note on batch record documentation.
2. Define CAPA. Explain flowchart of QA.
3. Define QbD. Explain the need of QbD.

UNIT-III

1. Write about GdP.
2. Explain importance of documentation in Pharmaceutical industries.
3. Explain quality audit.

UNIT-IV

1. Write a short note on complaint files.
2. Write a short note on log books.

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE** **DOCUMENTATION FOR QUALITYCONTROL PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge on different conventionaldosage forms.	-	-	30	4+1

PROJECT WORK

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester B. Voc., Pharmaceutical chemistry (V Semester)			
Course Code	**TITLE OF THE COURSE** **PHARMACEUTICAL AND MEDICINAL CHEMISTRY**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites	fundamental knowledge about various drugs	60	10	30	4+1

Course Objectives:

Upon completion of this course the student shouldbe able to:

1. Understand the Pharma dynamics of a drug.
2. learn terminology of drugs.
3. 3.learn HIV therapeutic drugs.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Learn about pharmaceutical chemistry and its terminology
CO2	Understand the concept of pharmacodynamics and pharmacokinetics
CO3	Learn about the classification of drugs based on the structure and therapeuticActivity
CO4	Illustrate the mechanism of AIDS and the drugs available for the prevention

Course with focus on employability / entrepreneurship / Skill Developmentmodules

Skill Development			**Employability**			**Entrepreneurship**	

Syllabus:UNIT-I

Pharmaceutical chemistry Terminology: Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics (ADME, Receptors - brief treatment) Metabolites and Antimetabolites.

UNIT-II

Drugs:

Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each.

Dosage forms: need for conversion drugs into medicines, different types of dosage forms based on physical state, Route of admistration

UNIT-III

Synthesis and therapeutic activity ofthecompounds:

a. Chemo therapeutic Drugs

1. Sulphadrugs(Sulphamethoxazole) 2.Antibiotics - β-Lactam Antibiotics, MacrolideAntibiotics, 3. Anti malarial Drugs (chloroquine)

b. Psycho therapeutic Drugs:

1. Anti pyretics(Paracetamol) 2.Hypnotics, 3.Tranquilizers(Diazepam)4.Levodopa
2. Anti viral drugs (acyclovir)

UNIT-IV

PharmacodynamicDrugs:

1. Antiasthma Drugs (Solbutamol) 3. Antianginals (Glycerol Trinitrate)

4. Diuretics (Frusemide) HIV-AIDS

Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, prevention of AIDS, Drugs available - examples with structures: PIS: Indivanir (crixivan),Nelfinavir(Viracept).

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_2	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	

K_1= Remembering, K_2= Understanding, K_3= Applying, K_4= Analysing, K_5= Evaluating, K_6=Create

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Dr. B.V.Ramana	Medicinal Chemistry	USA., latest edition.
2	O.D.Tyagi	Synthetic Drugs	New Age Publishers, latestedition
3	R.S Satoshkar & S.D.Bhandenkar	Pharmacology& Pharmacotherapeutics	CBS publications, New Delhi, 2008

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¶ **Web Links**

https://youtu.be/kHqxnFewdEg?si=V9peC0FzR_rrWdUG
https://youtu.be/X-QCNuVWd4Y?si=N_1fdHVpT8Z60d89
https://youtu.be/L1W0q1kEof4?si=8Q0l2KKK62pu0aDa
https://youtu.be/JEqdmNAqL8s?si=ox8ewB7v5QeD37XB

Course outcomes and programme outcomes mapping

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Learn about pharmaceutical chemistry and its terminology
CO2	Understand the concept of pharmacodynamics and pharmacokinetics
CO3	Learn about the classification of drugs based on the structure and therapeuticActivity
CO4	Illustrate the mechanism of AIDS and the drugs available for the prevention

CO-POMapping:

(1:Slight[Low]; 2:Moderate [Medium]; 3:Substantial [High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	3	1	2	2	3	2	3	3
CO2	3	2	3	3	2	3	3	1	3	3	2	3	2
CO3	3	3	3	3	2	2	2	2	2	3	3	3	2
CO4	3	2	2	2	2	2	3	3	1	1	3	3	3
Avg.	**2.75**	**2.5**	**2.5**	**2.75**	**2.25**	**2.5**	**2.25**	**2**	**2**	**2.5**	2.5	3	2.5

Programme outcomes

PO1 : Knowledge in Pharmaceutical Chemistry : Apply the knowledge of different dosage forms and their routes of administration.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze simple to complex problems reaching substantiated conclusions using fundamental principles of pharmaceutical chemistry.

