

**P.R.Government College (Autonomous)  
Kakinada**

(Affiliated to Adikavi Nannaya University)

**Department of Chemistry**

**B. Voc (Pharmaceutical Chemistry)**

Under NSQF Scheme

**Board of studies**

**2019-20**

**P.R.Government College (Autonomous), Kakinada**  
**Recommended Composition of the Board of Studies of**  
**B. Voc (Pharmaceutical Chemistry)**  
**And it's Functions of an Autonomous College**  
**April-2019-20**

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**I Composition**

**1. Chairman, Board of Studies:**

Sri V. Mallikarjuna Sarma, M.Sc., M.Phil. B.Ed.,

Nodal Officer for B. Voc (Pharmaceutical Chemistry)

**2. The entire faculty of each specialization.**

1. Dr. T. Vara Prasad, Lecturer in Charge, M.Sc., M. Ed, M.Phil, PhD.

2. Sri D. Rama Rao, M.Sc., M.Phil.,

3. Dr. V. Narayana Rao. M. Sc., Ph. D

4. Sri U. Sai Krishna, M.Sc,

**3. Two experts in the subject from outside the college to be nominated by The Academic Council**

1. Dr. K . Jhansi, Lecturer in Chemistry, Ideal Degree College, Kakinada

2. Dr. L. Srinivas, Professor, GITAM Institute of Pharmacy, GITAM UNIVERSITY, Visakhapatnam.

**4. One expert to be nominated by the Vice-Chancellor from a panel of six recommended by the College Principal**

Prof. K. Deepthi, Adikavi Nannaya University, Rajahmundry

**5. Three representatives from industry/ Corporate Sector/ allied area relating to Placement.**

1. Bala Subramanian. M., General Manager, Quality Control, Pfizer Health Care India Pvt. Ltd., Visakhapatnam.

2. Ch. S. N. Murty, Director, Venky Pharma Pvt. Ltd., Yanam

**6. One postgraduate meritorious alumnus to be nominated by the Principal. The chairman, Board of Studies, may with the approval of the Principal of the College, Co-opt.**

1. Sri. T. V. V. Satyanarayana, M.Sc.

## **II. Term.**

The term of the nominated members shall be two years.

## **III. Meeting**

The Principal of the College shall draw the schedule for meeting of the Board of Studies for different Departments. The meeting may be scheduled as and when necessary but at least once a year.

## **IV. Functions**

The Board of Studies of a Department in the College shall:

- a) Prepare syllabus and various courses keeping in view the objectives of the College interest of the stakeholders and national requirement for consideration and approval of the Academic Council.
- b) Suggest methodologies for innovative teaching and evaluation techniques.
- c) Suggest panel of names to the Academic Council for appointment of examiners.
- d) Coordinate research, Teaching, Extension and other academic activities in the Department/College.

**Signatures of the members who attended the  
Board of studies in B. Voc (Pharmaceutical Chemistry)**

S. No.	Name of the member	Designation	Signature
1	V. Mallikarjuna Sarma	Chairman, Board of Studies, Nodal Officer for B. Voc (Pharmaceutical Chemistry)	
2	Prof. K. Deepthi	University Nominee Asst. Professor & Head of the Department, Department of Chemistry, Adikavi Nannaya University, Rajamahendravaram	
3	Dr. L. Srinivas,	Subject Expert Professor, Department of Pharmacy, GITAM Institute of Pharmacy GITAM UNIVERISITY, VISAKHAPATNAM	
4	Dr. K. Jhansi	Subject Expert Lecturer in Chemistry, Ideal Degree & PG College Kakinada	
5	Sri Bala Subramanian. M.	Industry Expert General Manager, Quality Control, Pfizer Health Care India Pvt. Ltd., Visakhapatnam	

6	Sri Ch. S. N. Murty	Director, Venky Pharma Pvt. Ltd., Yanam	
7	Sri. T. V. V. Satyanarayana	Meritorious Alumnus Lecturer in Chemistry Government Degree College Ramachandrapuram.	
8	Dr. T. Vara Prasad	Member Lecturer in Charge Department of Chemistry	
9	Sri D. Rama Rao	Member Director of PG (Chemistry) Courses, Lecturer in Chemistry Department of Chemistry	
10	Dr. V. Narayana Rao	Member Lecturer in Chemistry	
11	Sri U. Sai Krishna	Member Lecturer in Chemistry	
12	Dr. V. Anantha Lakshmi,	Lecturer in Charge Department of Mathematics P. R. Govt. College	
13	Sri K. Ashok	Lecturer in Charge Department of Statistics P. R. Govt. College	
14	Dr. K. Shobha Rani	Lecturer in Charge Department of Computer Science P. R. Govt. College	
15	Dr. T. K. V. Srinivasa Rao	Lecturer in Charge Department of English P. R. Govt. College	

**ACTION PLAN BOS MEETING -CHEMISTRY HELD ON 25 -03 -2019.**

**Department activities for 2019-2020 academic year.**

**Annexure I**

<b>Month</b>	<b>Activity proposed</b>	<b>Faculty member in charge</b>
June-19	Departmental staff meeting to review admissions and faculty recruitment	V. Mallikarjuna Sarma
	Preparation of curricular plans, time-tables etc.,	
	Bridge classes	
July-19		
	Bridge classes for I year students	All Faculty members
	Student awareness programmes on ragging & eve teasing - consequences , self-discipline, career guidance, higher education opportunities etc.,	Dr. T.Vara Prasad
August-19	Conference on prospects in pharmaceutical industries	V. Mallikarjuna Sarma
	Study tour / Field trips	
Sept-19	Ozone day	
Oct-19	MOLE Day	D.Ramarao
	Faculty development programme	V. Mallikarjuna Sarma
Nov-19	11th National Education Day – Outreach Programme to nearby school	
Dec-19	World AIDS Day	
	Chemistry day & Chem Fest	V.Mallikarjuna Sarma
Jan-18	Study tour / Field trips	V.Mallikarjuna Sarma
Feb-18	NATIONAL SCIENCE DAY	V.Mallikarjuna Sarma
March-18	Consumer awareness day	Dr. T. Vara Prasad

**1. Organizing National/ State level seminars/Workshops/ Conferences/ Training programmes etc., with topics and other details.**

**(Mandatory for each Department)**

- i) Staff development programme
- ii) Training in the use of HPLC
- iii) Awareness on OZONE protection
- iv) National Chemistry day
- v) Chem. fest
- vi) National Science day 2020
- vii) Guest lectures
- viii) National seminar in chemistry
- ix) Training in Soil analysis
- x) Training in water analysis

**2. Change of modules in the syllabus content.**

Syllabus designed for first and second and final years as per university regulations. CBCS introduced for final year w.e.f. 2018-19.

**3. Plan for utilization of funds for Autonomous/UGC/other grants available for arranging guest lectures, faculty improvement programmes, study tours, equipping laboratories, reference books & other necessary teaching-learning material with ICT enabled teaching.**

**I. Study visits to: Rs, 50,000**

1. Visakha Steel Plant, Visakhapatnam
2. Hetero Laboratories, Nakkapally
3. Dr. Reddy's Laboratories, Yanam.
4. National Institute of Hydrology, Kakinada.
5. Soil analysis laboratory, Samalkot.
6. Nagarjuna Fertilizers and Chemicals Ltd, Kakinada.
7. Coromandel International Ltd., Kakinada
8. IICT, Hyderabad.
9. Venky Parenterals, Yanam

**II.**

- |                                                        |            |            |
|--------------------------------------------------------|------------|------------|
| 1. Sophisticated version UV-Visible spectrophotometer- | 5.0 lakhs  |            |
| 2. Other equipment                                     |            | 1.50 lakhs |
| 3. Consumables                                         | 1.98 lakhs |            |

**4. Plan for organizing subject oriented community outreach programmes & allocation of necessary funds. (Mandatory for each Department)**

- |                                  |     |        |
|----------------------------------|-----|--------|
| i) Adoption of village           | Rs. | 20,000 |
| ii) Medical Awareness programmes | Rs. | 10,000 |

**5. Institution of new medals/incentives/prizes etc., from alumni, philanthropists, parents, faculty etc., - Strategies to be recommended**

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**6. Introduction of new programmes –PG/UG/Diploma and certificate courses.**

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**7. Any other programme that enhances the learning capacity of students and their employable & knowledge skills.**

Training in the use of instruments like AAS, UV-Vis, HPLC, flame photometer, uranium analyzer, soil and water analysis projects, air quality projects.

**8. Change in internal assessment exams for conducting I mid Semester by way of Project work/Assignment.**

It is proposed to conduct an online Examination for I Mid Semester Examination from 2019-20.

**9. Suggest panel of examiners/paper setters & other experts/nominees for BOS deliberations.**

**Chemistry:**

1. Sri V. Sanjeev Kumar, GDC, Mandapeta.
2. Sri T. V. V. Satyanarayana, GDC, Ramachandrapuram
3. Dr. N. V. S. Venu Gopal, Associate Professor, GITAM, Visakhapatnam
4. Sri V. Sridhar, GDC, Nidadavole.
5. Dr. B. Mallikarjun, Arts College, Rajahmundry
6. Smt. C. Jyoti, St. Theresa College, Eluru.
7. P. Krishna Kumar, S.K.B.R.College, Amalapuram.
8. Dr. G. Venkatarao, GDC, Vijayawada
9. Shri B.Venkatarao, GDC, Ramachandrapuram
10. Dr. Ramchadarao, Y.N.College, Narasapuram



Department of B. Voc (Pharmaceutical Chemistry)

Board Of Studies Meeting

Dt.25 - 03-2019 at 2.00 pm

Resolutions:

Meeting of Board of studies in chemistry is convened on **25 – 03-2019** in the guest room of the College. The Principal Dr. Chappidi Krishna, Dr.K.Deepthi, University Nominee,Sri Bala Subramanian, General Manager- QC, Pfizer Health Care India Pvt Ltd, Visakhapatnam, Sri Ch. S. N. Murty, Director, Lord Venky Pharma Pvt Ltd., Yanam, Dr. K. Jhansi, Subject Expert, Ideal Degree College, Kakinada, all members of the faculty of Chemistry and student representatives attended the meeting. Agenda items are discussed and resolutions are made.

1. It is resolved to adopt Choice based credit system in the Chemistry combination programmes as per the directions of the CCE, Hyderabad to the first year and second year and final year students
2. Introduce Online Examination for I Mid Semester to first year students.
3. It is resolved to allot project works for final year students who opt for project work in chemistry preferably industry based.
4. It is resolved to conduct departmental activities such as Ozone day, Chem fest, Chemistry day and Science day etc.
5. It is resolved to implement the recommended Pedagogy for the first semester 2018-19.
6. Resolved to conduct practical examinations semester wise.

The following paper setters are recommended.

1. Sri V. Sanjeev Kumar, GDC, Mandapeta.
2. Sri T. V. V. Satyanarayana, GDC, Ramachandrapuram
3. Dr. N. V. S. Venu Gopal, Associate Professor, GITAM, Visakhapatnam
4. Sri V. Sridhar, GDC, Nidadavole.
5. Dr. B. Malliakarjun, Arts College, Rajahmundry
6. Smt. C. Jyoti, St.Therisa College, Eluru.
7. P. Krishna Kumar, S.K.B.R.College, Amalapuram.
8. Dr. G. Venkatarao, GDC, Vijayawada
9. Shri B.Venkatarao, GDC,Ramachandrapuram

7. It is resolved to organize Guest lectures by eminent professors and Industrial Experts.
8. Resolved to implement pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.
9. 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. Resolve to assist the orphan children of below two years age being taken by department of Women and Child Welfare as an extension activity with the funds contributed by the faculty members of the department.
11. It is proposed to give 33.3% weightage for competitive exam questions pertaining to the syllabus prescribed.
12. 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.
13. It is resolved to get the students of B. Voc (Pharmaceutical Chemistry) registered in NAPS (National Apprenticeship Promotion Scheme).
14. 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.
15. It is resolved to follow strictly the guidelines of UGC under NSQF scheme for the recruitment and engagement of faculty and non-teaching staff.

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## About B. Voc (Pharmaceutical Chemistry)

The University Grants Commission (UGC) had launched a scheme on 27 February, 2014 for skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) degree with multiple entry and exit points. Considering the implementation modalities, 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 NOSs along with broad based general education. This would 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 at each exit point of the programme.
3. To provide flexibility to students by means of pre-defined entry and multiple exit points.
4. To integrate NSQF within 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 workforce.
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 In formulations
8. Acquire knowledge on different types of instrumentation techniques in chemical analysis.
9. Understand stereochemistry of carbon compounds its importance in organic chemistry
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. Undergo industrial training and acquire skills in various instrumentation techniques.
14. 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 by State and Central Governments.



Semester-1

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**PAPER-: PHARMACEUTICS-I**  
**CORE- I**

**UNIT – I**

Pharmaceutical Dosage forms and New Drug Delivery systems: Solid, liquid, Gaseous Dosage Forms. Drug Delivery systems – Oral Drug delivery system, sustained action dosage forms, Transdermal Drug Delivery system-Ophthalmic drug delivery system-Contraceptive New Drug Delivery system-Additives in dosage forms.

**UNIT-II**

**Pharmacopoeias and Formularies: Monographs of the following:**

Official compendia: BP, BPC, USP, NF, IP

Non Official compendia: Merck Index, Remington's Pharmaceutical sciences.

**Weights and Measures:**

Imperial System, metric system ,conversions from Imperial to metric and metric to Imperial systems – calculations based on Imperial and metric systems-Alcohol Dilutions-Alligation methods-Isotonic solutions- freezing point data-molecular concentration- vapour pressure point determination-sodium chloride equivalents

**UNIT-III**

**Solid Dosage forms:**

Definition Tablets- Classification and types of various Tablets – Excipients used in the formulation of tablets- Manufacturing Defects in the processing of Tablets- Tablets Coating-Steps involved in tablet coating- types of coating-Enteric coating of Tablets Microencapsulation- In process Evaluation& quality control tests for Tablets Definition Capsules –Types of Capsules-Manufacturing of Hard soft special types of capsules-Formulation of capsules.

**UNIT-IV**

**Packaging of Pharmaceuticals:**

Characters tics of containers and closures-classification of containers –materials used for the construction of containers-Glass-Plastic-Metals-Paper-Materials used for the construction of closures-closure Liners- Aerosols- Introduction to aerosol packaging

**Recommended Books**

1. A Text book of Pharmaceuticals Formulation by B.M. Mithal, Vallabh Prakashan.
2. The Theory and Practice of Industrial Pharmacy. Leon Lachman, Herbert Lieberman and Joseph Kanig, Editors, Lea and Febiger, Philadelphia. Latest edition Verghese publishing House
3. Indian Pharmacopoeia, Govt. of India Publication.



**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**PAPER-: PHARMACEUTICS-I**  
**CORE- I**

**WEIGHTAGE TO CONTENT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**PAPER-: PHARMACEUTICS-I**  
**CORE- I**

Time 2hrs.30min

Maxmarks-60

**SECTION-A**

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

**SECTION-B**

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**CORE- I**  
**PAPER-: PHARMACEUTICS-I**  
**QUESTION BANK**  
**(Essay questions 10 marks)**

**UNIT: I**

1. Define drugs and dosage forms with examples
2. Write various "Novel drug delivery systems"-explain implants
3. How will you classify dosage forms? Write about solid dosage forms.

**UNIT: II**

1. Define Pharmacopoeia. List any four books
2. Write the history of Indian pharmacopoeia

**UNIT: III**

1. What are excipients used in tablet manufacturing
2. Enlist the evaluation test for tablets. explain
3. Give the manufacturing defects in tablet manufacturing.
4. Discuss in brief disintegration test for uncoated tablet
5. Write a short note on sugar coating

**UNIT: IV**

1. Define glass. What are the quality control tests performed on glass?
2. Define aerosols. Classify aerosols. Give formula of aerosol with example
- 3.

**Short Questions**

**UNIT-I**

1. Why different dosage forms are needed?
2. Write about effervescent granules

**UNIT –II**

1. In what proportion should 20% and 10%HCL is to be mixed to get 15% HCl
2. In what proportion 25%,18%,12% alcohol should be mixed to get 15% alcohol
3. How will you prepare 4 ounces of solution so that 1 table spoonful to 1 quart make 1 in 500 ml solution?
4. Give the metric equivalents of the following:
  - i. 2 drachum
  - ii. 5 grains
  - iii. 10 fl.ounce
  - iv. 1pound
5. Define posology? Give formulae for dose calculation in children
6. Enlist factors influencing dose of drug.

7. Find the concentration of sodium chloride required to make 50ml of solution containing 0.5% ephedrine HCl and 0.5% chlorbutol isotonic
  - i. Given: Freezing point of 1% solution of EphedrineHCl =  $0.165^{\circ}\text{C}$
  - ii. Freezing point of 1% solution of chlorbutol =  $-0.138^{\circ}\text{C}$
8. Calculate the dose of paracetamol for:
  - I. Nine month old infant
  - II. A boy of 16 years of age  
(Adult dose of Paracetamol is =500mg)
9. How will you find displacement value of a medicament
10. Send 150 ml of 4% potassium permanganate solution and label with directions for preparing 500 ml of a 1 in 2500 solution.
11. Pre pare 600 ml of 60% alcohol from 95% alcohol
12. Prepare 10 gm of dilute acetic acid 4% from 33% real acetic acid by allegation method.
13. Find the concentration of procaine hydrochloride required to make a solution isotonic with blood plasma. The freezing point of 1% W/V solution of procaine hydrochloride is  $-0.122^{\circ}\text{C}$ .
14. How many parts of 90%,80%,60% & 40% alcohol should be mixed so as to obtain 70%alcohol
15. Give the metric equivalentents for the following
  - a) 30 grain =
  - b) Half ounce +
  - c) One table spoonful=
  - d) 480 minims=
  - e) Two fluid drachm =
  - f) One teaspoonful=

### UNIT-III

1. List the advantages of tablets
2. Write the difference between hard and soft gelatin capGive reasons.
3. Why tablets are coated
4. Describe in detail various oral cavity tablets
5. Write the advantages and disadvantages of capsules
6. Give the manufacturing defects in tablet manufacturing
7. Explain the term Micro encapsulation. Enlist various techniques of micro-encapsulation state its advantages.
8. Write about Enteric coating

### UNIT-IV

1. Name various closures used in packaging industry
2. Write properties of ideal container
3. Write the advantages of glass as a container
4. List advantages of plastic as packaging material
5. Draw a well labelled diagram of aerosol container
6. Name various types of closures
7. Give merits and demerits of rubber as a material of clousur

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**CORE- I**  
**PAPER-: PHARMACEUTICS-I**  
**PRACTICALS**

1. Formulation of the following dosage forms Liquid orals:
  - Simple syrup, Piperazine citrate elixir, Aqueous Iodine Solution, Strong Iodine solution
  - Emulsion: Castor oil emulsion, Cod liver oil emulsion
  - Suspension: Calamine lotion, Magnesium hydroxide mixture
  - Ointments: Simple ointment base, Sulphur ointment
  - Dry powder: Effervescent powder, Dusting powder,
  - Sterile Injections: Calcium gluconate Injection
  - Capsules: Indomethacin capsules, Tetracycline capsules
2. Demonstration for tablet manufacturing including all types of coated tablets
3. Demonstration of methods for evaluation of all types of above formulations as per IP.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
CORE- II  
PAPER-: BASIC INORGANIC CHEMISTRY

**Course objectives:**

To make the student

- i. Understand the structure of atom and electronic configurations of elements.
- ii. Learn the structure and geometries of molecules
- iii. Learn the chemistry of p- block elements.

**Outcomes:**

The student will be able to

- i. Learn industrial preparation and uses of compounds of Sodium and Calcium
- ii. Learn structures of compounds of Boron, Silicon.
- iii. Learn structures of Interhalogens.
- iv. Learn classification of Oxides.

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**Unit-I**

**S-block elements:** General Characteristics of groups I and II elements, Diagonal relationship between Li and Mg, Be and Al

**Group – 1 elements (Alkali metals):** Electronic configurations- Anomalous behaviour of Lithium- differences between Lithium and other alkali metals- preparation and uses of Sodium Hydroxide, Sodium carbonate and Sodium Bicarbonate- biological importance of sodium and potassium.

**Unit-II**

**Group – 2 elements (Alkaline earth metals):** General characteristics – electronic configurations- anomalous behaviour of Beryllium- preparation and uses of some important compounds of Calcium ( Quick lime, slaked lime, calcium carbonate, calcium sulphate- plaster of Paris)- biological importance of Calcium and Magnesium. Manufacture of cement, cement setting and uses.

**Unit-III**

**P-block elements:**

**Group- 13 elements:** Boranes- preparation and structure of Diborane, structures of higher boranes,  $B_4H_{10}$  and  $B_5H_9$ , borazine preparation and structure, boron nitride preparation and structure.

**Group- 14 elements:** Preparation, properties and applications of silicones, Silanes.

**Unit-IV**

**Group- 15 elements:** Hydrazine, Hydroxylamine preparation and reactions.

**Group- 16 elements:** Classification of oxides based on a) chemical behaviour and b) oxygen content,

**Group- 17 elements:** interhalogen compounds- definition, classification, preparation and structures of interhalogen compounds. Pseudo halogens.

Reference Books:

1. Concise Inorganic Chemistry by J. D. Lee
2. Atkins, Inorganic Chemistry.
3. Cotton, Advanced Inorganic Chemistry
4. Inorganic Chemistry: Principles of Structure and Reactivity (4th Edition) by James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Hardcover: 964 pages, Publisher: Benjamin Cummings.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
CORE- II  
PAPER-: BASIC INORGANIC CHEMISTRY

WEIGHTAGE TO CONTENT

S.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120



P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
CORE- II  
PAPER-: BASIC INORGANIC CHEMISTRY

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**CORE- II**  
**PAPER-: BASIC INORGANIC CHEMISTRY**  
**QUESTION BANK**  
**Essay Questions (10M)**

**Unit- I**

1. Explain the preparation and uses of Sodium Hydroxide
2. Explain the preparation and uses of Sodium Carbonate and Sodium Bicarbonate.
3. Explain Diagonal relationship between Li and Mg, Be and Al.

**Unit- II**

1. Explain the preparation and uses of Quick lime, slaked lime
2. Explain the manufacture and uses of Cement.

**Unit- III**

1. Write any two methods of preparation of diborane. Explain the structure of diborane.
2. Write preparation and applications of silicones.

**Unit- IV**

1. Explain the classification of oxides based on
  - i. Chemical behaviour
  - ii. Oxygen content with examples.
2. Define interhalogen compounds. Write any two methods of preparation of interhalogens. Explain the structures of AX<sub>3</sub> and AX<sub>5</sub> type interhalogens.

**Short Answer Questions (5M)**

**Unit- I**

1. Explain the anomalous behaviour of Lithium.
2. Write the biological functions of sodium and potassium.

**Unit- II**

1. Explain the anomalous behaviour of Beryllium.
2. Write the biological functions of Calcium and magnesium.
3. Write the preparation and uses of plaster of paris.

**Unit- III**

1. Explain the structures of B<sub>4</sub>H<sub>10</sub> & B<sub>5</sub>H<sub>9</sub>.
2. Explain the preparation and structure of "Borazine".
3. Explain the preparation and structure of Boron nitride.

4. Define "Silanes". Give any two examples. Write any one method of preparation of silanes.

#### **Unit- IV**

1. Write any one method of preparation and three reactions of Hydrazine.
2. Write any one method of preparation and three reactions of Hydroxyl amine.
3. Explain the structure of  $IF_7$ .
4. Define pseudohalogens. Give any two examples. Write any two similar properties of pseudohalogens with halogens.

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P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
SKILL COMPONENT – II (CORE- II)  
PAPER:- BASIC INORGANIC CHEMISTRY

PRACTICALS

**Practicals:**Qualitative inorganic analysis

1. **Reactions of anions**  
(Carbonate,sulphate,chloride,bromide,acetate,nitrate,borate, phosphate )**and**
  2. **Cations** (Lead, copper, iron, aluminum, zinc, manganese, nickel, calcium, strontium, barium, potassium and ammonium.)
2. Analysis of simple salt containing one anion and cation from the following

**Anions:** Carbonate, Sulphate, chloride, bromide, acetate, nitrate, borate, and phosphate.

**Cations:** Lead, copper, iron, aluminum, zinc, manganese, nickel, calcium, strontium, barium, potassium and ammonium.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
CORE- III  
PAPER:- BASIC ANALYTICAL CHEMISTRY-I

**Course objectives:**

To make the student

- iv. Understand the preparation of standard solutions.
- v. Understand different theories of acids and bases.
- vi. Learn Stoichiometric calculations.

**Outcomes:**

The student will be able to

- v. Learn role of buffers in pharmacy
- vi. Understand the uses of acids and bases in pharmaceutical formulations
- vii. Calculate the oxidation number and its importance in redox reactions.
- viii. Learn the theoretical principles of inorganic qualitative analysis.

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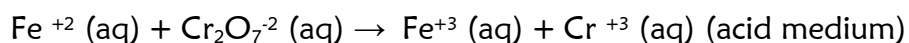
**Unit –I Solutions, Acids and Bases**

Solutions, solvent and solute of a true solution. Theories of Acids and Bases -The Arrhenius theory with examples, Limitations - Bronsted-Lowry theory with examples and Limitations-Conjugate acid-base pairs with examples- Lewis Theory with examples – Role of acids and bases in Pharmacy. Uses of some acids and bases in Pharmaceutical formulations (Boric acid, Hydrochloric acid, Ammonia and Calcium Hydroxide). pH definition and calculation of pH of acids and base solutions. Buffer solutions. Definition and classification with examples. Role of buffers in Pharmacy. Selection of pharmaceutical buffers.

**Unit-II Stoichiometry -I**

Balancing chemical equations- Concept of mole, calculation of molecular weights and equivalent weights of acids (HCl, H<sub>2</sub>SO<sub>4</sub>, CH<sub>3</sub>COOH & HNO<sub>3</sub>), bases (NaOH, Ca(OH)<sub>2</sub>), oxidizing (K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, KMnO<sub>4</sub> in acid and alkaline media) and reducing agents (H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>, FeSO<sub>4</sub>) and salts (NaCl, Na<sub>2</sub>CO<sub>3</sub>, K<sub>2</sub>SO<sub>4</sub>) with examples- Stoichiometric calculations involving weight-weight, weight-volume, mole-weight and mole - volume relations with examples. Oxidation state- Oxidation number- rules for

calculation of oxidation numbers and calculation of oxidation numbers with examples ( $K_2Cr_2O_7$ ,  $KMnO_4$ ,  $H_2SO_4$ ,  $Cr_2O_3$ ,  $K_2CrO_4$ ,  $MnO_2$ ,  $MnSO_4$ ,  $MnO_4^-$ ,  $Cr_2O_7^{2-}$ ) - Concept of oxidation and reduction, oxidizing agent and reducing agent - Redox reactions with examples- Balancing of Redox equations in acid and alkaline media with examples.



### Unit –III Qualitative Analysis

Principles in qualitative analysis of inorganic salts- solubility product and common ion effect and their applications in qualitative inorganic analysis- Reactions of carbonate, chloride, nitrate and Sulphate and acetate ions- chromyl chloride test, brown ring test. Reactions of ammonium, lead, cupric, Ferrous, Ferric, Zinc and Magnesium ions.

### Unit –IV Quantitative Analysis

Methods of expressing concentration- percent by weight, percent by volume, Molality, Molarity, and Normality- preparation of standard solutions of acids, bases, oxidizing and reducing agents.

Definition of terms: Titrant, titrand, analyte, end point and equivalence point, indicator, standard titrant, titration.

Types of Titrations- Theory of Acid base Titrations- Acid-base indicators with examples, Theory of acid- base indicators, Choice of indicators. Theory of Redox titrations- Redox indicators with examples.

### **Reference Books:**

1. Skoog, Fundamentals of Analytical Chemistry.
2. Vogel, Quantitative Chemical Analysis.
3. Cairns, Essential of Pharmaceutical Chemistry.

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**CORE- III**

**PAPER:- BASIC ANALYTICAL CHEMISTRY-I**  
**WEIGHTAGE TO CONTENT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
CORE- III  
PAPER:- BASIC ANALYTICAL CHEMISTRY-I

Time 2hrs.30min

Maxmarks-60

**SECTION-A**

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

**SECTION-B**

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV



12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
SKILL COMPONENT – III (CORE- III)  
PAPER:- BASIC ANALYTICAL CHEMISTRY-I**

**PRACTICALS**

1. Preparation and standardization of 0.01M hydrochloric acid solution using standard sodium carbonate.
2. Preparation and standardization of 0.1M sodium hydroxide with standard oxalic acid.
3. Estimation of carbonate and bicarbonate in a mixture.
4. Determination of  $\text{KMnO}_4$  with oxalic acid as primary standard.
5. Determination of Fe (II) with  $\text{K}_2\text{Cr}_2\text{O}_7$  as primary standard.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
CORE- III  
PAPER:- BASIC ANALYTICAL CHEMISTRY-I  
QUESTION BANK

Essay questions (10M)

**Unit- I**

1. Explain (i) Bronsted Lowry Acid- Base theory and (ii) Arrhenius theory of acids and bases with examples.
2. Define buffer solution. Explain the classification of buffers. Explain the selection of pharmaceutical buffers.
3. Explain the role of acids and bases in pharmacy. Write the uses of Hydrochloric acid and Calcium Hydroxide in pharmaceutical formulations.

**Unit- II**

1. If 40g of Calcium carbonate is completely calcined, how much amount of CaO is formed? And how much volume of CO<sub>2</sub> is liberated?
2. The balanced equation for the synthesis of ammonia is  
$$3 \text{H}_2 (\text{g}) + \text{N}_2 (\text{g}) \rightarrow 2 \text{NH}_3 (\text{g}).$$
Calculate:
  - a. the mass in grams of NH<sub>3</sub> formed from the reaction of 64.0 g of N<sub>2</sub>
  - b. the mass in grams of N<sub>2</sub> required for form 1.00 kg of NH<sub>3</sub>.
3. A metal reacts with an acid to produce 78.4 L of hydrogen gas at STP How many moles of H<sub>2</sub> were produced?
4. Balance the following redox reaction by ion- electron method.  
$$\text{Fe}^{+2} (\text{aq}) + \text{Cr}_2\text{O}_7^{-2} (\text{aq}) \rightarrow \text{Fe}^{+3} (\text{aq}) + \text{Cr}^{+3} (\text{aq}) \text{ (acid medium)}$$
5. Balance the following redox reaction by ion- electron method.  
$$\text{MnO}_4^- (\text{aq}) + \text{I}^- (\text{aq}) \rightarrow \text{MnO}_2 (\text{s}) + \text{I}_2 (\text{s}) \text{ (alkaline medium)}$$

**Unit- III**

1. Explain common ion effect. Write the applications of common ion effect in qualitative analysis.
2. Explain Solubility product. Write the applications of Solubility product in qualitative analysis.

3. Write the reactions of (i) Chloride and (ii) Ammonium ions.
4. Write the reactions of (i) Acetate and (ii) Lead ions.

#### Unit- IV

1. Explain (i) Quinonoid theory and (ii) Ostwald theory of acid- base indicators.
2. Define "Molarity". How do you prepare a standard solution of 0.05M and 0.1N  $\text{Na}_2\text{CO}_3$ ?
3. What are oxidizing agents? How do you prepare 0.02N  $\text{K}_2\text{Cr}_2\text{O}_7$  solution in acid medium?
4. Explain the theory of redox titrations. Write any two examples of redox indicators.

#### SHORT ANSWER QUESTIONS(5M)

#### Unit- I

1. Explain Lewis theory with examples.
2. Define pH. Calculate the pH of 0.01M  $\text{HNO}_3$ .
3. Define conjugate acid base pair. Give examples.

#### Unit- II

1. Define mole, calculate the molecular weights and equivalent weights of  $\text{CH}_3\text{COOH}$ ,  $\text{Ca}(\text{OH})_2$
2. Write about relation between mole-weight and mole - volume with examples.
3. Define Oxidation number and write rules for calculation of oxidation numbers and calculate the oxidation number of  $\text{KMnO}_4$ .

#### Unit- III

1. Write the reactions of Nitrate ion.
2. Write the reactions of Cupric ion.
3. Write the reactions of Ferrous ion.

#### Unit- IV

1. Define the terms Titrant, titrand, analyte.
2. How do you prepare 250ml of 0.25M  $\text{NaOH}$  solution?
3. Explain the theory of acid-base titrations.

**P.R.GOV.T.COLLEGE (AUTONOMOUS), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**GENERAL COMPONENT – I**  
**MATHEMATICS**  
**Course: DIFFERENTIAL EQUATIONS – I and DESCRIPTIVE STATISTICS**

**Total Hrs. of Teaching-Learning: 45@ 3hr/Week      Total credits: 3**

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**OBJECTIVES:**

- To classify differential equations by order, linearity and homogeneity.
  - To compute solutions to various differential equations by using analytic techniques.
  - To identify the appropriate method for solving the given differential equation.
  - To get awareness about the applications.
  - To understand and apply the suitable methods to collect data
  - To analyze the data using different statistical measures.
- .....  
.....

**Unit 1**

**Differential equations of first order and first degree (12 h)**

Exact differential equations, integrating factors, linear Differential equations, Differential equations reducible to linear form, Change of variables.

**Unit 2**

**Orthogonal Trajectories, Differential equations of the first order  
But not of the first degree (11 h)**

Orthogonal Trajectories, Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x (or y); Clairaut's equation.

**Unit -3 (11h)**

**Descriptive Statistics:**

Concept of primary and secondary data, methods of collection and editing of primary data-

Designing a questionnaire and a schedule- Sources and editing of secondary data-  
Measures of central tendency (Mean, Median and Mode) with real life examples.

**Unit-4**

**(11h)**

**Measures of Dispersion, Skewness:**

Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation-coefficient of variation. -Measures of Skewness: Karl Pearson and Bowley's Coefficient. Concept of moments.

**P.R.GOV.T.COLLEGE (AUTONOMOUS), KAKINADA**  
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**FIRST YEAR I SEMESTER**  
**GENERAL COMPONENT – I**  
**MATHEMATICS**

**Course: DIFFERENTIAL EQUATIONS – I and DESCRIPTIVE STATISTICS**

**BLUE PRINT FOR THE QUESTION PAPER**

UNIT	SHORT ANSWER QUESTIONS 5 Marks	ESSAY QUESTIONS 10 Marks	TOTAL MARKS
I	1	2	25
II	2	1	20
III	1	1	15
IV	2	1	20
<b>TOTAL NO. OF QUESTIONS</b>	<b>6</b>	<b>5</b>	<b>80 M</b>

Question Paper pattern:

Short Answer Questions = 4 x 5 = 20 Marks

Essay questions = 3 x 10 = 30 Marks

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TOTAL 50 Marks  
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**P.R.GOV.T.COLLEGE (AUTONOMOUS), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR I SEMESTER**  
**GENERAL COMPONENT – I**  
**MATHEMATICS**  
**Course: DIFFERENTIAL EQUATIONS – I and DESCRIPTIVE STATISTICS**

**MODEL PAPER**

**PART – I**

Answer any **FOUR** of the following questions.

**4 x 5 = 20 M**

1. Solve  $(e^y + 1)\cos x dx + e^y \sin x dy = 0$ .
2. Solve  $(py + x)(px - y) = 2p$ .
3. Find the orthogonal trajectories of the family of curves  
 $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ , where 'a' is a parameter.
4. Write features of good questionnaire.
5. Explain mean, median, mode for ungrouped data.
6. Write about measures of Skewness.

**PART – II**

Answer any **THREE** of the following questions.

**3 X 10 = 30 M**

7. Solve  $(y + \frac{y^3}{3} + \frac{x^2}{2}) dx + \frac{1}{4}(x + xy^2) dy = 0$ .
8. Solve  $(1 + y^2) dx = (\tan^{-1} y - x) dy$ .
9. Solve  $y^2 \log y = xpy + p^2$ .

10. Calculate mean for the following frequency distribution

Class-interval	0-8	8-16	16-24	24-32	32-40	40-48
Frequency	8	7	16	24	15	7

11. Calculate mean deviation for the following data

Dosage of drug(in mg)	0-10	10-20	20-30	30-40	40-50	50-60
No.of patients cured	2	3	5	6	4	1

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
GENERAL COMPONENT – II  
CHEMISTRY  
PAPER-: BASIC ORGANIC CHEMISTRY-I

**Course objectives:**

To make the student

- i. Understand formation of sigma and pi bonds.
- ii. Learn different types of structural isomerism.
- iii. Learn IUPAC Nomenclature of carbon compounds.

**Outcomes:**

The student will be able to

- i. Learn classification of carbon compounds.
- ii. Learn isomerism in carbon compounds.
- iii. Learn different types of reactive intermediates
- iv. Learn bond polarization and its effects.

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**Unit-I**

Introduction: Valence bond theory- covalent bond, types of covalent bonds (sigma and pi) and their formation. Structural representation of organic compounds (complete, condensed and bond line structural formulae). Homologous series with examples. Classification of organic compounds based on  
a) Functional group b) structure (homologous series).

Isomerism in carbon compounds: Isomerism- definition and classification, structural isomerism and its classification into chain, position, functional and metamerism with examples. Tautomerism with examples.

**Unit-II**

Structure and bonding: hybridization of orbitals- $sp^3$ ,  $sp^2$ ,  $sp$  hybridization in carbon compounds with examples

IUPAC nomenclature of carbon compounds, explanation with examples.

Fundamental concepts in Organic Reaction Mechanism. Bond fission and types (homolytic and heterolytic), Electron movement in organic reactions (representation by curved arrow and half headed curved arrows). Types of reactive intermediates

(free radicals, electrophiles and nucleophiles, carbocation and Carbanions) their structure and formation with examples.

### **Unit-III**

Reactivity: bond polarization and its effects-inductive effect and its applications with reference to acidity of carboxylic acids, basicity of amines and stability of carbonium ions. Resonance and rules for drawing resonance structures. Resonance effect or Mesomeric effect and its applications with reference to acidity of carboxylic acids, acidity of phenol. Hyper conjugation effect and its applications with reference to stability of carbonium ions and free radicals.

### **Unit-IV**

Types of organic reactions with examples: addition-electrophilic, Nucleophilic and free radical, substitution- electrophilic, Nucleophilic and free radical, elimination-examples (mechanism not required) and polymerization reactions.

### **List of Reference Books**

1. Organic Chemistry by Morrison and Boyd
2. A Text Book of Organic chemistry by I L Finar Vol. 1



P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
GENERAL COMPONENT – II  
CHEMISTRY  
PAPER-: BASIC ORGANIC CHEMISTRY-I

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	1	25
2.	UNIT -II	1	2	20
3.	UNIT -III	2	2	30
4.	UNIT -IV	1	1	15
	Total	6	6	90

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
GENERAL COMPONENT – II  
CHEMISTRY  
PAPER-: BASIC ORGANIC CHEMISTRY-I

Time 2hrs.30min

Maxmarks-50

SECTION-A

Answer any THREE of the following questions

3x10=30 M

1. One question is to be set from unit-I
2. One question is to be set from unit-I
3. One question is to be set from unit-II
4. One question is to be set from unit-III
5. One question is to be set from unit-III
6. One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4X5=20M

7. One question is to be set from unit-I
8. One question is to be set from unit-II
9. One question is to be set from unit-II
10. One question is to be set from unit-III
11. One question is to be set from unit-III
12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
GENERAL COMPONENT – II  
CHEMISTRY  
PAPER-: BASIC ORGANIC CHEMISTRY-I**

**PRACTICALS**

1. Determination of melting point of organic compounds
2. Lassaigne's tests detection of extra elements (N, S and Cl)
3. Reactions of alcohols, carboxylic acids, aldehydes, ketones, amines, amides.
4. Separation of organic compounds based on solubility.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR I SEMESTER  
GENERAL COMPONENT – II  
CHEMISTRY  
PAPER-: BASIC ORGANIC CHEMISTRY-I

Question bank  
Essay questions (10M)

Unit-I

1. Explain valence bond theory with suitable examples.
2. Write the classification of organic compounds based on functional group
3. Write the classification of organic compounds based on homologous series
4. Define isomerism. Explain the classification of structural isomerism with examples.

Unit-II

1. Define hybridization. Explain  $sp^3$ ,  $sp^2$  hybridization in carbon compounds with examples.
2. Write the classification of reactive intermediates with examples.
3. Explain IUPAC nomenclature of carbon compounds with examples.

Unit-III

1. What is inductive effect? Explain acidity of carboxylic acids and basicity of amines on the basis of inductive effect.
2. Explain mesomeric effect and apply mesomeric effect to explain the acidic character of phenol.
3. Define hyper conjugation effect and write its application to stability of carbonium ions.

Unit-IV

1. Explain addition and substitution reactions with examples.
2. Write about elimination and polymerization reactions with examples

Short answer questions (5M)

Unit-I

1. Define and differentiate sigma and pi bonds.
2. Explain tautomerism with examples.

Unit-II

1. Write short notes on types of bond fission.
2. Explain sp hybridization with examples.
3. Explain the acidity of mono, di and tri chloro acetic acids.
4. Write IUPAC nomenclature of following compounds with appropriate explanation  
a)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CHCl-COOH}$  b)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CHOH-CH}_2\text{-CHBr-CH}_3$

### Unit-III

1. Define resonance and write the rules to draw resonance structures.
2. Write the stability of free radicals on the basis of hyper conjugation effect.
3. Write about bond polarization.
4. Discuss the stability of free radicals.

**P. R. Government College (Autonomous), Kakinada**  
**B. Voc (Pharmaceutical Chemistry)**  
**GENERAL COMPONENT – III**  
**Foundation Course**  
**Environmental Studies**  
**SYLLABUS**

**Unit-I : Natural Resources**

**6 Hrs**

1. Definition, scope and importance. Need for public awareness.
2. Forest resources: Use and over-exploitation. Deforestation; timber extraction, mining, dams. Effect of deforestation environment and tribal people
3. Water resources: Use and over-utilization. Effects of over utilization of surface and ground water. Floods, drought.
4. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
5. Food resources: World food problems, Effects of modern agriculture; fertilizer-pesticide, salinity problems.
6. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
7. Land resources: Land as resources, land degradation, man induced landslides, soil erosion and desertification

**Unit-II : Ecosystems, Biodiversity and its conservation** 6 Hrs

1. Concept of an ecosystem Structure and function of an ecosystem Producers, consumers and decomposers.
2. Food chains, food webs and ecological pyramids
3. Characteristic features of - Forest ecosystem, Desert ecosystem, Aquatic ecosystem.
4. Value of biodiversity: Consumptive use, productive use. Biodiversity in India.
5. Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife-conflicts.
6. Endangered and endemic species of India; Conservation of biodiversity.

**Unit-III : Environmental Pollution**

**6 Hrs**

1. Definition, causes, effects and control measures of : (a) Air pollution (b) Water pollution (c) Soil pollution (d) Noise pollution

2. Solid waste management; Measures for safe urban and industrial waste disposal.
3. Role of individual in prevention of pollution.
4. Disaster management: Drought, floods and cyclones.

#### **Unit-IV : Social Issues and the Environment**

**6 Hrs**

1. From Unsustainable to Sustainable development.
2. Water conservation, rain water harvesting, watershed management.
3. Climate change, global warming, ozone layer depletion,
4. Environment protection Act
5. Wildlife Protection Act; Forest Conservation Act

#### **Unit-V: Human Population and the Environment**

**6 Hrs**

1. Population explosion, impact on environment.
2. Family welfare programme
3. Environment and human health
4. Women and Child Welfare
5. Value Education
6. Role of Information Technology in Environment and human health.

#### **Reference Books:**

- Environmental Studies by Dr.M.Satyanarayana, Dr.M.V.R.K. Narasimhacharyulu, Dr.G. Rambabu and Dr.V.VivekaVardhani, Published by Telugu Academy, Hyderabad.
- Environmental Studies by R.C.Sharma, Gurbir Sangha, published by Kalyani Publishers.
- Environmental Studies by Purnima Smarath, published by Kalyani Publishers.

**P. R. Government College (Autonomous), Kakinada**  
**B. Voc (Pharmaceutical Chemistry)**  
**GENERAL COMPONENT – III**  
**Environmental Studies**  
**Weightage to each unit**

<b>Unit</b>	<b>Essay Questions to be given &amp; Marks in parenthesis</b>	<b>Marks allotted Unit</b>	<b>Essay Questions to be Answered &amp; Marks in parenthesis</b>
<b>Unit-1</b> : Natural resources	2 (10)	20	1 (10)
<b>Unit -2</b> : Ecosystems, Biodiversity and its conservation	2 (10)	20	1 (10)
<b>Unit-3</b> : Environmental pollution	2 (10)	20	1 (10)
<b>Unit-4</b> : Social issues and the Environment	2 (10)	20	1 (10)
<b>Unit-5</b> : Human population and the Environment	2 (10)	20	1 (10)

**Note:** Question paper setters are requested to adhere strictly to the above blue Print while preparing the said paper.



**P. R. Government College (Autonomous), Kakinada**  
**B. Voc (Pharmaceutical Chemistry)**  
**First year First Semester**  
**GENERAL COMPONENT – III**  
**Environmental Studies**

**Time: 2 Hrs.**

**Max. Marks: 50 M**

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**Answer any FIVE of the following**

**5 x 10 = 50 M**

1. Write an essay on use and over utilization of water resources.
2. Discuss about world food problems.
3. Describe the value of Biodiversity.
4. Write an essay on different types of ecological pyramids.
5. Discuss the causes, effects and control measures of Air pollution.
6. Discuss the role of an individual in preventing pollution.
7. Give a detailed account of measures for water conservation.
8. Discuss the causes and effects of climate change.
9. Write an essay on population explosion and its impact on environment.
10. Discuss the role of information technology in environment and human health.

Semester-II

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B. Voc(PHARMACEUTICAL CHEMISTRY)

FIRST YEAR IISEMESTER  
CORE- I

PAPER:- PHARMACEUTICS-II

**UNIT: I**

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

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

**UNIT : II**

Mixing and Homogenization-Liquid mixing and powder mixing, Mixing of semisolids. Study of silverson Mixer-Homogenizer, planetary Mixer; Agitated powder mixer; Triple Roller Mill; Propeller Mixer, colloid Mill and Hand Homogeniser. Double cone mixer.

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

**UNIT: III**

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

**UNIT : IV**

Parenterals Preparations- Routes of administration of parental products-Types of parental products-Formulation of parental products-Aseptic work to prevent contamination-Manufacturing of Parenterals-Evaluation of Parenterals.

Recommended Books:

1. Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS publishers, Delhi
2. Cooper and Gunn's Tutorial Pharmacy, S.J. Carter.
3. Theory and practice of Industrial Pharmacy by Lachman.
4. Remington's, The Science and Practice of Pharmacy, Mack Publishing Co. Easton.

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**

**B. Voc(PHARMACEUTICAL CHEMISTRY)**

**FIRST YEAR IISEMESTER  
CORE- I**

**PAPER-: PHARMACEUTICS-II**

**WEIGHTAGE TO CONTENT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B. Voc(PHARMACEUTICAL CHEMISTRY)

FIRST YEAR IISEMESTER  
SKILL COMPONENT – I (CORE- I)

PAPER:- PHARMACEUTICS-II

PRACTICALS

1. Preparations involving ophthalmic preparations 2
2. Preparations involving aseptic techniques-2
3. Creams -2
4. Ointments-2

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B. Voc(PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR IISEMESTER  
CORE- I

PAPER-: PHARMACEUTICS-II

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I
7. One question is to be set from unit-II
8. One question is to be set from unit-II
9. One question is to be set from unit-III
10. One question is to be set from unit-III
11. One question is to be set from unit-IV
12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B. Voc(PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR IISEMESTER**  
**CORE- I**

**PAPER:- PHARMACEUTICS-II**

**QUESTION BANK**  
**(ESSAY QUESTIONS)**

**UNIT-I**

1. (a)Enlist four methods of size reduction  
(b)Write the advantages of ball mill.
2. Write the importance of size reduction
3. Write the advantages of hammer mill.

**UNIT-II**

1. Write the factors affecting rate of filtration
2. Write the advantages and disadvantages of filter press.
3. Explain factors which effect rate of filtration by Darcy's Law
4. What are filter aids. What should be qualities of filter aids
5. Describe construction and working of double cone blender.
- 6.

**UNIT-III**

1. Define sterilization. What are the various methods of sterilisation
2. Write short no test on water for Injection

**UNIT-IV**

1. What are aseptic technique? What are the various sources of contamination.
2. Enlist the general requirements of parenteral preparation
3. Name two methods for "Test for sterility" and explain basic principle of any one.
4. What are the various inprocess quality control tests for Parenterals.
5. Write a note on formulation of Parenterals

6. What are various quality control tests performed on the Parentrals. Explain

### (SHORT QUESTIONS)

#### UNIT-I

1. Write the official standards of powders
2. Draw a neat diagram of cyclone separator.
3. What is Levigaiton
4. Give the gradation of powder according to I.P.
5. Name factors affecting size reduction

#### UNIT-II

1. Write the main objectives of mixing
2. Draw neat diagram of silverson mixer
3. Explain with the help of diagram principle, construction, working and used of colloidal mill

#### UNIT-III

1. Formaldehyde is not used in gaseous sterilization. Why?
2. Write the advantage of dry heat sterilization
3. Name the various methods used for sterilisation
  - i. Hand gloves-rubber
  - ii. Injectables
  - iii. Hospital Wards
4. Discuss in brief gaseous sterilization using ethylene oxide
5. Define the following:
  - a) Tyndallisation
  - b) Pasteurization
6. Differentiate between moist heat sterilization & Dry Heat sterilization.