PO3: Design/development of solutions: Design solutions for simple to complex problems and designing novel routes for the synthesis of bioactive / active pharmaceutical ingredients.

PO4: Conduct investigations on new drug discoveries: Use fundamental research-based knowledge and available research methodologies including design of experiments, analysis and interpretation of data, and synthesis of the drug molecules.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for drug modeling and interpretation of simple to complex drug molecules.

PO6 : Society: Applying the contextual knowledge to assess societal, health, safety, legalissues.

PO7: Environment and sustainability: Understand the importance of synthetic drug chemistry for various discoveries in the field of health science and demonstrate the knowledge for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmaceutical manufacturing practice.

PO9 : Communication: Communicate effectively on issues related to pharmaceutical chemistry with the medical community, being able to write the effective reports and documentations and presentations.

PO10: Life-long learning: Recognize the need for, and have the preparation and ability toengage in independent and lifelong learning in the broadest context of technological change new drug investigations for new diseases.

Programme specific outcomes

PSO-1: To have a firm foundation in the fundamentals/concepts/theories and its applications in pharmaceutical chemistry.

PSO-2: To understand the structure and properties of drugs, Characteristics mechanisms of chemical reactions and their usage in pharmaceutical chemistry

PSO-3: To acquaint with safety measures that are to be taken in pharmaceutical chemistry laboratory and develop skills in proper manufacturing methods of pharmaceuticals and usage of different apparatus/instruments and carry out experimental procedures, record the observations and results and present the inference/conclusion

P.R.GOVERNMENTCOLLEGE(A),KAKINADA

B.Voc(PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–14: PHARMACEUTICAL AND MEDICINAL CHEMISTRY

WEIGHTAGETOCONTENT

S No.	Course Content	Essay (10M)	Short (5M)	Total marks	Question Relates as per Bloom's Taxonomy
1.	UNIT-I	2	2	30	Understanding. Skill
2.	UNIT-II	2	2	30	Remembering, Understanding
3.	UNIT-III	1	2	20	Remembering, Knowledge
4.	UNIT-IV	1	1	15	Evaluating, understanding
	Total	6	7	95	

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

V SEMESTER

Course–14: PHARMACEUTICAL AND MEDICINAL CHEMISTRY

Model Question Paper

Time 2hrs. **Max. Marks-50M**

SECTION-A

Answer any THREE questions choosing at least ONE question from each part

PART-A **3x10=30M**

1. One question from unit-I
2. One question from unit-I
3. One question from unit-II

PART-B

4. One question from unit-II
5. One question from unit-III
6. One question from unit-IV

SECTION-B

Answer any FOUR questions from the following **4x5=20M**

7. One question from unit-I
8. One question from unit-I
9. One question from unit-II
10. One question from unit-II
11. One question from unit-III
12. One question from unit-III
13. One question from unit-IV

QUESTIONBANK

(Essayquestions10marks)

UNIT-I

1. Explain metabolites and anti metabolites with an example each
2. Explain ADME in pharmacokinetics.

Unit-II

1. Explain the classification of drugs based on structure.
2. Explain the classification of drugs based on therapeutic activity.

UNIT-III

1. Write the synthesis and therapeutic activity sulphamethoxazole
2. Write the synthesis and therapeutic activity chloroquine
3. Write the synthesis and therapeutic activity diazepam

UNIT-IV

1. Write the synthesis and therapeutic activity solbutamol
2. Write the synthesis and therapeutic activity glycerol trinitrate.
3. Write the synthesis and therapeutic activity frusemide.

Short answer questions(5M)

UNIT-I

1. Explain the terms pharmacy and pharmacology.
2. Explain Pharmacophore with two examples.

Unit-II

3. Explain chemical name generic name and trade name with examples.
4. Write different types of dosage forms based on a) physical state b) route ofadmistration

UNIT-III

1. Write sort note on anti biotics

2. Write short notes on anti pyretics
3. What are hypnotics and tranquilizers give examples

UNIT-IV

1. Write about methods of prevention of AIDS.
2. Write the structures of drugs a) indivanir b) Nelfinavir.

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Course Code	**TITLE OF THE COURSE** **PHARMACEUTICAL AND MEDICINAL CHEMISTRY PRACTICAL**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites	fundamental knowledge about drugs	-	-	30	4+1

1. Preparation of aspirin.
2. Preparation of benzanilide.
3. Preparation of salicylic acid.
4. Preparation of 2, 4, 6 tri bromo phenol.
5. Preparation of beta Naphthol azo dye.