#### UNIT-IV

1. Why soda lime glass container is not used for parentrals
2. What instructions are to be printed on ophthalmic preparation
3. Give precautions to be taken during aseptic work



P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
CORE- II  
PAPER: ADVANCED INORGANIC CHEMISTRY

**Course objectives:**

To make the student

- iv. Understand the characteristic properties of d- block elements.
- v. Learn lanthanide contraction and its consequences.
- vi. Compare the properties of lanthanides and actinides.

**Outcomes:**

**The student will be able to**

- vii. Learn the characteristic properties of d- block elements.
- v. Learn differences between lanthanides and actinides.
- vi. Learn the important features of MOT
- vii. Learn theories of metallic bonding.

\*\*\*\*\*

**Unit-I**

d- Block elements: definition and classification. Characteristics of d-block elements with reference to electronic configurations, variable valence, color, magnetic, catalytic properties and ability to form complexes. Comparison of second and third transition series with first transition series.

**Unit-II**

f- Block elements: definition and classification. Lanthanide contraction and its consequences. Separation of lanthanides by solvent extraction method and ion exchange method. Actinide contraction. Comparison of Lanthanides with actinides.

**Unit-III**

Chemical Bonding: Important features of Molecular Orbital Theory- LCAO method- Bonding, Antibonding and Nonbonding Molecular Orbitals- Molecular Orbital Energy

diagrams of homonuclear and heteronuclear diatomic molecules (O<sub>2</sub>, N<sub>2</sub>, CO and NO molecules).

#### **Unit-IV**

##### **Theories of bonding in metals:**

6 hrs

Metallic properties. Free electron theory. Explanation of thermal and electrical conductivity of metals, limitations. Valence bond theory and its limitations. Band theory, formation of bands, explanation of conductors, semi-conductors and insulators.

##### **List of Reference Books**

1. Selected topics in inorganic chemistry by W.D.Malik, G.D.Tuli, R.D.Madan
2. Inorganic Chemistry J.E Huheey, E.A.Keiter and R.L.Keiter
3. Advanced Inorganic Chemistry by Gurudeep Raj
4. Basic Inorganic Chemistry by Cotton and Wilkinson
5. Concise Inorganic Chemistry by J.D.Lee

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

FIRST YEAR SEMESTER-II

CORE- II

PAPER: ADVANCED INORGANIC CHEMISTRY

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
CORE- II  
PAPER: ADVANCED INORGANIC CHEMISTRY

Time 2hrs.30min

Maxmarks-60

**SECTION-A**

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

**SECTION-B**

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II
8. One question is to be set from unit-II
9. One question is to be set from unit-III
10. One question is to be set from unit-III
11. One question is to be set from unit-IV
12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
CORE- II

PAPER: ADVANCED INORGANIC CHEMISTRY

**Question bank**

**Essay questions (10M)**

**Unit-I**

1. Discuss the electronic configuration and variable valence of d-block elements.
2. Explain the efficiency of transition elements to form complexes and their catalytic properties with examples.
3. Compare the properties of second transition series with those of first transition series.
4. Explain the color and magnetic properties of transition elements.

**Unit-II**

1. Write the definition and classification of f-block elements.
2. Explain the separation of lanthanides by solvent extraction and ion exchange method
3. Explain lanthanide contraction and its consequences.

**Unit-III**

1. Write important features of molecular orbital theory.
2. Draw the MOED of  $O_2, N_2$ . Write their bond order and magnetic behaviour
3. Draw the MOED of CO, NO. Write their bond order and magnetic behaviour

**Unit-IV**

1. Describe the free electron theory of metals and write its limitations.  
How does free electron theory explain thermal and electrical conductivity of metals?
2. Explain valence bond theory of metals and its limitations.
3. Explain band theory of metals with examples.

**Short answer questions (5M)**

**Unit-I**

1. Explain  $\text{Cu}^{+2}$  ion is colored and paramagnetic but  $\text{Zn}^{+2}$  is colorless and diamagnetic.
2. Discuss the catalytic properties of d-block elements.
3. Write the definition and classification of d-block elements.

#### **UNIT-II**

1. Write short notes on actinide contraction.
2. Write the comparisons between lanthanides and actinides.

#### **UNIT-III**

1. Explain bonding and antibonding molecular orbitals
2. Describe LCAO method.

#### **UNIT-IV**

1. Explain conductors and insulators on the basis of band theory.
2. Write short notes on properties of metals

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
SKILL COMPONENT – II (CORE- II)  
PAPER: ADVANCED INORGANIC CHEMISTRY

PRACTICALS

**Qualitative inorganic analysis**

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

**Anions:** Carbonate, Sulphate, chloride, bromide, acetate, nitrate, borate, phosphate.

**Cations:** Lead, copper, iron, aluminum, zinc, manganese, calcium, strontium, barium, potassium and ammonium.

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR SEMESTER-II**  
**CORE- III**  
**PAPER-: BASIC ANALYTICAL CHEMISTRY-II**

**Course objectives:**

To make the student

- i. Understand the theory and applications of different types of titrations.
- ii. Understand the principle and steps involved in gravimetric analysis.
- iii. Compare precision and accuracy.

**Outcomes:**

**The student will be able to**

- i. Learn the theory and applications of different types of titrations.
- iv. Learn the principle and steps involved in gravimetric analysis.
- ii. Learn different types of errors in chemical analysis.
- iii. Learn different types of solvents and reagents.

**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:**

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

Gravimetric analysis- principle and steps involved in gravimetric analysis, coprecipitation and post precipitation. 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, 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.

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
CORE- III  
PAPER-: BASIC ANALYTICAL CHEMISTRY-II**

**WEIGHTAGE TO CONTENT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
CORE- III  
PAPER:- BASIC ANALYTICAL CHEMISTRY-II

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II
8. One question is to be set from unit-II
9. One question is to be set from unit-III
10. One question is to be set from unit-III
11. One question is to be set from unit-IV
12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR SEMESTER-II**  
**CORE- III**  
**PAPER-: BASIC ANALYTICAL CHEMISTRY-II**

**QUESTION BANK**  
**ESSAY QUESTIONS (10M)**

**UNIT-I**

1. Write the theory and applications of non aqueous titrations.
2. Write the theory and applications of complexometric titrations.
3. Explain the estimation of nitrogen by Kjeldahl method.
4. Explain Carl 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 coprecipitation.

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**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR SEMESTER-II**  
**SKILL COMPONENT – III (CORE- III)**  
**PAPER-: BASIC ANALYTICAL CHEMISTRY-II**

#### **PRACTICALS**

1. Redox Titrations: Determination of Fe (II) using  $\text{KMnO}_4$  with Oxalic acid as primary standard.
2. Redox Titrations: Estimation of Cu (II) ions iodometrically using  $\text{Na}_2\text{S}_2\text{O}_3$ .
3. EDTA Titrations- Estimation of Zn using standard  $\text{Zn SO}_4$ .
4. EDTA Titrations- Estimation of Mg using standard  $\text{Zn SO}_4$ .
5. Estimation of hydrogen peroxide.
6. Karl- Fisher titrations

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
GENERAL COMPONENT – I  
Course: DIFFERENTIAL EQUATIONS – II and PROBABILITY

Total Hrs. of Teaching-Learning: 45@ 3hr/Week  
credits: 3

Total

.....  
**OBJECTIVES:**

- To classify differential equations by order, linearity and homogeneity.
  - To compute solutions to various differential equations by using analytic techniques.
  - To identify the appropriate method for solving the given differential equation.
  - To get awareness about the applications.
  - To understand and solve the problems in random cases
  - To understand and classify the random variables with respect to the real life examples.
  - To analyze the bi-variate data for inter-relations and predictions.
- .....

**Unit 1: Higher Order Linear Differential Equations (with constant coefficients) -- I**  
(12 h)

Solution of homogeneous linear differential equations of order  $n$  with constant coefficients. Solution of the non-homogeneous linear differential equations with constant coefficients  $f(D)y = Q(x)$  by means of polynomial operators when  $Q(x) = be^{ax}$ ,  $Q(x) = b \sin ax$  or  $b \cos ax$ .

**Unit 2: Higher Order linear differential equations (with constant coefficients) ---- II**

(11 h)

Solution of the non-homogeneous linear differential equations with Constant coefficients  $f(D)y = Q(x)$  by means of polynomial operators When  $Q(x) = bx^k$ ,  $Q(x) = e^{ax}V$ ,  $Q(x) = xV$  and  $Q(x) = x^2V$ .  
Method of variation of parameters

**Unit 3: Probability:****(11h)**

Basic concepts in probability-Mathematical, statistical and axiomatic definitions of probability-Conditional probability and independence of events- Addition and multiplication theorems and Bayes' theorem- Problems on probability using counting methods and theorems.

**Unit-4****(11h)****Random Variables:**

Definition of random variable-functions of random variables with illustrations- - Notation of bivariate random variable-Joint, marginal and conditional distributions. Independence of random variables. Pearson's correlation coefficient and regression lines-problems.

**Prescribed Text Books:**

1. Scope as in "Differential Equations and their applications by ZafarAhsan, published by prentice-Hall of India Pvt. Ltd. New Delhi-Second edition.

**Reference Books:**

1. A text book of Mathematics-Volume-I published by S.Chand& Company.
2. Differential Equations bySanthiNarayana, S.Chand& Company.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
GENERAL COMPONENT – I  
Course: DIFFERENTIAL EQUATIONS – II and PROBABILITY

BLUE PRINT FOR THE QUESTION PAPER

UNIT	SHORT ANSWER QUESTIONS 5 Marks	ESSAY QUESTIONS 10 Marks	TOTAL MARKS
I	1	2	25
II	2	1	20
III	1	1	15
IV	2	1	20
TOTAL NO. OF QUESTIONS	6	5	80

Question Paper pattern:

Short Answer Questions = 4 x 5 = 20 Marks

Essay questions = 3 x 10 = 30 Marks

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TOTAL 50 Marks  
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P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
GENERAL COMPONENT – I  
Course: DIFFERENTIAL EQUATIONS – II and PROBABILITY

**PART – I**

Answer any FOUR of the following questions.

4 x 5 = 20 M

1. 1. Solve  $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 2y = \sin 2x$ .
2. Solve  $(D^2 - 2D + 1)y = x^2 e^{3x}$ .
3. Solve  $(D^2 - 2D)y = e^x \sin x$ , by the method of variation of parameters.
4. Define Random experiment, trail, sample space, event, elementary & sample events
5. Prove that addition & multiplication theorem of probability for two events.
6. Define marginal probability mass function & conditional probability function.

**PART – II**

Answer any THREE of the following questions.

3 X 10 = 30 M

7. Solve  $(D^2 - 4D + 3)y = \sin 3x \cdot \cos 2x$
8. Solve  $(D^2 - 3D + 2)y = x^2 + \text{Cosh}x$
9. Solve  $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$ .
10. A pharmaceutical company has three plants I, II and III to produce drugs. The production capacities are respectively 40%, 35% and 25%. The probabilities that faulty labeling by the three plants are respectively 4%, 6% and 5%. At a distribution centre, it is found that a drug is with a faulty label. a) What is the probability that it is produced by plant-I  
b) What is the probability that it is produced by plant-II?
11. Compute the Karl Pearson's correlation coefficient to the following data.

Usage of	0-1	1-2	2-3	3-4	4-5	5-6
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chrocine(in mg)						
Reaction per 100 patients	2	10	14	12	25	37

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR SEMESTER-II**  
**GENERAL COMPONENT – II**  
**CHEMISTRY**  
**PAPER: BASIC ORGANIC CHEMISTRY- II**

### Unit-I

Alkenes: Nomenclature- general methods of preparation of alkenes ( dehydrohalogenation of alkyl halides, dehalogenation of dihalides, dehydration of alcohols. Chemical properties of alkenes- addition reactions: addition of Hydrogen, halogens, addition of water with mechanism. Electrophilic addition reactions- addition of hydrogen halides with mechanism. Markonikov's rule and anti- Markonikov's rule with mechanisms.

### Unit- II

Alkynes: Nomenclature- general methods of preparation of alkynes (dehydrohalogenation of alkyl dihalides and dehalogenation of tetrahalides). Industrial preparation of acetylene, polymerization reactions of acetylene. Addition reactions of alkynes (Addition of hydrogen, halogens and HX). Acidity of terminal alkynes (acetylene as an example).

Alkadienes: definition classification . addition of HBr to 1,3-butadiene

### Unit-III

Cycloalkanes: Nomenclature- methods of preparation of cycloalkanes (Freund method and Dieckman method). Chemical reactions of cycloalkanes- Baeyer strain theory and its limitations- Sacche Mohr theory. Conformations of cyclobutane and cyclohexane with brief explanation.

### Unit- IV

Benzene: structure of Benzene (Resonance theory and Molecular Orbital Theory). Aromaticity and criteria for Aromaticity- Huckel rule and its applications to benzenoid

(Benzene, Naphthalene and Anthracene) and non-benzenoid compounds (Cyclopropelium cation, Cyclopentadienyl anion and trolepium cation).

Electrophillic substitution reactions of benzene: General mechanism. Halogenation, nitration and sulphonation reactions with mechanisms.

#### List of Reference Books

1. Organic Chemistry by Morrison and Boyd
2. A Text Book of Organic chemistry by I L Finar Voll

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-II**  
**GENERAL COMPONENT – II**  
**CHEMISTRY**

**PAPER: BASIC ORGANIC CHEMISTRY- II**

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	1	1	15
3.	UNIT -III	1	2	20
4.	UNIT -IV	2	2	30
	Total	6	7	95

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-II  
GENERAL COMPONENT – II  
CHEMISTRY

PAPER: BASIC ORGANIC CHEMISTRY- II

PRACTICALS

**Qualitative organic analysis:**

1. Systematic procedure for the qualitative analysis of an organic compounds
2. Systematic qualitative analysis of the following organic compounds
  - a) Alcohols
  - b) carboxylic acids
  - c) aldehydes
  - d) ketones
  - e) amines
  - f) amides

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
FIRST YEAR SEMESTER-II  
GENERAL COMPONENT – II  
CHEMISTRY

PAPER: BASIC ORGANIC CHEMISTRY- II

Time 2hrs.30min

Maxmarks-50

SECTION-A

Answer any THREE of the following questions

3x10=30 M

1. One question is to be set from unit-I
2. One question is to be set from unit-I
3. One question is to be set from unit-II
4. One question is to be set from unit-III
5. One question is to be set from unit-IV
6. One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

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

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**FIRST YEAR SEMESTER-II**  
**GENERAL COMPONENT – II**  
**CHEMISTRY**  
**PAPER: BASIC ORGANIC CHEMISTRY- II**  
**QUESTION BANK**  
**ESSAY QUESTIONS (10M)**

**Unit-I**

1. Describe Markonikov's rule and anti-Markonikov's rule with mechanisms.
2. Write any two preparation methods and three chemical properties of alkenes.

**Unit- II**

1. Write any three preparation methods and two addition reaction of alkynes.
2. Define alkadienes write the classification of dienes and write the addition reaction of HBr to 1,3-butadiene.

**Unit-III**

1. Write the preparation methods and chemical reactions of cyclo alkanes.
2. Explain baeyer strain theory with limitations.
3. Write the predictions of sacche mohr theory.

**Unit- IV**

1. What is huckel rule? Apply it to benzinioid compounds.
2. Write mechanism of nitration and halogenation of benzene.
3. Describe the struture of benzene basing on molecular orbital theory.

**SHORT ANSWER QUESTIONS (5M)**

**Unit-I**

1. Write the IUPAC names of the following compounds with explanation  
a)  $\text{CH}_3\text{-CH=CBr-CH}_2\text{-CH}_3$  b)  $\text{CH}_3\text{CH=CHCH}_3$
2. Write the structures of the following compounds  
a) 2-ethyl,1-butanoic acid b) 3-methyl,5-hydroxy 3-hexenal
3. Explain addition of water to alkenes with mechanism.

**Unit- II**

1. Write the industrial preparation and polymerization reactions of acetylene.
2. Explain acidity of acetylene

### **Unit-III**

1. Explain the confirmations of cyclobutane
2. Explain the confirmation of cyclohexane

### **Unit- IV**

1. Apply huckel rule to cyclo propylium cation
2. Apply huckel rule to tropylium cation
3. Write mechanism of sulphonation of benzene
4. Explain structure of benzene with resonance theory.

**P R GOVT COLLEGE (A):: KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**INFORMATION & COMMUNICATION TECHNOLOGY –1 (ICT-1)**  
**SEMESTER-II (W.E.F 2018-19)**  
**GENERAL COMPONENT – III**  
**Computer Fundamentals and Office Tools**

**II Semester**  
(30 Hours of Teaching Learning including Lab)

**Unit-I:**

**Basics of Computers** :Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working – Central Processing Unit – I/O Devices.

**Unit-II:**

Primary, Auxiliary and Cache Memory – Memory Devices. Software, Hardware, Firmware and People ware – Definition and Types of Operating System – Functions of an Operating System – MS-DOS – MS Windows – Desktop, Computer, Documents, Pictures, Music, Videos, Recycle Bin, Task Bar – Control Pane.

**Unit-III:**

**MS-Word**

Features of MS-Word – MS-Word Window Components – Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format – Page Borders and Shading – Inserting Symbols, Shapes, Word Art, Page Numbers, Equations – Spelling and Grammar – Thesaurus – Mail Merge

**Unit-IV:**

**MS-PowerPoint**

Features of PowerPoint – Creating a Blank Presentation - Creating a Presentation using a Template - Inserting and Deleting Slides in a Presentation – Adding Clip Art/Pictures - Inserting Other Objects, Audio, Video - Resizing and Scaling of an Object – Slide Transition – Custom Animation

**Unit-V:**

**MS-Excel**

Overview of Excel features – Creating a new worksheet, Selecting cells, Entering and editing Text, Numbers, Formulae, Referencing cells – Inserting Rows/Columns – Changing column widths and row heights, auto format, changing font sizes, colors, shading.

**Reference Books:**

1. Fundamentals of Computers by ReemaThareja, Publishers : Oxford University Press, India
2. Fundamentals of Computers by V.Raja Raman, Publishers: PHI
3. Microsoft Office 2010 Bible by John Walkenbach, Herb Tyson, Michael R.Groh and FaitheWempen, Publishers : Wile.

**P. R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA  
MODEL BLUE PRINT (W.E.F. 2018-19)  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SEMESTER –II  
GENERAL COMPONENT – III**

**INFORMATION AND COMMUNICATION TECHNOLOGY-I**

**SUBJECT:ICT  
PAPER- I**

**Time: 2 Hrs  
Marks: 50**

Model blue print for the model paper and choice

S.NO	Type of Question	To be given in the Question Paper			To be answered		
		No. of Questions	Marks allotted to each question	Total Marks	No. of Questions	Marks allotted to each question	Total Marks
1	Section-B Short Questions	8	3	24	5	3	15
2	Section-A Essay Questions	4	10	40	2	10	20
<b>TOTAL MARKS</b>				<b>64</b>	<b>TOTAL MARKS</b>		<b>35</b>

Model Blue print for the question paper setter

Chapter Name	Essay Questions 10 Marks	Short Questions 3 Marks	Marks allotted to the chapter
UNIT-I, II	1	4	22



UNIT-III	1	1	13
UNIT-IV	1	1	13
UNIT- V	1	2	16
Total No. of questions	4	8	
Total Marks Including choice			64

**P.R. GOVT COLLEGE (AUTONOMOUS), KAKINADA  
MODEL PAPER (W.E.F. 2018-19)  
GENERAL COMPONENT – III**

**INFORMATION AND COMMUNICATION TECHNOLOGY-I**

**SEMESTER –II**

**Sub: ICT- I  
Time: 2 hrs**

**Paper: I**

**Marks: 50**

**SECTION – A**

**Answer any FOUR questions the following**

**4 x 5= 20 M**

1. Write about characteristics of Computer?
2. Explain types of computers?
3. Explain Primary and Secondary memory devices?
4. Explain Desktop and Recycle bin?
5. Explain feature of MS-Word?
6. Explain header and Footer in MS-Word?
7. Explain features of MS-Power point?
8. How to inserting Rows and Columns in MS-Excel?

**SECTION – B**

**Answer any THREE questions the following**

**3 x 10= 30 M**

9. Draw and explain block diagram of Computer in details?
10. Explain various input and output devices?
11. Explain types of operating system?
12. What is Mail-Merge? Explain Mail-Merge concept in MS-Word?
13. Explain Types of Views in MS-Power point?
14. Explain features of MS-Excel?

**P.R. GOVT COLLEGE (AUTONOMOUS), KAKINADA**  
**B. Voc (Pharmaceutical Chemistry)**  
**QUESTION BANK (W.E.F. 2018-19)**  
**SEMESTER-II**

**GENERAL COMPONENT – III**

**INFORMATION AND COMMUNICATION TECHNOLOGY-I**  
**QUESTION BANK**

1. Define computer? Explain the characteristics of computer.
2. Draw and explain block diagram of computer in details?
3. Explain the different types of computer?
4. Explain various input and output devices?
5. Explain types of memory devices?
6. Define operating system? Explain Function of operating system.
7. Explain types of operating system?
8. Explain internal commands in MS –DOS?
9. Explain feature of MS-Windows?
10. Explain desktop, recycle bin?
11. Explain feature of MS-Word?
12. Explain header and footers in MS-Word?
13. What is Mail-Merge? Explain Mail-Merge concept in MS-Word?
14. Explain features of MS-Power point?
15. What is Presentation? How to create a presentation in MS-Power point?
16. Explain types of Views in MS-Power point?
17. How to Inserting and Deleting in Slides in MS-Power point?
18. Explain features of MS-Excel?
19. Define worksheet and Cell? Explain Cell address and Cell Referencing in MS-Excel.
20. How to entering and editing text and numbers in Excel?
21. Explain Auto numbering and Auto Filling in MS-Excel?
22. How to inserting Rows and Columns in Excel?
23. How to changing column widths and rows heights in MS-Excel?

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

B. Voc (Pharmaceutical Chemistry)  
SEMESTER-II

FOUNDATION COURSE  
COMMUNICATION and SOFT SKILLS -I

**Unit - I : Vocabulary building**

Prefixes And Suffixes

Compound words

One word substitutes

Words often confused

Phrasal Verbs

**Unit II & III - Grammar**

Types of Verbs

Subject Verb agreement

Tense forms

Articles and Prepositions

**Unit - IV - Listening Skills**

Types of listening

Barriers of Effective listening

Strategies for effective listening

**Unit V - Reading Skills**

Skimming

Scanning

Intensive/ Extensive Reading

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

B. Voc (Pharmaceutical Chemistry)  
SEMESTER-II

FOUNDATION COURSE  
COMMUNICATION and SOFT SKILLS -I

Model Paper

Total marks 50      Time 2hr

Answer any three of the following  $6 \times 5 = 30m$

I. Look at the underline part in each word and write its meaning.  $10 \times 1/2 = 5m$

e.g. bicycle=two

1. semicircle

2. multipurpose

3. tripod

4. anticlimax

5. misunderstand

6. postpaid

7. supermarket

8. reload

9. Prorich

10. Hyperactive.

II. Write noun forms for following by choosing appropriate suffixes  $10 \times 1/2 = 5m$

E.g Supervise = supervision

1. commit
2. oblige
3. Expect
4. Normal
5. Examine
6. Relate
7. Capable
8. False
9. Conceive
10. apply

**III. Select the right option. 5x1=5m**

1. The rice seems to be very ( coarse/course)
2. Rasagulla is a delicious ( dessert/ desert)
3. Everyone prefers (piece/peace) to war.
4. Mr.Sharma is (formally/formerly) the Principal of this college.
5. Petrol is very precious. We must use it (judiciously/judicially)

**IV. Choose the appropriate phrasal verb for the underlined in each sentence by selecting from the list. 5x1=5m**

Put out , put off , took off , called off, closed down, passed away

1. The old man died due to cancer.
2. There was a fire accident in our locality yesterday. The fire fighters came and stopped the fire.
3. The RTC workers strike was cancelled.
4. The plane could not leave the ground due to bad weather.
5. The University deferred the exams on the request of students.

**V. Correct the following sentences 5x1=5m**

1. This scissors is very blunt.
2. A Team of doctors have examined the patient.
3. He said that he will be ready.

4. I saw your brother while I am returning from college.

5. I am going to college every day.

**VI. Fill in the blanks with suitable prepositions**

**5x1=5m**

1. India is a leading country \_\_\_\_\_ software development.

2. Milk is good \_\_\_\_\_ health.

3. The cat jumped \_\_\_\_\_ the rat.

4. She held her pen \_\_\_\_\_ her fingers.

5. The house is \_\_\_\_\_ the Balaji Temple.

## **UNIT- II**

**Answer any ONE question 2x5=10m**

1. What are the barriers to effective listening?

2. List out various strategies we can adopt for effective listening?

3. Write a note on the types of listening?

## **Unit - III**

### **(READING SKILLS)**

**Write a note on any ONE of the following 2x5=10m**

1. skimming

2. Intensive reading

3. scanning

**Semester-III**

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- I

PAPER:- PHARMA REGULATORY AFFIARS

Learning Objectives:

Upon completion of the course, the student shall be able to understand:

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. The regulatory authorities and agencies governing the manufacture and sale of Laws pharmaceuticals
3. Know different and Acts that regulate pharmaceutical industry

UNIT :1

Good laboratory Practice, Standard operating procedure, Standard Testing procedure, 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 drug Approval (NDA), specific requirements, content & format of NDA, manufacturing control requirement of NDA.

UNIT-III

GMP, ISO 9000, TQM, ICH.

UNIT:IV



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

Reference Books:

1. J.A Dean, analytical chemistry handbook, McGraw hill Inc., 1st Ed., 1995.
2. Ethical Guidelines for Biomedical research on human subjects 2000. Indian Council of Medical Research, New Delhi.
3. Goodman & Gilman: JG Hardman, LE Limbard, 10th Edn. McGraw Hill Publications, 2001.
4. Central Drugs Standard Control Organization. Good Clinical Practices- Guidelines for Clinical Trials on pharmaceutical Products in India. New Delhi: Ministry of Health; 2001.

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- I**

**PAPER:- PHARMA REGULATORY AFFIARS**

**WEIGHTAGE TO CONTENT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- I

PAPER:- PHARMA REGULATORY AFFIARS

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

**Answer any FOUR questions**

**4x5=20M**

5. One question is to be set from unit-I
6. One question is to be set from unit-I
7. One question is to be set from unit-II
8. One question is to be set from unit-II
9. One question is to be set from unit-III
10. One question is to be set from unit-III
11. One question is to be set from unit-IV
12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
SKILL COMPONENT – I (CORE- I)**

**PAPER-: PHARMA REGULATORY AFFIARS**

**Practicals:**

Analytical method validation

Assignment on product development filing to various regulatory authorities

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- I

PAPER:- PHARMA REGULATORY AFFIARS

QUESTION BANK  
(ESSAY QUESTIONS)

UNIT-I

1. Why are the reference (reserve) samples maintained
2. State the contents of SOP on handling of the rejected materials
3. Write short note on product Recalls

UNIT-II

1. Approval of new drugs in India
2. Write about the -Investigational New Drugs (IND) submission,
3. What are the content of IND,

UNIT-III

1. Give an account of sources of survey of literature
2. What is a patent? Describe importance of patent in research
3. Why protection is needed on Intellectual property
4. Write notes on
5. Industrial project as a part of industry institute interaction'
6. Trademark designs and copyrights
7. Status of IPR in india
8. Explain the role of IP laws in pharma industry
9. Indian patent act 1970
10. Schedule M and Y
11. Write short notes on  
Labeling of drugs

Drug master file  
ISO  
USFDA  
CDSCO

#### UNIT-IV

1. Explain the Domino theory and Heinrich Loss control Triangle
2. Describe in brief the engineering tools and techniques'
3. What is MSDS? Describe each section of MSDS
4. Write a note on General Chemical Spill Guidelines.
5. Write a note on first aid
6. Write a note on Fire safety emergency preparedness

#### SHORT QUESTIONS

##### UNIT-I

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

##### UNIT-II

1. Explain the content of investigator Brochure,
2. Give the general procedure of new drug Approval (NDA)
3. What are the specific requirements, content & format of NDA
4. What are the manufacturing control requirements of NDA.
5. Define IND
6. What is protocol
7. What is preformulation

##### UNIT-III

1. What are the major drugs and pharmaceuticals Regulating bodies in India
2. Define GMP protocol
3. Write a note on USFDA
4. Write a note on CDSCO
5. Define IPR

##### UNIT-IV

1. How will you use an eye shower
2. Define the steps in detail to do a safety Job analysis
3. What is meant by Emergency
4. Write about personnel protective equipment

5. Explain Emergency response in case of chemical spill
6. Write about fire extinguishers
7. What are the contents of First Aid Box
8. What are the various steps in Accident prevention control
9. Write about safety signs and signals

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- II  
PHARMACEUTICAL INORGANIC CHEMISTRY

## 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 limit test 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, biological effects of radiation, precautions to be taken while handling 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).

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-III**  
**CORE- II**  
**PHARMACEUTICAL INORGANIC CHEMISTRY**

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
SKILL COMPONENT – II (CORE- II)  
PHARMACEUTICAL INORGANIC CHEMISTRY

PRACTICALS

**Practicals:** Qualitative inorganic analysis

1. **Reactions of anions**  
(Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate, phosphate )**and**
  2. **Cations** (Lead, copper, iron, aluminum, zinc, manganese, nickel, calcium, strontium, barium, potassium and ammonium.)
2. Analysis of simple salt containing one anion and cation from the following

**Anions:** Carbonate, Sulphate, chloride, bromide, acetate, nitrate, borate, and phosphate.

**Cations:** Lead, copper, iron, aluminum, zinc, manganese, nickel, calcium, strontium, barium, potassium and ammonium.



P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- II  
PHARMACEUTICAL INORGANIC CHEMISTRY

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I
6. One question is to be set from unit-I
7. One question is to be set from unit-II
8. One question is to be set from unit-II
9. One question is to be set from unit-III
10. One question is to be set from unit-III
11. One question is to be set from unit-IV
12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- II  
PHARMACEUTICAL INORGANIC CHEMISTRY  
**Question bank**  
**Essay questions (10M)**

### Unit-I

1. Explain different sources of impurities in medicinal preparations.
2. Explain different methods for the purification of inorganic substances.
3. Explain principle and method involved in the limit test for a) chloride b) iron.
4. 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 pharmaceutical preparations.
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 sodium bisulphate 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 with examples.

### Unit-IV

1. Explain the precautions to be taken while handling radioactive materials.

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.
4. What is anti-acid therapy and give examples of anti-acids.

#### **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  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- III  
PAPER-: ADVANCED ANALYTICAL CHEMISTRY

**Separation Techniques:**

**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 and its 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 paper chromatography.

Thin Layer chromatography- principle and experimental details- superiority of thin layer chromatography 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 and applications

#### List of Reference Books

1. Analytical Chemistry by Skoog and Miller
2. A textbook of qualitative inorganic analysis by A.I. Vogel
3. Nanochemistry by Geoffrey Ozin and Andre Arsenault
4. Stereochemistry by D. Nasipuri
5. Organic Chemistry by Clayden

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

SECOND YEAR SEMESTER-III

CORE- III

PAPER-: ADVANCED ANALYTICAL CHEMISTRY

#### WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- III  
PAPER-: ADVANCED ANALYTICAL CHEMISTRY

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

## SECTION-B

Answer any **FOUR** questions

**4x5=20M**

5. One question is to be set from unit-I
6. One question is to be set from unit-I
7. One question is to be set from unit-II
8. One question is to be set from unit-II
9. One question is to be set from unit-III
10. One question is to be set from unit-III
11. One question is to be set from unit-IV
12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
CORE- III  
PAPER-: ADVANCED ANALYTICAL CHEMISTRY  
QUESTION BANK  
ESSAY QUESTIONS (10M)

**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. Write the instrumentation of gas-liquid chromatography.
4. Write the instrumentation of high performance liquid chromatography.
5. Write the applications of high performance liquid chromatography.

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-III**  
**SKILL COMPONENT – III (CORE- III)**  
**PAPER-: ADVANCED ANALYTICAL CHEMISTRY**

## **PRACTICALS:**

1. Assay of  $H_2O_2$  solution.
2. Assay of formaldehyde.
3. Determination of alkalinity of water sample.
4. Determination of free chloride in a sample of water.
5. Estimation of  $Al^{+3}$  in a given solution using EDTA (back titration)



P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – I  
PAPER-: MATHEMATICS  
Course: Numerical Analysis

Total Hrs. of Teaching-Learning: 45 @ 3 h / Week

Total Credits:

03

**Objectives:**

- To find the different types of errors in computation and then to reduce the errors
- To find the approximate Polynomial for the given data when the data is even or uneven by using interpolation, also we can find the differentiation even if the function is not known explicitly.
- To find the solution of Algebraic and Transcendental equations using Bisection, Falsi Position, Iteration and Newton Raphson methods.

-----  
**Unit I: Errors in Numerical Computation**

**(6 hrs)**

Errors and their accuracy, Mathematical preliminaries, Errors and their analysis, Absolute, Relative and Percentage errors, A general error formula, Errors in a series approximation.

**Unit II: Solutions of Algebraic and transcendental equations**

**(10 hrs)**

(a) Bisection Method (b) Iteration Method (c) Method of false position (d) Newton Raphson Method

### Unit III: Interpolation – I

(8 hrs)

**Finite Differences**, Forward, Backward and central difference operators, Shift and average difference operators, symbolic relation between the operators,

### Unit IV: Interpolation - II

(12 hrs)

Interpolation for equal intervals: Newton's forward, backward, Gauss forward, Backward, Stirling's. Lagrange's interpolation formula, divided differences and Newton's divided difference formula.

#### **Prescribed Text books:**

Numerical Analysis by S. Ranganatham, MVSSN Prasad, Dr. V. Ramesh Babu.  
S. Chand & Company

#### **Reference books:**

Numerical Analysis by S.S.Sastry Prentice Hall, NewDelhi  
Numerical Analysis by Kamali Surya Narayana, Schand&co, NewDelhi  
Numerical Analysis by Gupta &Malik, Krishna Prakashan media (P) Ltd Meerut”

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
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SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – I  
PAPER-: MATHEMATICS  
Course: Numerical Analysis

#### BLUE PRINT FOR THE QUESTION PAPER

UNIT	SHORT ANSWER QUESTIONS 5 Marks	ESSAY QUESTIONS 10 Marks	TOTAL MARKS
I	1	2	25
II	2	1	20
III	1	1	15
IV	2	1	20
<b>TOTAL NO. OF QUESTIONS</b>	<b>6</b>	<b>5</b>	<b>80</b>

Question Paper pattern:

Short Answer Questions =  $4 \times 5 = 20$  Marks

Essay questions =  $3 \times 10 = 30$  Marks

TOTAL

50 Marks

P P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – I  
PAPER:- MATHEMATICS  
Course: Numerical Analysis

Time: 2Hrs

Max. Marks: 50

PART – I

Answer any FOUR of the following questions.

4 x 5 =20

M

1. Find the absolute, relative, percentage errors of 625.483 is approximated to three significant figures.
2. Find a root of the equation  $x^3-2x-5=0$  by using Newton - Raphson method.
3. Solve the equation  $\sin x=5x-2$  by iteration method.
4. Find the missing term in the following table.

X	0	1	2	3	4
Y	1	3	9	?	81

5. Derive Newton's backward interpolation formula.
6. Find  $f(25)$  from  $f(20)=24$ ,  $f(24)=32$ ,  $f(28)=35$ ,  $f(32)=40$  by using Gauss forward interpolation formula.

## PART – II

Answer any THREE of the following questions.

3 X 10 =

30 M

7. If  $u=4xy^2/z^3$  and errors in  $x, y, z$  be 0.001, then compute the relative maximum error in  $u$ , when  $x = y = z = 1$ .
8. Define absolute, relative, percentage errors. Evaluate the sum  $S = \sqrt{3}+\sqrt{5}+\sqrt{7}$  to four significant digits and find its absolute and relative errors.
9. Explain Bisection method. Find the cube root of 30 by using Bisection method.
10. Prove that  
(1)  $E = e^{hD}$ , (2)  $\mu^2 = 1 + \frac{1}{4}\delta^2$ , (3)  $\Delta = E - 1$ , (4)  $(1 + \Delta)(1 - \nabla) = 1$ , (5)  $\nabla = \Delta E^{-1}$ .
11. Find  $y$  at  $x = 10$  from the data (5, 12), (6, 13), (9, 14), (11, 16) by using Lagrange's interpolation formula.

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SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – II  
PAPER:- CHEMISTRY  
PAPER: ORGANIC CHEMISTRY-I

### Unit- I

Stereochemistry of carbon compounds - I

Stereo isomerism and its classification, conformational isomerism-definition and conformational isomerism in alkanes (ethane and n-butane), configurational isomerism-definition and its classification. Differences between conformational isomers and configurational isomers.

Geometrical isomerism-definition and explanation with examples. E-Z configuration, CIP rules with examples.

### Unit- II

Stereochemistry of carbon compounds - II

Optical isomerism- definition. Wave nature of light, plane polarized light. Elements of symmetry- criteria for optical activity- Optical rotation and specific rotation.

Asymmetric and dissymmetric molecules, definition and examples. Chiral and achiral molecules, definition and examples. Enantiomers and diastereomers, definition and examples.

Optical isomerism in Lactic acid, alanine, tartaric acid and 2, 3- dibromobutane.

Relative configuration (D, L Configuration) with examples. Absolute configuration (R, S Configuration). CIP Rules for assigning R and S configuration for optical isomers.

### Unit – III

**Halogen compounds:**

5hrs

Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl halides. Nucleophilic substitution reactions in alkyl halides -classification into  $S_N1$  and  $S_N2$  – reaction mechanism and stereochemistry with examples- Ethyl chloride, t-butyl chloride and optically active alkyl halide 2-bromo butane. Differences between  $S_N1$  and  $S_N2$  reactions.

**Unit – IV****Hydroxy compounds:**

5hrs

Nomenclature and classification of hydroxyl compounds.

Alcohols: Preparation with hydroboration reactions .Grignard synthesis of alcohols.

Phenols: Preparation i) from diazonium salt ii) from aryl sulphonates

iii) From cumene.

Physical properties : Hydrogen bonding (inter molecular and intra molecular). Effect of hydrogen bonding on boiling point and solubility in water.

Identification of alcohols by oxidation with  $KMnO_4$ , Ceric ammonium nitrate. Luca's reagent and phenols by reaction with  $FeCl_3$ .

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**SECOND YEAR SEMESTER-III**  
**GENERAL COMPONENT – II**  
**PAPER:- CHEMISTRY**  
**PAPER: ORGANIC CHEMISTRY-I**

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	1	2	20
2.	UNIT -II	2	2	30
3.	UNIT -III	1	1	15
4.	UNIT -IV	2	1	25
	Total	6	6	90

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SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – II  
PAPER-: CHEMISTRY  
PAPER: ORGANIC CHEMISTRY-I

Time 2hrs.30min

Maxmarks-50

**SECTION-A**

Answer any **THREE** of the following questions

3x10=30 M

1. One question is to be set from unit-I
2. One question is to be set from unit-II
3. One question is to be set from unit-II
4. One question is to be set from unit-III
5. One question is to be set from unit-IV
6. One question is to be set from unit-IV

**SECTION-B**

Answer any **FOUR** questions

4x5=20M

7. One question is to be set from unit-I
8. One question is to be set from unit-I
9. One question is to be set from unit-II
10. One question is to be set from unit-II

11. One question is to be set from unit-III
12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
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SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – II  
PAPER:- CHEMISTRY  
PAPER: ORGANIC CHEMISTRY-I

**Practicals:**

Preparation of the following compounds.

1. Salicylic acid from methyl salicylate
2. Acetyl salicylic acid from salicylic acid
3. Benzanilide from aniline
4. 2,4,6-tri bromo phenol from phenol e) N-methyl azo  $\beta$  Naphthol.
5. Assay of Aspirin.
6. Assay of Isoniazid.



**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-III**  
**GENERAL COMPONENT – II**  
**PAPER:- CHEMISTRY**  
**PAPER: ORGANIC CHEMISTRY-I**

**Unit- I**

1. Define stereo isomerism. write the classification of stereoisomerism.
2. Explain geometrical isomerism with examples.
3. Explain the classification of configurational isomerism.

**Unit- II**

1. Explain optical isomerism taking any two examples.
2. Explain CIP rules for assigning R-S configuration with examples.
3. Explain CIP rules for assigning E-Z configuration with examples.

**Unit – III**

1. Write about Nucleophilic substitution reaction in alkyl halides with reaction mechanism.
2. Write the classification of halogen compounds with examples.
3. Write the stereochemistry of  $SN^1$  and  $SN^2$  reaction taking ethyl chloride and t-butyl chloride as examples.

**Unit – IV**

1. Write the preparation methods of phenols from a) diazonium salt b) aryl sulphonates c) cumene
2. Write any two preparation methods and two identification tests for alcohols.
3. Write the classification of hydroxyl compounds.

**Short answer questions(5M)**

**Unit- I**

1. Write the differences between conformational isomers and configurational isomers
2. Explain E-Z configuration with examples.
3. Write about conformational isomerism in n-butane.

**Unit- II**

1. Define chiral and achiral molecules give examples.
2. Define enantiomers and diastereomers give examples
3. Define optical rotation and specific rotation.
4. Define asymmetric and dissymmetric compounds give examples.

#### **Unit – III**

1. Write the differences between  $S_N1$  and  $S_N2$  reactions.
2. Write IUPAC names of the following compounds  
a) 4-chlorotoluene b) 2-bromo-2-chloro-1,1,1-trifluoroethane c) 2,4,6-trichlorophenol
3. Write the stereochemistry of  $S_N1$  and  $S_N2$  reaction taking optically active alkyl halide 2-bromo butane as an example.

#### **Unit – IV**

1. Write the identification test for phenols with  $FeCl_3$
2. Explain types of hydrogen bonding in alcohols.
3. Write about effect of hydrogen bonding on boiling point of alcohols.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – III

INFORMATION & COMMUNICATION TECHNOLOGY –II (ICT-II)  
SEMESTER-III (W.E.F 2018-19)

**Total hrs. Of teaching-learning: 30 @ 2 Hrs / week      Total credits: 02**

Module -I:

Fundamentals of Internet : Networking Concepts, Data Communication – Types of Networking, Internet and its Services, Internet Addressing – Internet Applications – Computer Viruses and its types – Browser –Types of Browsers.

Module -II: Internet applications: Using Internet Explorer, Standard Internet Explorer Buttons, Entering a Web Site Address, Searching the Internet – Introduction to Social Networking: Twitter, LinkedIn, Facebook, Flickr, Skype, Yahoo!, Google+, Youtube, WhatsApp, etc.

Module -III: E-mail :Definition of E-mail - Advantages and Disadvantages – User Ids, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management, Email Inner Workings.

Module -IV:

WWW- Web Applications, Web Terminologies, Web Browsers, URL – Components of URL, Searching WWW – Search Engines and Examples

Module -V:

Basic HTML: Basic HTML – Web Terminology – Structure of a HTML Document – HTML, Head and Body tags – Semantic and Syntactic Tags – HR, Heading, Font,

Image and Anchor Tags –Different types of Lists using tags – Table Tags, Image formats – Creation of simple HTML Documents.

**Reference Books:**

In-line/On- line: Fundamentals of the Internet and the World Wide Web, 2/e - by Raymond Greenlaw and Ellen Hepp, Publishers: TMH

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-III  
GENERAL COMPONENT – III**

**INFORMATION & COMMUNICATION TECHNOLOGY –II (ICT-II)**

Time: 2 Hrs

Marks: 50

Model blue print for the model paper and choice

S.NO	Type of Question	To be given in the Question Paper			To be answered		
		No. of Questions	Marks allotted to each question	Total Marks	No. of Questions	Marks allotted to each question	Total Marks
1	Section-B Short Questions	8	5	40	4	5	20
2	Section-C Essay Questions	6	10	60	3	10	30
<b>TOTAL MARKS</b>				<b>100</b>	<b>TOTAL MARKS</b>		<b>50</b>

Model Blue print for the question paper setter

Chapter Name	Essay Questions 10 Marks	Short Questions 5 Marks	Marks allotted to the chapter
Module-I	2	2	30

<b>Module-II</b>	<b>1</b>	<b>2</b>	<b>20</b>
<b>Module-III</b>	<b>1</b>	<b>1</b>	<b>15</b>
<b>Module-IV</b>	<b>1</b>	<b>1</b>	<b>15</b>
<b>Module-V</b>	<b>1</b>	<b>2</b>	<b>20</b>
<b>Total No. of questions</b>	<b>6</b>	<b>8</b>	<b>100</b>

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-III**  
**FOUNDATION COURSE**  
**PAPER: COMMUNICATION and SOFT SKILLS (CSS -2)**

CSS - 2 aims at improving the speaking skills of the learner. For many learners of English, the sound-spelling relationship of the language appears anarchic. Another problem of many Indian learners face is English word accent. Unit I and Unit II help learners overcome these problems to a great extent. The remaining units are on the two productive skills, speaking and writing. The techniques of day-to-day conversations and the important characteristics of interviews and GDs presented in this course strengthen the learner's speaking skills. The last unit presents various aspects of presentation in writing.

Unit I: Pronunciation - 1

The Sounds of English

Unit II: Pronunciation – 2

1. Word Accent

2. Intonation

Unit III: Speaking Skills -1

1. Conversation Skills

2. Interview Skills

3. Presentation Skills

4. Public Speaking

Unit IV: Speaking Skills -2

1. Role Play

2. Debate

3. Group Discussion

Unit V: Writing Skills

1. Spelling

2. Punctuation

3. Information Transfer- Tables

Bar Diagrams

Line Graphs

Pie Diagrams

Flow Charts

Tree Diagrams

Pictures

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-III**  
**FOUNDATION COURSE**

**PAPER: COMMUNICATION and SOFT SKILLS (CSS -2)**

**Time: 2hrs**

**marks:50m**

**SECTION-I**

**I. Answer any three of the following questions : 3x5=15marks**

1. Consonants and Consonant clusters
2. pure vowels and Diphthongs
3. Explain phonemic symbols and phonemic transcription? What is their use?
4. What is Intonation? What are the various intentions that can be conveyed through intonation?
5. What are the differences between English and Telugu in terms of spellings and pronunciation?

**SECTION-II**

**II. Answer any three of the following questions : 3x5=15marks**

6. What is a syllable and how are words on the basis of number of syllables classified.
7. What are content words? What are structure words? Give suitable examples.
8. What is neutral accent? How can we achieve it?
9. In what way a dictionary is useful to the learner for improving one's pronunciation or stress?
10. What type of pronunciation problems do the Telugu speakers face when they speak English?

**SECTION-III**

**III. Answer any four of the following questions : 4x5=20marks**

11. Write a brief note on the dos and dont's of power point presentation?
12. Prepare a role-play (dialogue) between a hotel receptionist and a customer who wants to book a room.

13. Imagine yourself ask an interviewer for jobs and write a list of questions you would like to ask the candidate.
14. What is a Group Discussion ? What is its Purpose?
15. What are the various skills and personality traits that can be assessed in a Group Discussion?
16. Describe the various punctuation marks use in Written English.
17. Describe the process of Making Tea (five cups) by using a flow-chart.



**Semester-IV**

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

SECOND YEAR SEMESTER-IV

CORE-I

Basic Quality control & Quality Assurance

Learning Objective: Upon completion of the course student shall be able to:

- understand the cGMP aspects in a pharmaceutical industry
- appreciate the importance of documentation
- understand the scope of quality certifications applicable to pharmaceutical industries
- understand the responsibilities of QA & QC departments

**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

BOOKS RECOMMENDED:

1. Lachman L., Liberman H.A., and Kanig J.L., Theory and Practice of Industrial Pharmacy Lea &Febiger, USA., latest edition.

2. Sambhamurthy, Pharmaceutical Engineering, New Age Publishers, latest edition.
3. Sethi PD. Quantitative analysis of drugs in pharmaceutical formulations, 3rd ed., CBS publications, New Delhi, 2008
4. Text book of Pharmaceutics-I & II by A.K.Gupta
5. Indian Pharmacopoeia -2014 (or latest Edition)
6. Pharmaceutical Drug Analysis-Kar, Ashutosh

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-IV**  
**CORE-I**  
**Basic Quality control & Quality Assurance**

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
CORE-I

Basic Quality control & Quality Assurance

Time 2hrs.30min

Maxmarks-60

**SECTION-A**

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

**SECTION-B**

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc IN PHARMACEUTICAL CHEMISTRY  
SECOND YEAR SEMESTER-IV  
SKILL COMPONENT – I (CORE-I)  
Basic Quality control & Quality Assurance

**PRACTICAL**

1. Determination of Solubility of a range of substances in water
2. To study the effect of pH on solubility of Drugs & Raw materials
3. Determination of by LOD of the sample
4. Determination of Residue on Ignition of the sample
5. Determination of Melting point of the sample
6. Limit test for chlorides
7. Limit test for sulphates
8. Limit test for heavy metals
9. Study of some drugs as per official monographs (Ascorbic Acid, Acetaminophen, Aspirin)
10. Determine the viscosity by Oswald viscometer

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc IN PHARMACEUTICAL CHEMISTRY  
SECOND YEAR SEMESTER-IV  
CORE-I

Basic Quality control & Quality Assurance

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. Describe the sampling procedure for packaging materials
5. Describe the sampling procedure for finished products

UNIT-II

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

UNIT-III

1. Write short note on process validation.
2. Write about equipment validation.
3. Explain about concurrent validation.
4. Define validation, write its importance and its types
5. What is validation master plan. Elaborate its content

UNIT IV

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

SHORT ANSWERS

UNIT-I

1. What is stability and importance of stability studies
2. Differentiate toxicogenity& carcinogenicity
3. Why stability studies are required and what stages stability is performed.
4. What are the various testing frequency of the samples.
5. Describe the five steps in sampling procedure
6. Describe the steps to weigh the sample
7. What are the things to keep in mind while handling toxic and carcinogenic samples.
8. What are the various stability conditions for validation batches.

UNIT-II

1. Define API

2. Write a detail note on format and content of product regulatory documents
3. Enlist the various types of SOPs and discuss them briefly
4. Write a short notes on MSDS preparation
5. Give a short notes on (a) Batch record documentation (b) Log Books

### UNIT-III

1. Define calibration, validation and qualification
2. Write about equipment validation.
3. Explain about concurrent validation.
4. Define change control
5. Explain the change control procedure in pharmaceutical industry
6. Differentiate between change control and change request.

### UNIT\_IV

1. What are the various types of documents .
2. Write a short note on SOP
3. Explain the guidelines for document preparation.
4. Explain about issuance of documents
5. Write a short notes on Certificate of Analysis
6. Write about MFR & BPCR

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-IV**  
**CORE-II**  
**PAPER: PHARMACEUTICAL ORGANIC CHEMISTRY**

**Pharmaceutical Organic chemistry**

**UNIT-I**

**Carbonyl compounds:**

10hrs

Nomenclature of aliphatic and aromatic carbonyl compounds, structure of the carbonyl group. Synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids.

Physical properties : Reactivity of carbonyl group in aldehydes and ketones.

Nucleophilic addition reaction with a)NaHSO<sub>3</sub> b)HCN c)RMgX d)NH<sub>2</sub>OH e)PhNHNH<sub>2</sub> f)2,4-DNPH g)Alcohols - formation of hemiacetal and acetal.

Base catalysed reactions: a)Aldol condensation b)Cannizaro's reaction c) Perkin reaction d) Benzoin condensation e)Haloform reaction f)Knoevangel reaction. Oxidation of aldehydes : Baeyer-Villiger oxidation of ketones.

Reduction: Clemensen reduction, Wolf-kishner reduction. MPV reduction , reduction with LiAlH<sub>4</sub> and NaBH<sub>4</sub>. Analysis of aldehydes and ketones with

a)2,4-DNPH test b)Tollen's test c)Fehling's test d)Schiff's test e) Haloform test (with equation).

**UNIT-II**

**Carboxylic acids and derivatives:**

6hrs

Nomenclature: classification and structure of carboxylic acids. Methods of preparation by a)Hydrolysis of nitriles, amides b)Hydrolysis of esters and bases with mechanism c) Carbonation of Grignard reagents. Special methods of preparation of aromatic acids by a)Oxidation of side chain b) Hydrolysis by benzo tri chlorides c) Kolbe reaction

Physical properties: Hydrogen bonding, dimeric association, acidity-strength of acids with examples of trimethyl acetic acid and tri-chloroacetic acid. Relative differences in the acidities of aromatic and aliphatic acids.

Chemical properties: Reactions involving H, OH and COOH groups - salt formation, anhydride formation, acid chloride formation, amide formation and esterification (with mechanism).

**UNIT-III**

**Heterocyclic Compounds:**

8h



Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1,4,- di carbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan. Pyridine – Structure - Basicity - Aromaticity - Comparison with pyrrole - one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

## **UNIT-IV**

### **Amino acids and proteins**

9h

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis. Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

### **List of Reference Books**

- 1.A Text Book of Organic Chemistry by Bahl and Arun Bahl
- 2.A Text Book of Organic Chemistry by I.L.Finar Vol.I
- 3.Organic Chemistry by Bruice
- 4.Organic Chemistry by Clayden

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
CORE-II  
PAPER: PHARMACEUTICAL ORGANIC CHEMISTRY

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B.Voc (PHARMACEUTICAL CHEMISTRY)

SECOND YEAR SEMESTER-IV

CORE-II

PAPER: PHARMACEUTICAL ORGANIC CHEMISTRY

Time 2hrs.30min

Maxmarks-60

**SECTION-A**

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

**SECTION-B**

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
CORE-II  
PAPER: PHARMACEUTICAL ORGANIC CHEMISTRY

Question bank  
Essay questions(10M)

UNIT-I

1. Write short note on the following  
a) Aldol condensation b) Cannizzaro's reaction c) Perkin reaction
2. Write any three preparation methods for ketones
3. Write the Nucleophilic addition reaction of carbonyl compounds with a)  $\text{RMgX}$  b)  $\text{NH}_2\text{OH}$  c)  $\text{PhNHNH}_2$  d) 2,4-DNPH .
4. Write short notes on the following reduction reactions  
a) Wolf-kishner reduction. B) MPV reduction

UNIT-II

1. Write any four preparation methods for aromatic acids.
2. Write the following formations from carboxylic acids  
a) acid chloride b) amide c) ester
3. Explain the chemical reactions of carboxylic acids.

UNIT-III

1. Write the preparation methods of furan, thiophene, pyrrole from 1,4-dicarbonyl compounds, Paul-Knorr synthesis.
2. Compare basicity and Aromaticity of pyridine with pyrrole.
3. Explain the reactivity towards Nucleophilic substitution reaction of pyridine.

UNIT-IV

1. Explain the classification of amino acids.
2. Write three preparation methods for Alanine.
3. Write preparation method for leucine from halogenated carboxylic acids, malonic ester, Strecker's synthesis
4. Explain the formation of lactams from gamma and delta amino acids.

Short answer questions

UNIT-I

1. Write about reactivity of carbonyl group in aldehydes.
2. Write the identification tests of carbonyl compounds with  
a) 2,4-DNPH test b) Tollen's test
3. Explain Baeyer-Villiger oxidation.
4. Explain haloform test with equation.

## UNIT-II

1. Compare the acidic strength of tri methyl acetic acid and tri-chloro acetic acid.
2. Write the differences in acidities of aromatic and aliphatic acids.
3. Explain hydrogen bonding in carboxylic acids.
4. Explain dimeric association in carboxylic acids.

## UNIT-III

1. Define hetero cyclic compounds, give examples
2. Explain halogenations, nitration and sulphonation in hetero cyclic compounds.
3. Compare the structure of pyridine with pyrrole.
4. Write one preparation method and two chemical reactions of pyridine.

## UNIT-IV

1. Explain isoelectric point, amphoteric nature of amino acids.
2. Explain salt like character of amino acids.
3. Write about melting point and solubility of amino acids.
4. Explain the structure of proteins.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
SKILL COMPONENT – II (CORE-II)  
PAPER: PHARMACEUTICAL ORGANIC CHEMISTRY

Practicals:

1. Criteria of Purity: Determination of melting and boiling points.
2. Preparations: Mechanism of various reactions involved to be discussed. Recrystallization, determination of melting point and calculation of quantitative yield to be done.
  - a) Bromination of Phenol/Aniline
  - b) Benzoylation of amines/phenols
  - c) Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone
3. Basic tests for pharmaceutical dosage forms (Amiloride Hydrochloride tablets, Ampicillin capsules, Ampicillin powder for oral suspension, Ascorbic acid tablets, Mebendazole tablets, Paracetamol tablets, Laevo Dopa tablets)

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
CORE-III

PAPER: BASICS OF PHARMACOLOGY

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

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical Sciences

UNIT-1

General Pharmacology Introduction and scope of Pharmacology• Various routes of drug administration- advantages and disadvantages• Drug absorption- definition, types, factors affecting drug absorption• Bio availability and the factors affecting the bioavailability• Drug distribution- definition, factors affecting drug distribution• Biotransformation of drugs- Definition, types of biotransformation• reactions Excretion of drugs- Definition, routes of drug elimination• General mechanisms of drug action and factors modifying drug action•

UNIT-II

Drugs Acting on Peripheral Nervous System Steps involved in neurohumoral transmission• Definition, classification, pharmacological actions, dose, indications, and• contraindications of a) Cholinergic drugs b) Anti-Cholinergic drugs c) Adrenergic drugs d) Adrenergic receptor blockers e) Neuromuscular blocking agents f) Drugs used in Myasthenia gravis g) Local anaesthetic agents h) Non Steroidal Anti-Inflammatory drugs (NSAIDs).

UNIT-III

Drugs Acting on Blood and Blood Forming Organs Definition, classification, pharmacological actions, dose, indications and contraindications of Haematinics, Anti-coagulants and Anti platelet drugs.

Drugs Acting on Eye Definition, classification, pharmacological actions, dose, indications and contraindications of Miotics, Mydriatics and Cycloplegics

## UNIT-IV

Drugs Acting on Cardiovascular System- Definition, classification, pharmacological actions, dose, indications and contraindications of Anti-hypertensive drugs• Anti-anginal drugs• 6 Anti-arrhythmic drugs• Drugs used in atherosclerosis and congestive heart failure.●

### Recommended Books:

1. Pharmacological Basis Of Therapeutics By Goodman & Gillman.
2. Pharmacology And Pharmacotherapeutics By Satoskar & Bhandarkar.
3. Essentials Of Pharmacotherapeutics By F.S.K. Barar.
4. Essentials: Of Medical Pharmacology By K.D. Tripathi.
5. Pharmacology By Rang & Dale.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
CORE-III

PAPER: BASICS OF PHARMACOLOGY  
WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120



P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
SKILL COMPONENT – III (CORE-III)  
PAPER: BASICS OF PHARMACOLOGY

PRACTICALS

1. Introduction to experimental pharmacology
2. Study of laboratory animals (a. Mice, b. Rats c. Guinea pigs, d. Rabbits)
3. Commonly used instruments in Experimental Pharmacology
4. Study of different routes of administration of drugs
5. Study of Local anaesthetics on rabbit eye and study of Mydriatic and Mitotic effect on rabbit eye
6. Demonstration of effect of analgesics using Analgesiometer

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
CORE-III  
PAPER: BASICS OF PHARMACOLOGY

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
CORE-III

PAPER: BASICS OF PHARMACOLOGY  
QUESTION BANK

Essay Questions

UNIT-I

1. What are the various routes of administering drugs. Write the advantages of IV Route.
2. Define drug absorption. What are the various factors affecting drug absorption.
3. Define Bioavailability. What are the various factors affecting bioavailability.
4. Define Drug distribution.

UNIT-II

1. Write a note on Myasthenia gravis
2. What are  $\beta$ -blocker. Give their classification with examples
3. Define NSAIDs. Classify NSAIDs. Write the pharmacology of Aspirin or indomethacin
4. Discuss mode of action of sympatholytics
5. Define local anesthetics. Classify with examples
6. Write synthesis, metabolism and release of NA at different sites of adnergic nervous system
7. Write about the pharmacological action of different drugs use as smooth muscle relaxants

UNIT-III

1. Write a note on coagulant & anticoagulants. classify them
2. Why Ephedrine preferred to atropine in ophthalmic conditions.
3. Explain the mode of action of drugs used in the treatment of glaucoma.

UNIT-IV

1. Classify drugs used in Angina Pectoris.
2. Enlist calcium channel blockers used in the treatment of Hypotension.  
Give M/A adverse effects on them.
3. Classify the drugs used in congestive cardiac failure
4. Classify the drugs used in arrhythmia.

## Short Questions

### UNIT-I

1. Define the following terms with suitable examples of each
  - i. Synergism
  - ii. Pharmacology
  - iii. Bioavailability
  - iv. Biotransformation
  - v. Pharmacokinetics
2. Explain Entero Hepatic circulation
3. Define BBB
4. Write about drug antagonism
5. Define Agonist & Antagonist

### UNIT-II

1. Write a note on Myasthenia gravis
2. Adverse effects for the following:
  - I. Propranol
  - II. Pheniramine maleate
  - III. Phenobarbitone
  - IV. PenicillineD
3. Define Mydriatics and Mitotics
4. Aspirin is not given for peptic ulcer. Give reason
5. What are adrenergics. Classify them with examples
6. Write pharmacology of isoprenaline and Ephedrine

### UNIT-III

1. Write a note on anticoagulants
2. Why Ephedrine preferred to atropine in ophthalmic conditions.
3. Explain the mode of action of drugs used in the treatment of glaucoma.
4. Write about menadione

### UNIT-IV

1. Give MOA of nitrites
2. Write a short note on Plasma Expanders
3. Write about Anaemia
4. Write the pharmacology of Trinitroglycerine
5. Write about cardiotonics
6. Define and classify cardiovascular drugs
7. Write a short notes on propranol

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
 B.Voc (PHARMACEUTICAL CHEMISTRY)  
 SECOND YEAR SEMESTER-IV  
 GENERAL COMPONENT – I  
PAPER: MATHEMATICS

**COURSE: ADVANCED NUMERICAL ANALYSIS**

Total hours of teaching: 45 @ 3 hours/ week

Total credits: 3

**Objectives**

- To find the integration and solutions for ordinary differential equations using numerical methods.
- To find the best fitted curve for the given data.

**Unit – I: Curve Fitting (8 hrs)**

Least-Squares Curve Fitting Procedures, Fitting a Straight Line, Nonlinear Curve Fitting: Fitting of Power Function, Polynomial of the  $n^{\text{th}}$  degree and Exponential Function.

**UNIT – II: Numerical Integration (10 hrs)**

General Quadrature Formula on Errors, Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule.

**UNIT – II: Solutions of Simultaneous Linear Systems of Equations (11 Hrs)**

Solution of Linear Systems – Direct Methods: Matrix Inversion Method, Gaussian Elimination Method, Gauss-Jordan Method, Iterative Methods: Jacobi's Method, Gauss-Siedel Method.

**UNIT – IV: Numerical Solution of Ordinary Differential Equations (10 Hrs)**

Introduction, Solution by Taylor's Series, Picard's Method of Successive Approximations, Euler's Method, Runge-Kutta Methods.

**Reference Books:**

1. Numerical Analysis by S.S. Sastry, Published by Prentice Hall India (Latest Edition).
2. Numerical Analysis by G. Sankar Rao, Published by New Age International Publishers, New Hyderabad.

3. Finite Differences and Numerical Analysis by H.C. Saxena, Published by S. Chand and Company, Pvt. Ltd., New Delhi.

4. Numerical Methods for Scientific and Engineering Computation by M.K. Jain, S.R.K. Iyengar, R.K. Jain.

Course: Advanced Numerical Analysis

Semester - IV

BLUE PRINT FOR THE QUESTION PAPER

UNIT	SHORT ANSWER QUESTIONS 5 Marks	ESSAY QUESTIONS 10 Marks	TOTAL MARKS
I	1	2	25
II	2	1	20
III	1	1	15
IV	2	1	20
TOTAL NO. OF QUESTIONS	6	5	80 M

Question Paper pattern:

Short Answer Questions =  $4 \times 5 = 20$  Marks

Essay questions =  $3 \times 10 = 30$  Marks

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TOTAL 50 Marks

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P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
GENERAL COMPONENT – I  
PAPER: MATHEMATICS  
COURSE: ADVANCED NUMERICAL ANALYSIS  
MODEL QUESTION PAPER

Time: 2 Hrs

Max.

Marks: 50

SECTION - I

Answer any **FOUR** of the following questions.

4 × 5

= 20 M

1. Find the values of  $a$  and  $b$  so that  $y = ax + b$  fits the following data.

x	0	1	2	3	4
y	1.0	2.9	4.8	6.7	8.6

2. Find the area bounded by the curve and the X-axis from  $x = 7.47$  to  $x = 7.52$  for the following data by using Trapezoidal rule.

x	7.47	7.48	7.49	7.50	7.51	7.52
f(x)	1.93	1.95	1.98	2.01	2.03	2.06

3. Evaluate  $I = \int_0^1 \frac{1}{1+x} dx$  correct to three decimal places by using Simpson's  $\frac{1}{3}$  - rule with  $h = 0.25$ .
4. Solve the system of equations  $3x + y + 2z = 3$ ,  $2x - 3y - z = -3$ ,  $x + 2y + z = 4$  by using Matrix inversion method.
5. Given the differential equation  $y' = x - y^2$  with the condition  $y(0) = 1$ , use Taylor's series method to determine the value of  $y(0.1)$ .
6. Using Euler's method, solve the initial value problem  $\frac{dy}{dx} = x(1 + x^3y)$  with  $y(0) = 1$ .

SECTION - II

Answer any **THREE** of the following questions.

3 × 10

= 30 M

7. Fit a polynomial of the second degree to the data points given below.

x	0	1	2	3
y	1	0	3	10

8. Determine the constants  $a$  and  $b$  by the method of least squares such that  $y = ae^{bx}$  fits the following data.

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

9. Evaluate  $I = \int_0^1 \frac{1}{1+x^2} dx$  correct to four decimal places by using Simpson's  $\frac{3}{8}$  - rule.
10. Solve the system of equations  $10x + y - z = 11.19$ ,  $x + 10y + z = 28.08$ ,  
 $-x + y + 10z = 35.61$  by using Gauss-Seidel method.
11. Given  $\frac{dy}{dx} = y - x$  with  $y(0) = 2$ , find the values of  $y(0.1)$  and  $y(0.2)$  correct to four decimal places by using Runge - Kutta fourth order.



**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-IV**  
**GENERAL COMPONENT – II**  
**PAPER: CHEMISTRY**  
**PHYSICAL CHEMISTRY**

**UNIT-I**

**Surface chemistry**

**10**

Definition of colloids. Solids in liquids(sols), preparation, purification, properties - kinetic, optical, electrical. Stability of colloids, Hardy-Schulze law, protective colloid. Liquids in liquids (emulsions) preparation, properties, uses. Liquids in solids (gels) preparation, uses.  
Adsorption: Physical adsorption, chemisorption. Freundlich, Langmuir adsorption isotherms. Applications of adsorption.

**UNIT-II**

**Dilute Solutions:**

10 hrs

Colligative properties, Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties-Vant Hoff's factor

**UNIT-III**

**Electrochemistry-I**

10 hrs

Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye-Huckel-Onsagar's equation for strong electrolytes(elementary treatment only). Application of conductivity measurements – conductometric titrations.

**UNIT-IV**

**Electro chemistry-II**

8 hrs

Single electrode potential, sign convention, Reversible and irreversible cells, Nernst equation. Reference electrode, Standard Hydrogen electrode, Calomel electrode, Indicator electrode, metal-metal ion electrode, Inert electrode, Applications of EMF measurements-Potentiometric titrations. electrochemical series and its significance

**Recommended Books:**

1. Text book of physical chemistry by K L Kapoor
2. Text book of physical chemistry by S Glasstone
3. Advanced physical chemistry by Bahl and Tuli
4. Modern Electrochemistry by J.O.M. Bockris and A.K.N. Reddy
5. Advanced Physical Chemistry by Atkins

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
GENERAL COMPONENT – II  
PAPER: CHEMISTRY  
PHYSICAL CHEMISTRY**

**WEIGHTAGE TO CONTENT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	1	2	20
3.	UNIT -III	2	1	25
4.	UNIT -IV	1	1	15
	Total	6	6	90

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
GENERAL COMPONENT – II  
PAPER: CHEMISTRY  
PHYSICAL CHEMISTRY

PRACTICALS

1. Conductometric Titrations: Determination of HCl using NaOH
2. Conductometric Titrations: Determination of CH<sub>3</sub>COOH using NaOH
3. Conductometric Titrations: Determination of HCl in a mixture of HCl and CH<sub>3</sub>COOH using NaOH
4. Potentiometric Titrations: Determination of Fe(II) using K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
GENERAL COMPONENT – II  
PAPER: CHEMISTRY  
PHYSICAL CHEMISTRY

Time 2hrs.30min

Maxmarks-50

SECTION-A

Answer any THREE of the following questions

3x10=30 M

1. One question is to be set from unit-I
2. One question is to be set from unit-I
3. One question is to be set from unit-II
4. One question is to be set from unit-III
5. One question is to be set from unit-III
6. One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

7. One question is to be set from unit-I
8. One question is to be set from unit-I
9. One question is to be set from unit-II
10. One question is to be set from unit-II
11. One question is to be set from unit-III
12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**SECOND YEAR SEMESTER-IV**  
**GENERAL COMPONENT – II**  
**PAPER: CHEMISTRY**  
**PHYSICAL CHEMISTRY**  
**Question bank**  
**Essay questions (10M)**

**UNIT-I**

1. Explain any three methods of preparation of colloids
2. Explain any three methods of purification of colloids
3. Explain kinetic ,optical, and electrical properties of colloids
4. Derive Langmuir adsorption isotherm

**UNIT-II**

1. State Raoult's law how is molecular weight of non-volatile solute determined from Raoult's law
2. Define elevation of boiling point derive relation between molecular weight of non-volatile solute and elevation of boiling point
3. Define osmotic pressure. how is molecular weight of non-volatile solute determined from osmotic pressure

**UNIT-III**

1. Explain Kohlrausch law and write its application.
2. Explain Arrhenius theory of electrolytic dissociation and write its limitations
3. Explain Debye-Huckel theory of strong electrolytes
4. Write an essay on conductometric titrations

**UNIT-IV**

1. Explain standard hydrogen electrode and calomel electrode.
2. Write an essay on potentiometric titrations.
3. What are reversible and irreversible cells give examples.

**Short answer questions(5M)**

**UNIT-I**

1. Write preparation and uses of emulsions
2. Write preparation and uses of gels
3. Explain Hardy-Schulz law.
4. Write differences between physical adsorption and chemical adsorption.

**UNIT-II**

1. What are colligative properties give examples.
2. Explain theory of dilute solutions
3. Explain abnormal colligative properties.

**UNIT-III**

1. Define specific conductance and equivalence conductance and how does equivalence conductance vary with dilution.
2. State and derive Ostwald dilution law.

**UNIT-IV**

1. What are reversible and irreversible cells give examples.
2. Write Nernst equation for metal and non-metal electrodes.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
SECOND YEAR SEMESTER-IV  
FOUNDATION COURSE  
ANALYTICAL SKILLS

Total Hrs. of Teaching-Learning: 30@ 2 hr/Week

Total credits: 03

.....  
**Objectives:**

- To impart the knowledge of arithmetic and reasoning.
  - To built up confidence for writing competitive examinations.
- .....  
.....

**UNIT – 1**

**Data Analysis:-**The data given in a Table – Graph - Bar Diagram - Pie Chart - Venn diagram or a passage is to be analyzed and the questions pertaining to the data are to be answered. (6 hrs)

**UNIT – 2**

**Sequence and Series:-** Analogies of numbers and alphabets - completion of blank spaces following the pattern in A:b::C: d relationship - odd thing out - Missing number in a sequence or a series.  
(6 hrs)

**UNIT - 3**

**Arithmetic ability:-**Algebraic operations- BODMAS – Fractions - Divisibility rules- LCM&GCD (HCF) - Date, Time and Arrangement Problems; Calendar problems, Clock problems, Blood Relationship.  
( 6 hrs)

**UNIT - 4**

**Quantitative aptitude:-** Averages - Ration and proportion - Problems on ages - Time-distance – speed.  
(6 hrs)

**UNIT – 5**

**Business computations:-** Percentages - Profit &loss-Partnership - simple and compound interest.

(6 hrs)

**Reference Books:**

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc IN PHARMACEUTICAL CHEMISTRY  
SECOND YEAR SEMESTER-IV  
ANALYTICAL SKILLS  
WEIGHTAGE TO CONTENT**

UNIT	TOPIC	V.S.A.Q Multiple choice (1 Mark)	S.A.Q (3Marks)	E.Q (5 Marks)	
1	Data Analysis	-	-	2	10
2	Sequence and Series	10	-	-	10
3	Arithmetic ability	-	3	2	19
4	Quantitative aptitude	-	2	2	16
5	Business computations	-	3	2	19
TOTAL MARKS					74

**V.S.A.Q** = Very short answer questions (1 mark)

**S.A.Q** = Short answer questions (3 marks)

**E.Q** = Essay questions (5 marks)

Very short answer questions :  $10 \times 1 = 10$

Short answer questions :  $05 \times 3 = 15$

Essay questions :  $05 \times 5 = 25$

.....  
Total Marks = 50





**SECTION - B**

**Answer any FIVE of the following questions. Each question carries 3 marks. 5 x 3 = 15M**

11. Find the value of  $\frac{(6+6+6+6)\div 6}{4+4+4+4\div 4}$
12. If the number 517\*324 is completely divisible by 3, then the smallest whole number in Place of \* will be.
13. A is B's sister. C is B's mother. D is C's father. E is D's mother. Then, how is A related to D?
14. If  $A : B = 2 : 3$  and  $B : C = 4 : 7$  then find  $A : B : C = ?$
15. The average of four consecutive even numbers is 27. Find the largest of these Numbers.
16. What is 25% of 25% equal to?
17. A man buys a cycle for Rs.1400 and sells it at a loss of 15%. What is the selling price of the cycle?
18. Find the simple interest on Rs 7500 in 4 years at 15%

**SECTION - C**

**Answer any FIVE of the following questions. Each question carries 5 mark 5 x 5 = 25 M**

19. DIRECTIONS: Study the table carefully to answer the questions that follow:

Maximum and minimum Temperature(in degree Celsius) recorded on first day of each month for five different cities.

Month	Temperature									
	Bhuj		Sydney		Ontario		Kabul		Beijing	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1 <sup>st</sup> sep	24	14	12	2	5	1	34	23	12	9
1 <sup>st</sup> oct	35	21	5	-1	15	6	37	30	9	3
1 <sup>st</sup> nov	19	8	11	3	4	0	45	36	15	1
1 <sup>st</sup> dec	9	2	-5	-9	-11	-7	31	23	2	-3
1 <sup>st</sup> jan	-4	-7	-11	-13	-14	-19	20	11	5	-13

1 .What is the difference between the max temperature of Ontario on 1<sup>st</sup>Nov and the min temperature of Bhuj on 1<sup>st</sup>Jan?

- (1) 3 °C    (2) 18 °C    (3) 15 °C    (4) 9 °C    (5) 11 °C

2 . In which month respectively the max temperature of Kabul is 2<sup>nd</sup> highest and min temperature of Sydney is highest ?

- (1) 1<sup>st</sup>oct& 1<sup>st</sup>jan    (2) 1<sup>st</sup>oct& 1<sup>st</sup>nov    (3) 1<sup>st</sup>dec& 1<sup>st</sup>jan    (4) 1<sup>st</sup>sept& 1<sup>st</sup>jan  
(5) 1<sup>st</sup>dec& 1<sup>st</sup> Sept

3. In which month on 1<sup>st</sup> day is the difference between the max temperature & min temperature of Bhuj second highest ?

- (1) 1<sup>st</sup>sept (2) 1<sup>st</sup>oct    (3) 1<sup>st</sup>nov    (4) 1<sup>st</sup>dec    (5) 1<sup>st</sup>jan

4. What is the averagemaximum temperature of Beijing over all the months together.

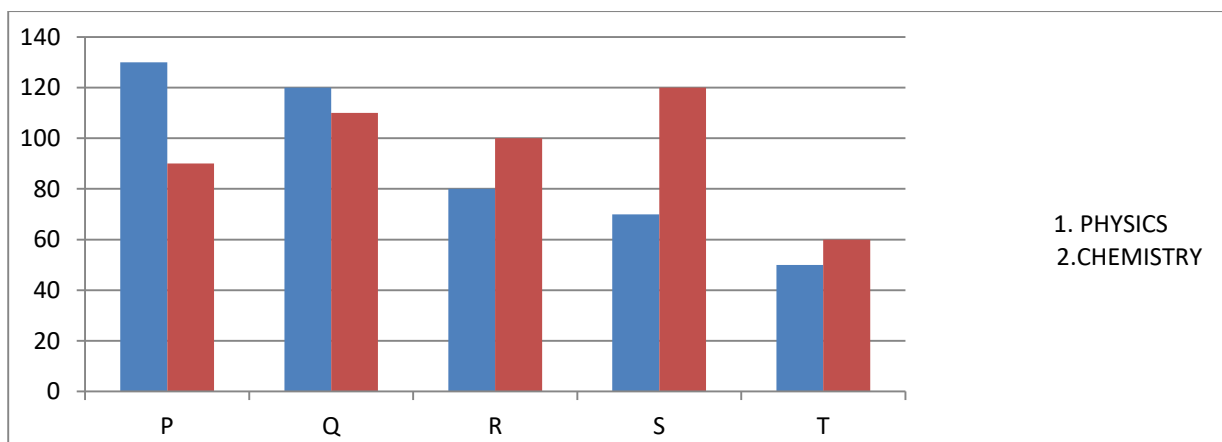
- (1) 8.4°C    (2) 9.6°C    (3) 7.6°C    (4) 9.2°C    (5) 8.6°C

5. What is the respective ratio between the min temperature of Beijing on 1<sup>st</sup>sept& the max temperature of Ontario on 1<sup>st</sup>oct ?

- (1) 3:4    (2) 3:5    (3) 4:5    (4) 1:5    (5) 1:4

**20.** Study the following bar graphs carefully to answer these questions

Marks obtained by 5 students in physics & chemistry



1. Marks obtained by S in chemistry is what percent of the total marks obtained by all the students in chemistry ?  
 (1)25            (2)28.5            (3)35            (4)31.5            (5)22
2. If the marks obtained by T in physics were increased by 14% of the original marks, what would be his new approximate % in physics if the max marks in physics were 140?  
 (1)57            (2)32            (3)38            (4)48            (5)41
3. Fill in the blank space in order to make the sentence correct as per the given information. Total marks obtained by T in both the subjects together is more than the marks obtained by  
 (1) Q in chemistry    (2) R in physics    (3) S in chemistry    (4) P in physics  
 (5) R in both the subjects together
4. What is the respective ratio between the total obtained by P in physics & chemistry together to the total marks obtained by T in physics & chemistry together ?  
 (1) 3:2            (2) 4:3    (3) 5:3    (4) 2:1            (5)None of these
5. What is the respective ratio between the total marks obtained by Q &S together in chemistry to the total marks obtained by P & R together in physics?  
 (1)23:25            (2)23:21            (3)17:19            (4)17:23            (5) none of these
21. The H.C.F. of two numbers is 11 and their L.C.M. is 693. If one of the numbers is 77, then Find the other
22. A clock is set right at 8 a.m. The clock gains 10 minutes in 24 hours will be the true time when the clock indicates 1 p.m. on the following day?
23. If  $\frac{1}{5} : \frac{1}{x} :: \frac{1}{x} : \frac{1}{125}$ , then the value of x is?
24. How many minutes does Aditya take to cover a distance of 400m, if he runs at a speed of 20 km/hr?
25. Sanjay and Raju started a business and invested Rs.20000 and Rs.25000 respectively. After 4 months Raju left and Naresh joined by investing Rs.15000. At the end of the year there was a profit of Rs.4600. what is the share of Naresh?
26. Meena purchased two fans each at Rs.1200. She sold one fan at the loss of 5% and other at the gain 10%. Find the total gain or loss percent?

\*\*\*\*\*

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**DEPARTMENT OF MATHEMATICS AND STATISTICS**  
**QUESTION BANK FOR ANALYTICAL SKILLS**  
**UNIT-1 DATA ANALYSIS**

**TABLE & GRAPHS**

1. DIRECTIONS: Study the table carefully to answer the questions that follow:

Maximum and minimum Temperature (in degree Celsius) recorded on first day of each month for five different cities.

Month	Temperature									
	Bhuj		Sydney		Ontario		Kabul		Beijing	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1 <sup>st</sup> sep	24	14	12	2	5	1	34	23	12	9
1 <sup>st</sup> oct	35	21	5	-1	15	6	37	30	9	3
1 <sup>st</sup> nov	19	8	11	3	4	0	45	36	15	1
1 <sup>st</sup> dec	9	2	-5	-9	-11	-7	31	23	2	-3
1 <sup>st</sup> jan	-4	-7	-11	-13	-14	-19	20	11	5	-13

Q:1 What is the difference between the max temperature of Ontario on 1<sup>st</sup>nov and the min temperature of Bhuj on 1<sup>st</sup>jan?

- (2) 3 °C    (2) 18 °C    (3) 15 °C    (4) 9 °C    (5) 11 °C

ANS: (5) Required difference =  $4 - (-7) = 4 + 7 = 11$

2: In which month respectively the max temperature of Kabul is 2<sup>nd</sup> highest and min temperature of Sydney is highest ?

- (2) 1<sup>st</sup>oct & 1<sup>st</sup>jan    (2) 1<sup>st</sup>oct & 1<sup>st</sup>nov    (3) 1<sup>st</sup>dec & 1<sup>st</sup>jan  
 (4) 1<sup>st</sup>sept & 1<sup>st</sup>jan    (5) 1<sup>st</sup>dec & 1<sup>st</sup>Sept

ANS: (1)

3: In which month on 1<sup>st</sup> day is the difference between the max temperature & min temperature of Bhuj second highest ?

- (2) 1<sup>st</sup>sept (2) 1<sup>st</sup>oct (3) 1<sup>st</sup>nov (4) 1<sup>st</sup>dec (5) 1<sup>st</sup>jan

ANS: (3) Temperature difference of Bhuj :

1<sup>st</sup>Sept 24-14=10°C, 1<sup>st</sup>Nov 19-8=11°C, 1<sup>st</sup>Oct 35-21=14°C, 1<sup>st</sup>Dec 9-2=7°C  
1<sup>st</sup>Jan -4+7=3°C

4. What is the average maximum temperature of Beijing over all the months together.

- (2) 8.4°C (2) 9.6°C (3) 7.6°C (4) 9.2°C (5) 8.6°C

ANS: (5) Max temperature= $\frac{12+9+15+2+5}{5} = 43/5=8.6^\circ\text{C}$

5. What is the respective ratio between the min temperature of Beijing on 1<sup>st</sup>sept & the max temperature of Ontario on 1<sup>st</sup>oct ?

- (1) 3:4 (2) 3:5 (3) 4:5 (4) 1:5 (5) 1:4

ANS: required ratio=9:15=3:5

2. Study the following table carefully answer the questions percentage of marks obtained by 6 students in 6 different subjects

Sub/student	History (out of 50)	Geography (out of 50)	Maths(out of 150)	Science(out of 100)	English (out of 75)	Hindi (out of 75)
Amit	76	85	69	73	64	88
Bharat	84	80	85	78	73	92
Umesh	82	67	92	87	69	76
Nikhil	73	72	78	69	58	83
Pratiksha	68	79	64	91	66	65
Ritesh	79	87	88	93	82	72

1. What is the approximately the integral % of marks obtained by umesh in all the subjects ?

- (1) 80% (2) 84% (3) 86% (4) 78% (5) 77%

ANS: (1) total marks obtained by Umesh

$$=41+33.5+92/100*150+87+69/100*75+76/100*5$$

$$=41+33.5+138+87+51.75+57=408.25$$

Required % =  $408/500 \times 100 = 80\%$

2. What is the avg % of marks obtained by all the students in hindi (approximated to two places of decimal )

- (1) 77.45%      (2) 79.33%      (3) 75.52%      (4) 73.52%      (5) none of these

ANS: (2) required avg of % in hindi =  $88+92+76+83+65+72/6=476/6=79.33\%$

3. What is the avg marks of all the students in Mathematics ?

- (1) 128      (2) 112      (3) 118      (4) 138      (5) 144

ANS: (3) avg mark in mathematics = 118.

$(69+85+92+78+64+88)/100 \times 6 = 118$

4. What is the avg marks obtained by all the students in geography ?

- (1) 38.26      (2) 37.26      (3) 37.16      (4) 39.16      (5) None of these

ANS: (4) Average marks in geography

$=50(85+80+67+72+79+87)/6 \times 1/100 = 39.16$

5. What are the total marks obtained by pratiksha in all the subjects taken together ?

- (1) 401.75      (2) 410.75      (3) 402.75      (4) 420.75      (5) none of these

ANS: (5) marks obtained by

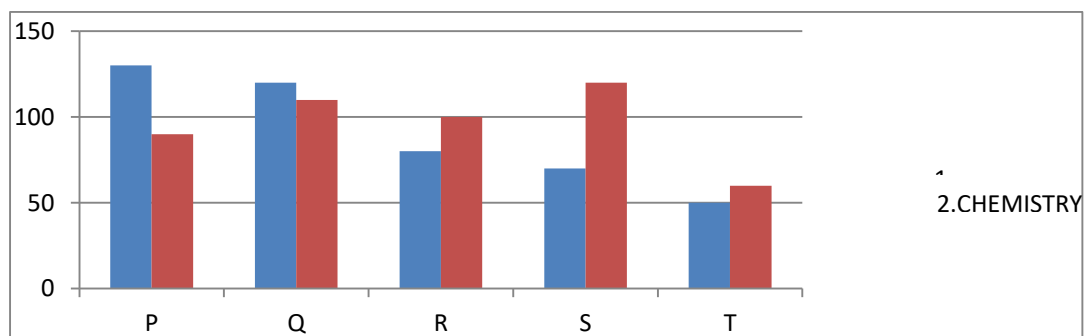
Ritesh =  $50 \times 68/100 + 50 \times 79/100 + 150 \times 64/100 + 91 + 75 \times 66/100 + 50 \times 86/100 + 75 \times 65/100$

$= 34 + 39.5 + 96 + 91 + 49.5 + 48.75 = 358.75$

### BAR GRAPHS

1. Study the following bar graphs carefully to answer these questions

Marks obtained by 5 students in physics & chemistry



1. Marks obtained by S in chemistry is what percent of the total marks obtained by

all the students in chemistry ?

- (1)25      (2)28.5      (3)35      (4)31.5      (5)22

ANS: (1) required  $\% = \frac{120}{90+110+100+120+60} \times 100 = \frac{120}{480} \times 100 = 25\%$

2. If the marks obtained by T in physics were increased by 14% of the original marks, what would be his new approximate % in physics if the max marks in physics were 140?

- (1)57      (2)32      (3)38      (4)48      (5)41

ANS: (5) increase in marks in physics of T =  $50 \times 1.14 = 57$

Required  $\% = \frac{57}{140} \times 100 = 40.7 = 41$

3. What is the respective ratio between the total obtained by P in physics & chemistry together to the total marks obtained by T in physics & chemistry together ?

- (1) 3:2      (2) 4:3      (3) 5:3      (4) 2:1      (5) None of these

ANS: (4) required ratio =  $\frac{130+90}{60+50} = \frac{220}{110} = 2:1$

4. What is the respective ratio between the total marks obtained by Q & S together in chemistry to the total marks obtained by P & R together in physics?

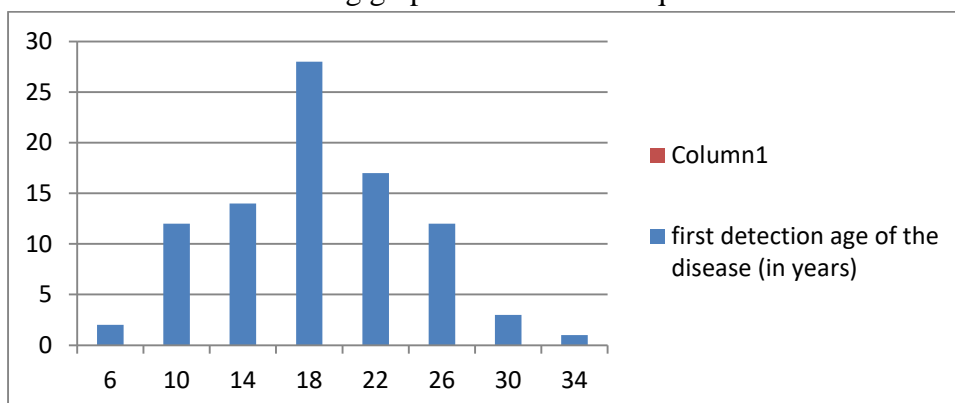
- (1)23:25      (2)23:21      (3)17:19      (4)17:23      (5) none of these

ANS: (2) marks obtained by Q & S in chemistry =  $110+120=230$

Marks obtained by P & R in physics =  $130+80=210$

Required ratio =  $\frac{230}{210} = 23:21$

2 Read the following graph and answer the questions.



1. The avg age of first detection of the disease (in years) is

- (1)18.25      (2)19      (3)20      (4)18.45      (5) none of these

ANS: (3)

2. Max number of patients are susceptible to the disease at the age (in years) of

- (1)12      (2)18.45      (3)18      (4)20      (5)none of these

ANS: (3) it is clear from the graph

3.How many patients, below 20 years of age, were suffering from the disease ?

- (1)54      (2)16      (3)25      (4)72      (5) none of these

ANS: (1) required number of patients= $2+12+15+25=54$

4.The % of patients, suffering from the disease having ages, above 20 years, is approximately

- (1)67.04      (2)18.18      (3)43.86      (4)38.64      (5) none of these

ANS: (4) required %= $18+12+3+1/88*100=38.64\%$

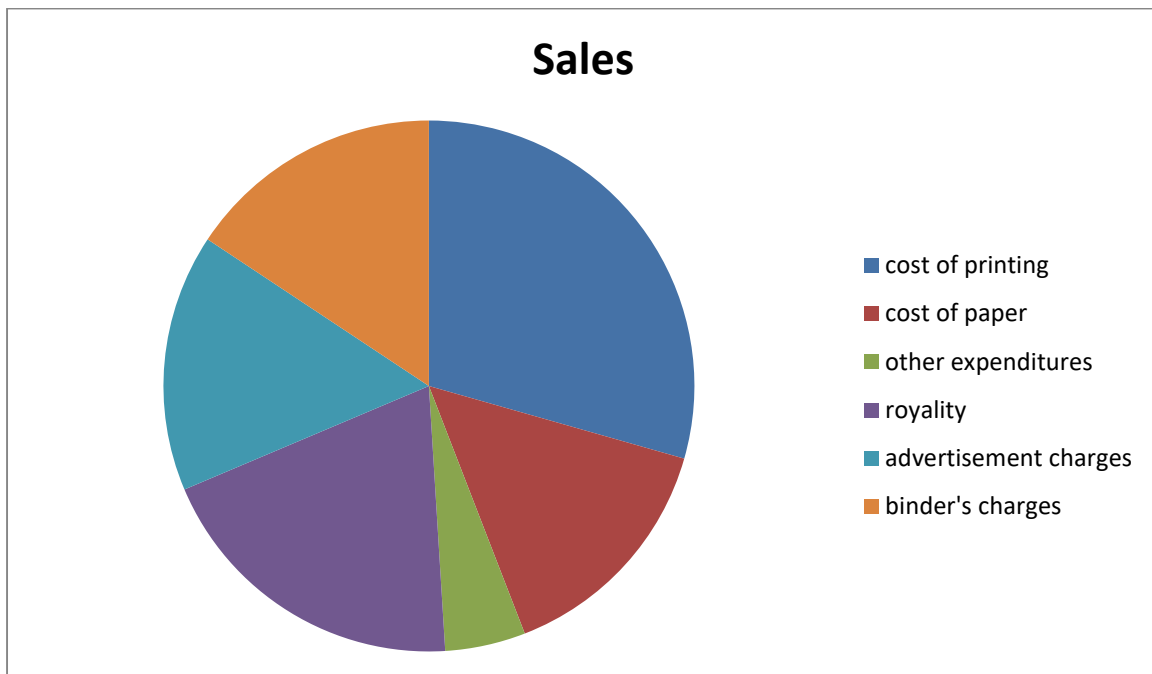
5. The number of patients surveyed was

- (1)88      (2)1624      (3)25      (4)18      (5) none of these

ANS: (1)

### PIE DIAGRAM

1.Directions : the pie-chart given below shows the expenditures incurred in bringing out a book by a publisher. Study the chart & answer the questions.



1. If 3,000 copies are published, other expenditures amount to 12,000/- and publisher's profit is 25%, then marked price of each copy is

- (1) 100/-      (2) 125/-      (3) 80/-      (4)95/-      (5) none of these



ANS: (1) other expenditure=5%=12,000/-

Total cost=20\*12000

Total selling price=1.25\*20\*12000

Marked price per copy=1.25\*20\*12000/3000=100/-

2. Advertisement charges are less than royalty by

- (1) 20%            (2)25%            (3)10%            (4)15%            (5) none of these

ANS: (1) required %=20-16/20\*100=20%

3. If the cost of printing is 19,500/-, the royalty is

- (1) 10,400/-            (2) 13,000/-            (3) 9,100/-            (4) 10,000/-            (5) none of these

ANS: (2) cost of royalty=19500/3\*2=13000/-

4. The central angle of the sector for the cost of paper is

- (1) 57.6°            (2) 72°            (3) 50.4°            (4)54°            (5) none of these

ANS: (4) required angle=15/100\*360°=54°

5. If the cost of paper is 5000/-, then total cost excluding advertisement charges and royalty is

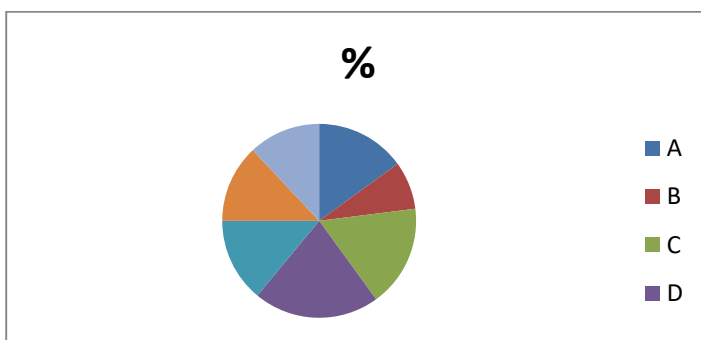
- (1)24,666\*2/3 /-            (2)36,000/-            (3)12,000/-            (4)16,667/-            (5) none of these

ANS: (5) required cost=5000/15\*64=64000/3=Rs. 21333\*1/3

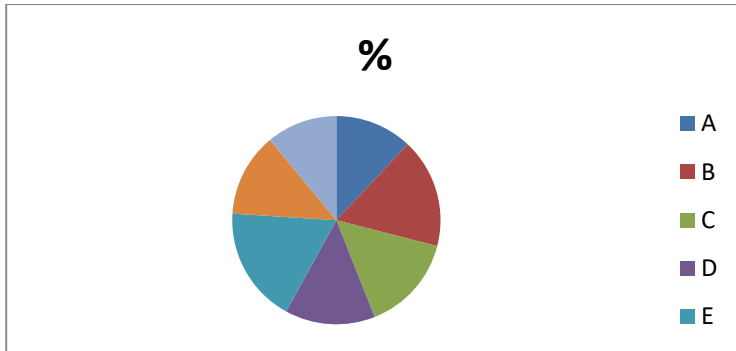
2. Percentage wise distribution of students studying in arts and commerce in 7 different institutions

Different institutions- A, B, C, D, E, F & G

Total number of students studying arts=3800.



Total number of students studying commerce=4200



1. What is the total number of students studying arts in institutes A & G together ?

- (1)1026                      (2)1126                      (3)226                      (4)1206                      (5)1306

ANS: (1) required answer= $3800 \times \frac{27}{100} = 1026$

2. How many students from institute B study arts & commerce ?

- (1)1180                      (2)1108                      (3)1018                      (4)1208                      (5)1408

ANS: required answer= $3800 \times \frac{8}{100} + 4200 \times \frac{17}{100} = 304 + 714 = 1018$

3. The respective ratio between the number of students studying arts & commerce from institute E

- (1)27:14                      (2)19:27                      (3)19:16                      (4)19:28                      (5)none of these

ANS: (2) required ratio= $3800 \times \frac{14}{100} : 4200 \times \frac{18}{100} = 38 \times 14 : 42 \times 18 = 19:27$

4. The ratio between the number of students studying arts from institute E to that of students studying commerce from institute D is

- (1)12:17                      (2)12:7                      (3)19:21                      (4)17:19                      (5) none of these

ANS: (3) required ratio= $3800 \times \frac{14}{100} : 4200 \times \frac{14}{100} = 19:21$

5. How many students from institutions B & D together study commerce ?

- (1) 1320                      (2)1302                      (3)1202                      (4)1220                      (5) none of these

ANS: (2) required answer= $4200 \times \frac{17}{100} + 4200 \times \frac{14}{100} = 714 + 588 = 1302$

### VENN DIAGRAM

1. Which of the following Venn- diagram correctly illustrates the relation ship among the classes : *Tennis fans, Cricket players, Students*



2. In a dinner party both fish and meat were served. Some took only fish and Some only meat. There were some vegetarians who did not accept either. The rest accepted both fish and meat. Which of the following Venn-diagrams correctly reflects this situation?



## UNIT-2

1 In each of the following questions, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and replace the question mark in the given series.

1. 1,9,25,49,?,121

a)64                      b)81                      c)91                      d)100                      ( )

2. 11,13,17,19,23,25,?

a)26                      b)27                      c)29                      d)37                      ( )

3. 6,11,21,36,56,?

a)42                      b)51                      c)81                      d)91                      ( )

4. 10,18,28,40,54,70,?

a)85                      b)86                      c)87                      d)88                      ( )

5. 22,24,28,?,52,84

a)36                      b)38                      c)42                      d)46                      ( )

6. 28,33,31,36,?,39

a)32                      b)34                      c)38                      d)40                      ( )

7. 6,17,39,72,?

a)83                      b)94                      c)116                      d)127                      ( )

8. 325,259,204,160,127,105,?

a)94                      b)96                      c)98                      d)100                      ( )

II In each of the following questions, one term in the number series is wrong. Find out the wrong term

1.3,10,27,4,16,64,5,25,105

a)3                      b)4                      c)10                      d)27                      ( )

2. 8,13,21,32,47,63,83

a)13                      b)21                      c)32                      d)47                      ( )

3. 105,85,60,30,0,-45,-90

a)105                      b)60                      c)0                      d)-45                      ( )

4. 325,259,202,160,127,105,94

a)94                      b)127                      c)202                      d)259                      ( )

5. 1,2,4,8,16,32,64,96

a)4                      b)32                      c)64                      d)96                      ( )

6. 10,26,74,218,654,1946,5834

a)26                      b)74                      c)218                      d)654                      ( )

7. 1,3,10,21,64,129,356,777

a)21                      b)129                      c)10                      d)356                      ( )

8. 3,4,10,32,136,685,4116

a)10                      b)32                      c)136                      d)4116                      ( )

III In each of the following questions, various terms of an alphabet series are given with one or more terms missing as shown by (?). Choose the missing terms out of the given alternatives.

1. R, U, X, A, D,?

a)F                      b)G                      c)H                      d)I                      ( )

2. T, R, P, N, L,?,?

a)J,G                      b)J,H                      c)K,H                      d)K,I                      ( )

3. a,b,c,f,?,h, g,?,i

a)e,j                      b)e,k                      c)f,j                      d)j,e                      ( )

4. Z,Y,X,U,T,S,P,O,N,K,?,?

a)G,H                      b)H,I                      c)I,H                      d)J,I                      ( )

5. A,B,N,C,D,O,E,F,P,?,?,?

a)G,H,I                      b)G,H,J                      c)G,H,Q,                      d)J,K,L                      ( )

6. A,B,B,D,C,F,D,H,E,?,?

a)E,F                      b)F,G                      c)F,I                      d)J,F                      e) j,k                      ( )

7. C,Z,F,X,I,V,L,T,O,?,?

a)O,P                      b)P,Q                      c)R,R                      d)S,R                      ( )

8. AB,DEF,HIJK,?,STUVWX

a)LMNO                      b)LMNOP                      c)MNOPQ                      d)QRSTU                      ( )

IV In each of the following questions, a letter-number series is given with one or more terms missing as shown by (?). Choose the missing term out of the given alternatives.

1. D-4, F-6, H-8, J-10, ?, ?

a) K -12, M-13                      b)L-12,M-14                      c)L-12,N-14                      d)K-12,M-14                      ( )

2. 3F,6G, 11I, 18L, ?

a)21O                      b)25N                      c)25P                      d)27P                      e) 27Q                      ( )

3. W-144, ?, S-100, Q-81, O-64

a)U-121                      b) U-122                      c)V-121                      d)V-128                      ( )

4. 2Z5,7Y7,14X9,23W11, 34V13, ?

a)27U24                      b)45U15                      c)47U15                      d)47V14                      ( )

5. N5V, K7T, ? ,E14P, B19N

a)H9R                      b)H10Q                      c)H10R                      d)I10R                      ( )

6. find the term which does not fit into the series

1CV,5FU,9IT,15LS,17OR

a)5FU                      b)15LS                      c)9IT                      d)17OR                      ( )

7.Q1F, S2E,U6D, W21C, ?

a)Y44B                      b)Y66B                      c)Y88B                      d)Z88B                      ( )

V In each of the following letter series, some of the letters are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

1. \_ \_ aba \_ \_ ba \_ ab

a)abbba                      b)abbab                      c)baabb                      d)bbaba                      ( )

2. ab \_ \_ baa \_ \_ ab \_

a)aaaaa                      b)aabaa                      c)aabab                      d)baabb                      ( )

3. a \_ba \_ b\_b\_ a\_ b

a)abaab                      b)abbab                      c)aabba                      d)bbabb                      ( )

4. \_ op \_ mo \_ n \_ \_ pnmop \_

a)mnpmon                      b)mpnnop                      c)mnompn                      d)mnpomn                      ( )

5. \_ nmmn \_ mmnn \_ mnnm \_

a)nmmn                      b)mnnm                      c)nnmm                      d)nmmn                      ( )

6. ba\_ cb \_ b\_ bab \_

a)acbb                      b)back                      c)bcaa                      d)cabb                      ( )

7. \_ aa \_ ba \_bb \_ ab \_ aab

a)aaabb                      b)babab                      c)bbaab                      d)bbbaa                      ( )

8. ab \_ d \_ aaba \_ na \_ badna \_ b

a)andaa                      b)babda                      c)badna                      d)dbanb                      ( )

**VI** Find out the relationship between the first two words and choose the word from the given alternatives.

1. Anaemia : Blood :: Anarchy : ?

a)Lawlessness                      b) Government                      c) Monarchy                      d) Disorder                      ( )

2. Botany : Plants :: Entomology : ?

a) Snakes                      b) Insects                      c)Birds                      d) Germs                      ( )

3. Menu : Food :: Catalogue :

a) Rack                      b) Newspaper                      c) Library                      d)Books                      ( )

4. Pulp : Paper :: Hemp : ?

a) Basket                      b)Yarn                      c) Rope                      d) Cotton                      ( )

5. Moon : Satellite :: Earth : ?

a) Sun                      b) Planet                      c) Solar System                      d)Asteroid                      ( )

6. Coconut : Shell :: Letter : ?

a) Letter – Box                      b) Stamp                      c) Mail                      d) Envelope                      ( )

7. Assam :Bihu :: Kerala : ?

a) Kathakali                      b) Kuchipudi                      c)Kathak                      d)Bharanatyam                      ( )

8. Man : Machine :: Master : ?

a)Worker                      b)Manager                      c) House                      d)Slave                      ( )

**VII** 1. Necklace is related to Jewellery in the same way as Shirt is related to ?

a) Thread                      b) Cloth                      c) Cotton                      d) Apparel                      ( )

2. Needle is related to Thread in the same way as Pen is related to ?  
 a) Ink                      b) Cap                      c) Paper                      d) Word                      e) Stationery ( )
3. Drama is related to Director in the same way as Magazine is related to ?  
 a) Story                      b) Editor                      c) Reader                      d) Printer ( )
4. Wax is related to Grease in the same way as Milk is related to ?  
 a) Drink                      b) Gee                      c) Curd                      d) Protein ( )
5. Impossible is related to Feasible in the same way as Theoretical is related to ?  
 a) Radical                      b) Usable                      c) Practical                      m                      d) Workable ( )
6. Cyclone is related to Anticyclone in the same way as Flood is related to ?  
 a) Devastation                      b) Havoc                      c) River                      d) Drought ( )
7. Earth is related to Axis in the same way as Wheel is related to ?  
 a) Tyre                      b) Car                      c) Road                      d) Hub ( )
8. Income is related to Profit in the same way as Expenditure is related to ?  
 a) Balance                      b) Loss                      c) Sale                      d) Receipt                      e) Surplus ( )

**VII** Find out the relationship between the first two numbers and choose the number from the given alternatives.

1. 18 : 30 :: 36 : ?  
 a) 54                      b) 62                      c) 64                      d) 66 ( )
2. 6 : 222 :: 7 : ?  
 a) 210                      b) 336                      c) 343                      d) 350 ( )
3. 14 : 9 :: 26 : ?  
 a) 12                      b) 13                      c) 15                      d) 31 ( )
4. 8 : 28 :: 27 : ?  
 a) 55                      b) 63                      c) 64                      d) 65 ( )
5. 68 : 130 :: ? : 350  
 a) 210                      b) 216                      c) 222                      d) 240 ( )
6. 42 : 56 :: 72 : ?  
 a) 81                      b) 90                      c) 92                      d) 100 ( )
7. 9 : 80 :: 100 : ?  
 a) 901                      b) 1009                      c) 9889                      d) 9999 ( )

8.  $149 : 238 :: 159 : ?$

a) 169

b) 248

c) 261

d) 268

( )

### UNIT- 3

#### BODMASRULE AND SIMPLIFICATION

1.  $12573+43495+23472=?$
2.  $(8 \div 88) \times 8888088=?$
3. The value of  $1001 \div 11$  of 13 is?'
4.  $20\frac{1}{2} + 30\frac{1}{3} - 15\frac{1}{6}=?$
5. Simplify  $2-[2 - \{2 - 2(2 + 2)\}]=?$
6. Simplify  $18-[5 - \{6 + 2(7 - \overline{8-5})\}]$ .
7.  $(-5)(4)(2)(-\frac{1}{2})(\frac{3}{4})=?$
8. Find the value of  $\frac{(6+6+6+6) \div 6}{4+4+4+4 \div 4}$
9. What is the value of  $\frac{(P+Q)}{(P-Q)}$  if  $\frac{P}{Q}=7?$

#### DECIMAL FRACTIONS

1. If  $204 \div 12.75 = 16$ , then  $2.04 \div 1.275 = ?$
2.  $0.03 \times 0.0124 = ?$
3.  $7212 + 15.231 - ? = 6879$
4.  $4211.01 + 22.261 - ? = 2645.759$
5.  $0.004 \times 0.5 = ?$
6.  $24.39 + 562.093 + 35.96 = ?$
7.  $926 + 9.026 + 0.926 + 9.0026 = ?$
8. The expression  $(12.86 \times 12.86 + 12.86 \times p + 0.14 \times 0.14)$  will be a perfect square for p equal to

#### DIVISIBILITY RULE

1. If the the number  $5*2$  is divisible by 6 then \*?
2. If the number  $517*324$  is completely divisible by 3 , then the smallest whole number in Place of \* will be.
3. If the number  $481*673$  is completely divisible by 9, then the smallest whole number in Place of \* will be.
4. If the number  $97215*6$  is completely divisible by 11, then the smallest whole number in Place of \* will be.
5. If the number  $91876*2$  is completely divisible by 8, then the smallest whole number in Place of \* will be.
7. Find the least value of \* for which  $7*5462$  is divisible by 9
8. Find the least value of \* for which  $4832*18$  is divisible by 11.



### **LCM and HCF:**

1. What is the lowest common multiple of 12, 36 and 20?
2. Find the H.C.F of 108, 288 and 360.
3. Find the greatest common divisor of 24 and 16
4. Two numbers are in the ratio 2 : 3. If their L.C.M. is 48. what is sum of the numbers?
5. The ratio of two numbers is 4 : 5. If the HCF of these numbers is 6, what is their LCM?
6. The H.C.F. of two numbers is 5 and their L.C.M. is 150. If one of the numbers is 25, then the other is:
7. The H.C.F. of two numbers is 11 and their L.C.M. is 693. If one of the numbers is 77, then find the other.
8. Find L.C.M of  $\frac{2}{3}$ ,  $\frac{8}{9}$ ,  $\frac{16}{81}$  and  $\frac{10}{27}$

### **BLOOD RELATIONS**

1. A is B's sister. C is B's mother. D is C's father. E is D's mother. Then, how is A related to D?
2. P is the brother of Q and R. S is R's mother. T is P's father. Which of the following statements cannot be definitely true?
3. Pointing out to a lady, a girl said, "She is the daughter-in-law of the grandmother of my father's only son." How is the lady related to the girl ?
4. There are six persons A, B, C, D, E and F. C is the sister of F. B is the brother of E's husband. D is the father of A and grandfather of F. There are two fathers, three brothers and a mother in the group. Who is the mother ?
5. Pointing to a person, a man said to a woman, "His mother is the only daughter of your father." How was the woman related to the person ?
6. A girl introduced a boy as the son of the daughter of the father of her uncle. What is the relation between the boy and the girl ?
7. In a family, there are six members A, B, C, D, E and F. A and B are a married couple, A being the male member. D is the only son of C, who is the brother of A. E is the sister of D. B is the daughter-in-law of F, whose husband has died. How is E related to C ?
8. A woman introduces a man as the son of the brother of her mother. How is the man, related to the woman ?

### **CALENDAR**

1. What was the day on 15th August 1947 ?
2. Today is Monday. After 61 days, it will be?
3. The last day of a century cannot be?
4. What was the day of the week on, 16th July, 1776?

5. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?
6. What was the day of the week on 28th May, 2006?
7. What will be the day of the week 15th August, 2010?
8. If 6<sup>th</sup> March, 2005 is Monday, what was the day of the week on 6<sup>th</sup> March, 2004?

### **CLOCKS**

1. A clock is set right at 8 a.m. The clock gains 10 minutes in 24 hours will be the true time when the clock indicates 1 p.m. on the following day?
2. At what time between 4 and 5 o'clock will the hands of a watch point in opposite directions?
3. An accurate clock shows 8 o'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?
4. A clock is set right at 5 a.m. The clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 10 p.m. on 4th day?
5. At what time between 5 and 6 o'clock are the hands of a clock 3 minutes apart?
6. Find the angle between the hour hand and the minute hand of a clock when the time is 3.25?
7. At what angle are the hands of a clock inclined at 15 minutes past 5?
8. At what time between 2 and 3 o'clock will the hands of a clock be together?

### **Unit -IV**

#### **AVERAGE:**

1. The average of 5, 10, 15, 20, 25?
2. Find the average of first 40 natural numbers.
3. The average of four consecutive even numbers is 27. Find the largest of these numbers
4. The average of four consecutive odd numbers is 61 what is the difference between the highest and lowest numbers?
5. The average of 5 numbers is 15 and the average of first three numbers is 10. what is the average of last two numbers?
6. The average age of 15 students of a class is 15 years. Out of these, the average age of 5 students is 14 years and that of the other 9 students is 16 years. The age of the 15<sup>th</sup> student is
7. The average of 5 numbers is 15 and the average of first three numbers is 10 and the average of last three numbers is 20. Then find the middle number?
8. The average of five numbers is 27. If one number is excluded, the average becomes

25.the excluded number is:

### **RATION & PROPORTION:**

1. If  $A : B = 2 : 3$   $B : C = 4 : 7$  then find  $A : B : C = ?$
2. If  $A : B = 2 : 3$   $B : C = 3 : 4$  then find  $A : B : C = ?$
3. If  $a:b=2:3$  and  $b:c=3:5$  then find  $a:c=?$
4. If  $2A=3B$  and  $4B=5C$ , then  $A:C$  is
5. Find the mean proportional of 9 and 25
6. Find the third proportional to 16 and 4
7. If  $\frac{A}{3} = \frac{B}{4} = \frac{C}{5}$ , then  $A:B:C$  is
8. If  $\frac{1}{5} : \frac{1}{x} :: \frac{1}{x} : \frac{1}{125}$ , then the value of  $x$  is

### **PROBLEM ON AGES:**

1. A father said his son , " I was as old as you are at present at the time of your birth. " If the father age is 38 now, the son age 5 years back was :
2. The total age of A and B is 12 years more than the total age of B and C. C is how many years younger than A ?
3. In 10 years, A will be twice as old as B was 10 years ago. If A is now 9 years older than B, the present age of B is :
4. The age of a man is 4 times of his son. Five years ago, the man was nine times old as his son was at that time. The present age of man is?
5. The sum of the present ages of a father and his son is 60 years. five years ago, father's age was four times the age of the son. so now the son's age will be:
6. Six years ago Anita was P times as old as Ben was. If Anita is now 17 years old, how old is Ben now in terms of P ?
7. Sachin is younger than Rahul by 7 years. If the ratio of their ages is 7:9, find the age of Sachin.
8. The ratio of the present ages of P and Q is 3 : 4. Five years ago, the ratio of their ages was 5 : 7. Find their present ages.

### **TIMES AND DISTANCE-SPEED**

1. An athlete runs 200 metres race in 24 seconds. His speed is?
2. How many minutes does Aditya take to cover a distance of 400m, if he runs at a speed of 20 km/hr?
3. A car is running at speed of 108kmph. What distance will it cover in 15 seconds?
4. A cyclist covers a distance of 750 m in 2 min 30 sec. What is the speed in km/hr of the cyclist?
5. Peter can cover a certain distance in 1hr.24min. by covering two third of the distance at 4kmph and the rest at 5kmph. Find the total distance.
6. A and B are two stations 390km apart. A train starts form A at 10 a.m. and travels

towards B at 65kmph. Another train starts from B at 11a.m.and travels towards A at 35 kmph. At what time do they meet?

## UNIT-V

### PERCENTAGES

1.  $8\frac{1}{3}\%$  expressed as fraction is ?
2. 2 is what percent of 50?
3. What percent of  $\frac{1}{2}$  is  $\frac{1}{3}$ ?
4. X% of Y is Y% of ?
5. What is 25% of 25% equal to?
6. 30% of 140 = ? % of 840
7. 5 % of (50% of Rs 300) is?
8. 270 candidates appeared in an examination, of which 252 passed. The pass percentage is.

### PROFIT AND LOSS

1. A man buys a cycle for Rs.1400 and sells it at a loss of 15%. What is the selling price of the cycle?
2. The CP of 21 articles is equal to SP of 18articles. Find the gain (or ) loss percent
3. A man buys an article for Rs 27.50 and sells it for Rs 28.60. find his gain percent ?
4. An article is bought for RS. 450 and sold for Rs.400 .what is the loss%?
5. When a commodity is sold for Rs. 34.80 there is a loss of 25%, what is the cost price of commodity?
6. An article is sold at certain price. By selling it at  $\frac{2}{3}$  of that price one loses 10%. Find the gain percent at original price..
7. Meena purchased two fans each at Rs.1200. She sold one fan at the loss of 5% and other at the gain 10%.Find the total gain or loss percent?
8. Three partners A, B, C starts a business. Twice the investment of A is equal to thrice the capital of B and the capital of B is four times the capital of C. finds the share of each out of a profit of Rs.297000?

### PARTNERSHIP

1. Dhilip and Manohar started a business by investing Rs.100000 and Rs.150000 respectively. Find the share of each out of a profit of Rs.24000?
2. Sanjay and Raju started a business and invested Rs.20000 and Rs.25000

respectively. After 4 months Raju left and Naresh joined by investing Rs.15000. At the end of the year there was a profit of Rs.4600. what is the share of Naresh?

3. Three partners A, B, C starts a business. Twice the investment of A is equal to thrice the capital of B and the capital of B is four times the capital of C. finds the share of each out of a profit of Rs.297000?
4. A, B, C hire meadow for Rs.2934.60. A puts in 10 oxen for 20 days; B 30 oxen for 8 days and C 16 oxen for 9 days. Find the rent paid by each?
5. A and B started a business in partnership by investing Rs.8000 and Rs.7000 respectively. If at the end of a year, a profit of Rs.22, 500 was earned. What is the share of A?
6. In partnership business, A has invested Rs.4200 while B has invested a certain amount. If out of the overall profit of Rs.600, A's share is Rs.320, what is the amount invested by B (in Rs)?
7. Chetan and Suman started a business in partnership by investing Rs.15000 and Rs.18000 respectively. If at the end of the year, Chetan's share in the profit was Rs.1200, what was the amount of total profit?
8. In a partnership business, A has invested 2000 for 5months, while B has invested Rs.3500 for a certain period. If out of the total annual profit of Rs.1440, B's share has been Rs.840. For how many months has he kept his investment in the business?

### **SIMPLE AND COMPOUND INTEREST**

1. Find the simple interest on Rs 7500 in 4 years at 15% .
2. The simple interest on Rs. 6400 at  $12\frac{1}{2}$  % per annum is Rs.2000, find the period
3. On what sum of money will the simple interest be Rs.2000 in 5 years 8% per annum?
4. A sum of Rs 1600 gives a simple interest of Rs252 in 2years and 4months. The rate of interest per annum is ?
5. Find the compound interest on Rs 8000 for 3years at 5% per annum
6. A sum of Rs.3000 is lent for 3 years at 10% p.a compound interest. Find the amount
7. Find the amount on Rs 7500 at 4% per annum for 2 years compounded annually.
8. Find the compound interest on Rs.15,625 for 9 months at 16% per annum compounded Quarterly.

**SEMESTER – V**

**INDUSTRIAL  
INTERNSHIP FOR THE  
ENTIRE SEMESTER**

**Semester-VI**

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**THIRD YEAR SEMESTER-VI**  
**CORE-I**  
**PAPER: ADVANCED PHARMACOLOGY**

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

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical Sciences

### **UNIT-I**

Definition, classification, pharmacological actions, dose, indications and contraindications of Bronchodilators• Expectorants• Anti-tussives•

Autocoids Physiological role of Histamine, 5 HT and Prostaglandins. • Classification, clinical uses and adverse effects of antihistamines and 5• HT antagonists

### **UNIT-II**

Drugs Acting on Gastro Intestinal Tract Definition, classification, pharmacological actions, dose, indications and contraindications of Anti-ulcer drugs• Anti-emetics• Laxatives and purgatives• Anti-diarrheal drugs•

### **UNIT-III**

Chemotherapy Classification, dose, indication and contraindications of drugs belonging to Penicillins• Cephalosporins• Aminoglycosides• Fluoroquinolones• Anti-tubercular drugs• Anti-fungal drugs• Anti-viral drugs• Anti-cancer•

### **UNIT-IV**

Drugs Acting on Kidney Definition, classification, pharmacological actions, dose, indications, and contraindications of Diuretics• Anti-Diuretics•

### **Recommended Books:**

1. Pharmacological Basis Of Therapeutics By Goodman & Gillman.
2. Pharmacology And Pharmacotherapeutics By Satoskar & Bhandarkar.



3. Essentials Of Pharmacotherapeutics By F.S.K. Barar.
4. Essentials: Of Medical Pharmacology By K.D. Tripathi.
5. Pharmacology By Rang & Dale.

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**THIRD YEAR SEMESTER-VI**  
**CORE-I**  
**PAPER: ADVANCED PHARMACOLOGY**

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
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THIRD YEAR SEMESTER-VI  
SKILL COMPONENT – I (CORE-I)  
PAPER: ADVANCED PHARMACOLOGY

PRACTICALS

1. Principles involved in screening of anti-convulsant in mice or rats
2. Principles involved in screening of Muscle relaxants using Rota Rod apparatus
3. Principles involved in screening of CNS stimulants and depressants using actophotometer Pyrogen testing by rabbit method
4. Study of effect of drugs on isolated heart
5. Effect of drugs on ciliary motility on frog's buccal cavity

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THIRD YEAR SEMESTER-VI  
CORE-I  
PAPER: ADVANCE PHARMACOLOGY

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

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PAPER: ADVANCED PHARMACOLOGY

QUESTION BANK  
(ESSAY QUESTIONS)

UNIT-I

1. Define Brochodilators. Give the classification
2. Define Antitussives. Give classification
3. What are Expectorants.
4. Define antihistamines. And wrie the classification. Write the pharmacology of diphenhydramine and chlorphenaramine maleate.

UNIT-II

1. Define Anti-ulcer drugs. Give classification with examples
2. Classification of Laxatives and purgatives
3. What are anti-diarrheal drugs.Give classification.
4. Write a note on Loperamide

UNIT-III

1. Write a short note on pencillines
2. Write about various generations of cephalosproines
3. Write a note on streptomycin
4. Define antitubercular drugs. Classify them with examples
5. Write about antifungal drugs give classification
6. Write a short notes on Tuberculosis
7. Write about chemotherapy.

SHORT ANSWERS

UNIT-I

1. Write M/A,Adverse effects of salbutamol
2. Define Autocoids
3. Write the pharmacology of 5HT
4. Write a note on prostaglandins

UNIT-II

1. Write a short note on peptic ulcer
2. Write a note on anti-emetics
3. Write a short note on vomiting centre
4. Write about domperidol
5. Define laxatives and purgatives

6. Why castor oil is given along with antihelminthic drugs
7. Write a note on Loperamide

### UNIT-III

1. Write about Ketoconazole
2. Write about anti viral drugs . Give classification with examples
3. Write about zidovuridine
4. Write a short note on PAS & Ethambutol
5. Drug of choice for the following:
  - I. Leukemia
  - II. Leprosy
  - III. Trichomoniasis
  - IV. Rheumatoid arthritis
6. Write about chemotherapy.

### UNIT-IV

1. Write about Vasopressin
2. Write about filtration
3. What is polyuria
4. What are diuretics? Can drinking water be used as diuretic
5. Write about osmotic diuretics
6. Write a note on thiazides
7. Write about Acetazolamide

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**THIRD YEAR SEMESTER-VI**  
**CORE-II**  
**PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

45 hrs (3 h / w)

**UNIT-I**

**8h**

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

**UNIT-II**

**Drugs:**

**8h**

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 administration

**UNIT-III**

**Synthesis and therapeutic activity of the compounds:**

**12h**

a. Chemotherapeutic Drugs

1. Sulphad drugs (Sulphamethoxazole) 2. Antibiotics -  $\beta$ -Lactam Antibiotics, Macrolide Antibiotics, 3. Anti malarial Drugs (chloroquine)

b. Psycho therapeutic Drugs:

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

**UNIT-IV**

**Pharmacodynamic Drugs:**

**8h**

1. Antiasthma Drugs (Salbutamol) 3. Antianginals (Glycerol Trinitrate)  
4. Diuretics (Furosemide)

**HIV-AIDS:**

**9h**

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

**List of Reference Books:**

1. Medicinal Chemistry by Dr. B.V. Ramana

2.Synthetic Drugs by O.D.Tyagi & M.Yadav

3.Medicinal Chemistry by Ashutoshkar

4.Medicinal Chemistry by P.Parimoo

5.Pharmacology& Pharmacotherapeutics R.S Satoshkar & S.D.Bhandenkar

6.Medicinal Chemistry by Kadametal P-I & P.II

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**THIRD YEAR SEMESTER-VI**  
**CORE-II**  
**PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

**Question bank**

**Essay questions(10M)**

**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 paracetamol
4. 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.
4. Explain CD-4cells and CD-8cells.

**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 of administration



### **UNIT-III**

1. Write short 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) indinavir b) Nelfinavir.

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**THIRD YEAR SEMESTER-VI**  
**CORE-II**  
**PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

**WEIGHTAGE TO CONTENT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**THIRD YEAR SEMESTER-VI**  
**CORE-II**  
**PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

Time 2hrs.30min

Maxmarks-60

**SECTION-A**

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

**SECTION-B**

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
SKILL COMPONENT – II (CORE-II)  
PHARMACEUTICAL AND MEDICINAL CHEMISTRY**

**Practicals**

**Project work-50marks**

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**THIRD YEAR SEMESTER-VI**  
**CORE-III**  
**PAPER: INSTRUMENTAL METHODS OF ANALYSIS**

### **Unit-1**

#### **Electronic spectrometry:**

#### **Electronic Spectroscopy:**

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals ( $\sigma, \pi, n$ ). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore and auxochrome

General features of absorption-Beer-Lambert's law and its limitations. Transmittance, Absorbance and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert's law for quantitative analysis of (i)Chromium in  $K_2Cr_2O_7$  (ii)Manganese in  $MnSO_4$

### **Unit-II**

**Infrared spectroscopy:** principle of IR spectroscopy, Different regions in infrared radiations. Modes of vibrations in diatomic and poly atomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic alcohols, carbonyls and amines with one example to each, finger print region and its significance

### **Unit-III**

#### **Proton magnetic resonance spectroscopy ( $^1H$ -NMR) :**

8 hrs

Principles and instrumentation of  $H^1$  nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals, spin-spin coupling, coupling constants. Applications of NMR with suitable examples-ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and Acetophenone.

### **Unit-IV**

**Mass Spectrometry:** Basic principles & brief outline of instrumentation, ionization techniques, ion formation & types; molecular ions, fragment ions- fragmentation processes, fragmentation patterns -representation of mass spectrum- mass spectra of

some organic compounds ( Ethyl benzene, Acetophenone, benzamide, 1-butanol and n-butanamine).

### List of Reference Books

- 1.Spectroscopy by William Kemp
- 2.Spectroscopy by Pavia
- 3.Organic Spectroscopy by J.R.Dyer
- 4.Elementary Organic spectroscopy by Y.R.Sharma
- 5.Spectroscopy by P.S.Kalsi

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**THIRD YEAR SEMESTER-VI**  
**CORE-III**  
**PAPER: INSTRUMENTAL METHODS OF ANALYSIS**

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	2	2	30
4.	UNIT -IV	2	2	30
	Total	8	8	120

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
CORE-III  
PAPER: INSTRUMENTAL METHODS OF ANALYSIS

Time 2hrs.30min

Maxmarks-60

SECTION-A

Answer the following questions

4x10=40 M

1. One question is to be set from unit-I

Or

One question is to be set from unit-I

2. One question is to be set from unit-II

Or

One question is to be set from unit-II

3. One question is to be set from unit-III

Or

One question is to be set from unit-III

4. One question is to be set from unit-IV

Or

One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

5. One question is to be set from unit-I

6. One question is to be set from unit-I

7. One question is to be set from unit-II

8. One question is to be set from unit-II

9. One question is to be set from unit-III

10. One question is to be set from unit-III

11. One question is to be set from unit-IV

12. One question is to be set from unit-IV

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
SKILL COMPONENT – III (CORE-III)  
PAPER: INSTRUMENTAL METHODS OF ANALYSIS

**PRACTICALS**

1. Determination of Critical Solution Temperature of Preparation of buffer solutions: a. Sodium acetate-acetic acid b. Ammonium chloride-ammonium hydroxide
2. Measurement of the pH of buffer solutions and comparison of the values with theoretical values.
3. pH metry: Determination of HCl using NaOH
4. pH metry: Determination of CH<sub>3</sub>COOH using NaOH
5. Phenol- water system
6. Effect of electrolyte (NaCl) on the consolute temperature of Phenol – water system



**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**THIRD YEAR SEMESTER-VI**  
**CORE-III**  
**PAPER: INSTRUMENTAL METHODS OF ANALYSIS**

**Question bank**  
**Essay questions(10M)**

**UNIT-I**

1. Explain types of electronic transitions in molecules.
2. State Beer's law and explain the Application of Beer-Lambert's law for quantitative analysis of Chromium in  $K_2Cr_2O_7$  (ii) Manganese in  $MnSO_4$
3. State Beer's law and explain the Application of Beer-Lambert's law for quantitative analysis of Chromium in Manganese in  $MnSO_4$

**UNIT-II**

1. Write the principle of IR spectrophotometry.
2. Explain different modes of vibration in diatomic and polyatomic molecules
3. Explain characteristic absorption bands of various functional groups.

**UNIT-III**

1. Explain the principle of NMR spectroscopy
2. Outline the instrumentation of NMR spectroscopy draw the diagram
3. Explain NMR spectra of a) ethyl bromide b) ethanol c) ethyl acetate
4. Explain NMR spectra of a) acetaldehyde b) 1,1,2-tri bromo ethane c) Acetophenone.

**UNIT-IV**

1. Explain the basic principles of mass spectrometry.
2. Outline the instrumentation of mass spectrometry.
3. Explain the mass spectra of a) ethyl benzene b) Acetophenone
4. Explain the mass spectra of a) benzamide b) 1-butanol

**Short answer questions(5M)**

**UNIT-I**

1. Explain chromophore and auxochrome with examples.
2. Explain transmittance, absorbance and molar absorptivity
3. Draw and label single and double beam spectrophotometers

**UNIT-II**

1. What is the fingerprint region in IR spectrum and write its significance
2. How do you interpret the IR spectra of aromatic alcohols and give an example.

**UNIT-III**

1. Explain chemical shift.
2. What are equivalent and non-equivalent protons give an example.
3. Explain spin-spin coupling

#### **UNIT-IV**

1. What are molecular ion and fragment ion give an example.
2. Explain fragmentation process .
3. Explain the representation of mass spectrum

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
GENERAL COMPONENT – I  
MATHEMATICS  
Course: Vector Calculus and Statistical Applications

Total Hrs. of Teaching-Learning: 45 @ 3 hr/Week  
credits: 3

Total

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**Objectives:**

- To impart knowledge on Ring Theory and its applications.
- To make awareness of the concepts of the transformation between line Integral, Surface Integral and Volume integral.
- To introduce the concepts of geometrical meaning of Gradient, Divergence and Curl.
- To understand and apply various probability distributions in relevant application areas.
- To learn the concepts of sampling and to apply different statistical tools to estimate and test any hypothetical statements.

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**VECTOR CALCULUS**

**UNIT:I Vector differentiation**  
hrs)

(10

Vector differentiation –Ordinary Derivatives of Vector valued functions, Gradient , Directional Derivatives, Angle between two surfaces, Divergence, Curl operators, Irrotational and Solenoidal Vectors.

**UNIT:II .Vector integration**& Applications:

(10 hrs)

Line Integral, Surface Integral, Volume Integrals with examples. Statements of Gauss Divergence Theorem, Stokes theorem, Green's Theorem in plane and applications of these theorems.

UNIT III:

**Probability distributions:**  
hrs)

(10

Discrete: Binomial, Poisson, properties(mean and variance only) and their real life applications-

Continuous: Normal distribution properties(mean and variance only) and its real life applications.

**Sampling distributions:** Concepts of population, parameter, sampling, sample, statistic, standard error. Chi-square, t and F distributions (only statements)

## UNIT IV:

### Statistical Inference:

(15

hrs)

Interval estimation-confidence intervals-applications.

Testing of hypothesis: Null and Alternative hypothesis, Critical region, types of errors, level of significance, one-tailed and two-tailed tests, large sample tests for means and proportions, small sample tests for means, variances, chi-square test for goodness of fit and Independence of attributes, concept of one-way ANOVA

### Prescribed text Book:

1. A text book of Mathematics, Vol. III, S. Chand & Co.
2. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan .  
Chand&Sons, New Delhi
- 3.V.K.Kapoor and S.C.Gupta : Fundamentals of Applied Statistics. Sultan Chand

### Books for Reference:

1. Vector Calculus by Santhi Narayan, Published by S.Chand & Company Pvt. Ltd., New Delhi
2. Vector Calculus by R.Gupta, Published by Laxmi Publications.
3. Goon AM, Gupta MK, Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd., Kolakota.
6. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
7. Pratirupa Sidhanthamulu – Telugu Academy.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
 B.Voc (PHARMACEUTICAL CHEMISTRY)  
 THIRD YEAR SEMESTER-VI  
 GENERAL COMPONENT – I  
 MATHEMATICS  
 Course: Vector Calculus and Statistical Applications

Course: Vector Calculus

Semester - IV

BLUE PRINT FOR THE QUESTION PAPER

UNIT	SHORT ANSWER QUESTIONS 5 Marks	ESSAY QUESTIONS 10 Marks	TOTAL MARKS
I	1	2	25
II	2	1	20
III	1	1	15
IV	2	1	20
<b>TOTAL NO. OF QUESTIONS</b>	<b>6</b>	<b>5</b>	<b>80 M</b>

Question Paper pattern:

Short Answer Questions = 4 x 5 = 20 Marks

Essay questions = 3 x 10 = 30 Marks

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TOTAL 50 Marks

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PP.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
GENERAL COMPONENT – I  
MATHEMATICS  
Course: Vector Calculus and Statistical Applications

**Course: VECTOR CALCULUS AND STATISTICAL APPLICATIONS**

Time: 2 Hrs

Max.

Marks: 50

**PART – I**

Answer any FOUR of the following questions.

4 x 5

=20 M

1. If  $a = x + y + z$ ,  $b = x^2 + y^2 + z^2$ ,  $c = xy + yz + zx$ , then prove that  $[\text{grad } a, \text{grad } b, \text{grad } c] = 0$ .
2. Evaluate  $\int_s F \cdot N \, dS$ , where  $\bar{F} = z\bar{i} + x\bar{j} - 3y^2z\bar{k}$  and  $S$  is the surface  $x^2 + y^2 = 16$  included in the first octant between  $z = 0$  and  $z = 5$ .
3. If  $F(t) = (t - t^2)\bar{i} + 2t^3\bar{j} - 3\bar{k}$ , then find  $\int_1^2 F(t) dt$ .
4. Define Binomial and Poisson distribution.
5. Define Concepts of population, parameter, sampling, sample, statistic, standard error.
6. Write about chi-square test for goodness of fit

**PART – II**

Answer any THREE of the following questions.

3 X

10=30M

7. Prove that  $\text{curl}(\bar{A} \times \bar{B}) = \bar{A} \text{div} \bar{B} - \bar{B} \text{div} \bar{A} + \bar{B} \text{div} \bar{A} + (\bar{B} \cdot \nabla) \bar{A} - (\bar{A} \cdot \nabla) \bar{B}$ .
8. Prove that  $\text{div}\{(\bar{r} \times \bar{a}) \times \bar{b}\} = -2(\bar{a} \cdot \bar{b})$ , where  $\bar{a}$  and  $\bar{b}$  are constant vectors.
9. Verify Green's theorem for  $\oint_C (3x^2 - 8y^2) dx + (4y - 6xy) dy$  where  $C$  is the region bounded by  $y = \sqrt{x}$  and  $y = x^2$ .
10. The sales of 1000 pharmaceutical companies are normally distributed with an average of Rs.23.45 lakhs with a S.D of Rs. 1.2 lakhs. How many companies

would you expect to have the sales a) less than Rs.20 lakhs b) more than Rs.26 lakhs .

11. The following data relating to the two drugs A and B keeping sugar levels.

Drug A	125	100	112	156	160	110
Drug B	100	120	115	102	104	112

Test the significance difference between the means at 5% level.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
GENERAL COMPONENT – II  
CHEMISTRY

PAPER-: PHYSICAL CHEMISTRY

**Physical chemistry**

**Unit-I**

**Chemical kinetics** :Rate of reaction, factors effecting rate of reaction( nature and concentration of reactants, catalysts , temperature and light) - Rate law or rate equation, Definition of order and molecularity. Derivation of equations for rate constants of first, second and zero order reactions and examples. half life definition and derivation of equation for half life of first order reaction, numerical problems based of half life of first order reactions. Methods for determination of the order of reactions( differential method, integrated method, half life method and Ostwald isolation methods). Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

**Unit-II**

**Photochemistry**

**6h**

Difference between thermal and photochemical reactions. Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield-Photochemical reaction mechanism- hydrogen- chlorine, hydrogen-bromine reactions. Jablonski diagram for Qualitative description of fluorescence, phosphorescence, Photosensitized reactions- energy transfer processes (simple example).

**Unit-III**

**Thermodynamics- I**:definition- terminology(system, surroundings, reversible and irreversible process, isothermal and adiabatic process, internal energy, enthalpy, entropy and free energy)The first law of thermodynamics-different statements and mathematical expressions. Heat capacities and their relationship. Joule-Thomson effect.. Temperature dependence of enthalpy of formation-Kirchoff's equation.

**Unit-IV**

**Thermodynamics- II**Second law of thermodynamics. Different Statements of the law. Carnot cycle and efficiency of heat engine. Carnot theorem. Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes

**List of Reference Books:**

1. Advanced Physical Chemistry by Atkins
2. Text book of physical chemistry by S Glasstone



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B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
GENERAL COMPONENT – II  
CHEMISTRY

WEIGHTAGE TO CONTENT

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	1	1	15
4.	UNIT -IV	1	1	15
	Total	6	6	90

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
GENERAL COMPONENT – II  
CHEMISTRY

Time 2hrs.30min

Maxmarks-50

**SECTION-A**

Answer any **THREE** of the following questions

3x10=30 M

1. One question is to be set from unit-I
2. One question is to be set from unit-I
3. One question is to be set from unit-II
4. One question is to be set from unit-II
5. One question is to be set from unit-III
6. One question is to be set from unit-IV

**SECTION-B**

Answer any **FOUR** questions

4x5=20M

7. One question is to be set from unit-I
8. One question is to be set from unit-I
9. One question is to be set from unit-II
10. One question is to be set from unit-II
11. One question is to be set from unit-III
12. One question is to be set from unit-IV

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**B.Voc (PHARMACEUTICAL CHEMISTRY)**  
**THIRD YEAR SEMESTER-VI**  
**GENERAL COMPONENT – II**  
**CHEMISTRY**  
**Question bank**

Essay questions (10M)

Uniy-I

1. Define rate of reaction .explian factors effecting rate of reaction
2. Define first order reaction give two examples. derive equation rate constant for first order reaction
3. Define second order reaction give two examples. derive equation rate constant for first order reaction
4. Define zero order reaction give two examples. derive equation rate constant for first order reaction
5. Define order of reaction explain any two methods for the determination of order of reaction.

Uniy-II

1. Define quantum yield. The quantum yield of hydrogen-chlorine reaction is very high explain with mechanism.
2. Define quantum yield. The quantum yield of hydrogen-bromine reaction is very low explain with mechanism.
3. Draw jablonsky diagram and explain fluorescence and phosphorescence.

Uniy-III

1. Define heat capacities derive equation for  $c_p$  and  $c_v$  and show that  $C_p - C_v = R$ .
2. Derive krichoff equation.

Uniy-IV

1. Explain the efficiency of heat engine by carnot cycle.
2. Explain entropy changes in reversible and irreversible processes.

**Short answer questions (5M)**

Uniy-I

1. Define order and molecularity write their differences
2. Define half life. Derive equation for half life of first order equation.
3. Explain the effect of temperature on rate of reaction.
4. Write Arrhenius equation. explain the concept of activation energy.

Uniy-II

1. Write the differences between thermal and photochemical reactions.

2. State and explain Grothuss-Draper's law.
3. State and explain Stark-Einstein law of photochemical equivalence.
4. What are photosensitized reactions? Give any three examples.

#### Uniy-III

1. State first law of thermodynamics. Derive equation for it.
2. State and explain Joule-Thomson effect.
3. Define and differentiate isothermal and adiabatic processes.
4. Define and differentiate reversible and irreversible processes.

#### Uniy-IV

1. Write different statements of second law of thermodynamics.
2. Explain entropy changes in spontaneous and equilibrium processes.

P.R.GOVERNMENT COLLEGE (A), KAKINADA  
B.Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
GENERAL COMPONENT – II  
CHEMISTRY  
PRACTICALS

1. Potentiometry Performing the following potentiometric titrations:
  - i. Strong acid vs. strong base
  - ii. Weak acid vs. strong base
2. Separation of amino acids by paper chromatography.
3. Determination of viscosity of liquids
4. Determination of surface tension of liquids
5. Determination of the composition of the  $\text{Fe}^{3+}$ -salicylic acid complex solution by Job's method.
6. Estimation of the amount of nickel present in a given solution as bis(dimethylglyoximate)nickel (II) or aluminium as oximate in a given solution gravimetrically.
7. Drawing calibration curve (absorbance at  $\lambda_{\text{max}}$  vs. concentration) for various concentrations of a given coloured compound ( $\text{KMnO}_4$ /  $\text{CuSO}_4$ ) and estimation of the concentration of the same in a given solution.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B. Voc (PHARMACEUTICAL CHEMISTRY)

THIRD YEAR SEMESTER-VI

General Component – III

PAPER-: HEALTH EDUCATION AND COMMUNITY PHARMACY

UNIT 1

Concept of Health : Definition of physical Health, mental Health, social Health, spiritual Health, determinants of health, indicatory of health, concept of disease, natural history of diseases, the disease agents, concept of prevention of diseases

UNIT II

Nutrition and Health: Classification of foods, requirements, disease induced due to deficiency of proteins, vitamins and minerals-treatment and prevention

Demography and family planning-Demography cycle, fertility, family planning,contraceptivemethods,behavioral methods, natural family planning methods, chemical methods, mechanical methods, hormonal contraceptives.

UNIT III

First Aid: Emergency treatment in shock, snakebite, burns, poisoning, heart diseases, fractures and resuscitation methods. Elements of minor surgery and dressings

UNIT IV

Communicable& Non communicable Diseases: Causative agents, mode of transmission and prevention

Respiratory infections-Chicken pox ,measles, influenza, whooping cough and TB

Intestinal Infections-poliomyelitis,Hepatitis,cholera,Typhoid,foodpoisoning,

Arthropod Infections-Malaria, filarial, plague, dengue

Surface infection-Rabies, Tetanus, Leprosy

Sexually transmitted diseases: Syphilis, Gonorrhoea, AIDS

Recommended Books

1. Social Pharmacy – Innovation and development edt. Geoff Harding, Sarah Nettleton and Kevin Taylor. The Pharmaceutical Press.

2. Text Book of Community Pharmacy Practice. RPSGB Publication
3. Community Pharmacy Handbook- Jonathan Waterfield
4. S.Khurana, P Suresh and R Kalsi. Health Education & Community Pharmacy. S Vikas& Co
5. Social Pharmacy: Tayler,Geoffery. Pharmaceutical Press. London. --

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**

**B. Voc (PHARMACEUTICAL CHEMISTRY)**

**THIRD YEAR SEMESTER-VI**

**General Component – III**

**PAPER-: HEALTH EDUCATION AND COMMUNITY PHARMACY**

**WEIGHTAGE TO EACH UNIT**

Sl.No.	Course Content	Essay (10M)	Short (5M)	Total marks
1.	UNIT -I	2	2	30
2.	UNIT -II	2	2	30
3.	UNIT -III	1	1	15
4.	UNIT -IV	1	1	15
	Total	6	6	90

P.R.GOVERNMENT COLLEGE (A), KAKINADA

B. Voc (PHARMACEUTICAL CHEMISTRY)  
THIRD YEAR SEMESTER-VI  
General Component – III MODEL PAPER

PAPER-: HEALTH EDUCATION AND COMMUNITY PHARMACY

Time 2hrs.30min

Maxmarks-50

SECTION-A

Answer any THREE of the following questions

3x10=30 M

1. One question is to be set from unit-I
2. One question is to be set from unit-I
3. One question is to be set from unit-II
4. One question is to be set from unit-II
5. One question is to be set from unit-III
6. One question is to be set from unit-IV

SECTION-B

Answer any FOUR questions

4x5=20M

7. One question is to be set from unit-I
8. One question is to be set from unit-I
9. One question is to be set from unit-II
10. One question is to be set from unit-II
11. One question is to be set from unit-III
12. One question is to be set from unit-IV



**P.R.GOVERNMENT COLLEGE (A), KAKINADA**

**B. Voc (PHARMACEUTICAL CHEMISTRY)**

**THIRD YEAR SEMESTER-VI**

**General Component – III MODEL PAPER**

**PAPER-: HEALTH EDUCATION AND COMMUNITY PHARMACY**

**QUESTION BANK**

**ESSAY QUESTIONS (10M)**

**UNIT-I**

1. Define Disease. What are the various types of diseases
2. various indicators used for measurement of health and explain mortality indicators
3. Explain “natural history of disease

**UNIT-II**

1. Define Food and Nutrition. Classify food and explain deficiencies
- 2.
3. Define Demography and Family Planning. What are the various methods of family planning
4. What is balanced diet?
5. Define fertility and name the four factors affecting fertility.
8. Define the term Demography. Explain demographic cycle.

**UNIT-III**

1. What are emergency preparedness for poisoning
2. Write the first aid in poisoning.
3. Give the emergency treatment for shock
4. Write prevention and control of coronary heart diseases
5. Write the elements of Minor Surgery and dressing

**UNIT-IV**

1. Write about influenza
2. Write a note on Communicable & Non communicable Diseases
3. Malaria-: Causative agents, mode of transmission and prevention
4. A short note on Poliomyelitis ,
5. Write about any one Arthropod Infections
6. Write about any one Surface infection
7. Write about any one Sexually transmitted diseases

## SHORT ANSWER QUESTIONS (5M)

### UNIT-I

1. Define the terms
  - i. Physical health
  - ii. Social health
  - iii. Mental health
2. Define nosocomial infections. Write prevention and control of nosocomial infections.

### UNIT-II

1. Write a note on Kwashiorkor and marasmus
2. Write a note on disease induced due to deficiency of proteins, vitamins and minerals-treatment and prevention
  - a) Name the vitamin causing following deficiency diseases:
    - i. Rickets
    - ii. Night Blindness
    - iii. Scurvy
    - iv. Pellagra
  - (b) Define the terms:
    - i. Disease
    - ii. Health
  - © Name the orthopod transmitting following diseases
    - i. Plague
    - ii. Kala Azar
    - iii. Cholera
    - iv. Malaria
3. Name a deficiency disease of following nutrients
  - i. Vit.D
  - ii. Iodine
  - iii. Protein
  - iv. Calcium
4. Give Long forms of following abbreviations:
  - i. BCG
  - ii. MMR
  - iii. WHO
5. Give examples for physical methods of contraception.
6. Write about hormonal contraceptives
7. Classify vitamins and write sources of vitamin c
8. Give the advantages and disadvantages of condoms
9. Write sources and deficiency disease of Vitamin B1 and vitamin B12

### UNIT-III

1. What are the contents of first aid box
2. What is mouth to mouth respiration
3. Write about the first aid for shock
4. Write about the first aid for snake bite
5. What are antidotes.

### UNIT-IV

1. Write about any two arthropod infections
2. Write about Cholera and Typhoid
3. Write a note on STDs
4. Write a note on non communicable diseases.
5. Name causative agent of the following diseases:
  - i. Rabies
  - ii. Chicken pox
  - iii. Treponema pallidum
  - iv. Bordetella pertussis
6. What do the following acronyms stand for?
  - a) HIV
  - b) TT
  - c) RNA
  - d) STD
7. Give the causative agent, mode of transmission and prevention of
  - i. Leprosy
  - ii. AIDS
  - iii. Cholera
  - iv. Tuberculosis
  - v. Influenza
  - vi. Plague