

# SYLLABUS

## Saurashtra University



### DDU Kaushal Kendra Curriculum for **BACHELOR of VOCATION** in **PHARMACEUTICAL ANALYSIS & QUALITY ASSURANCE**

(Under UGC – DDU Kaushal Kendra sanctioned to Shree Manibhai Virani & Smt.  
Navalben Virani Science College-Rajkot)

(Sanction Letter No. 3-43/2015(KAUSHAL) dated 14.08.2015)

### **B.Voc. - Pharm. Analysis & QA**

### **Semester I & II**

**Credit Based Semester System (CBSS)**  
**Effective from June 2015-16**

## **Bachelor of Vocation – Pharmaceutical Analysis & Quality Assurance**

(3 years – Six Semester Full Time Course)

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### **DEEN DAYAL UPADHYAY KAUSHAL KENDRAS**

(XII plan guidelines for Deen Dayal Upadhyay Centres for knowledge acquisition and upgradation of skilled human abilities and livelihood (KAUSHAL) in universities and colleges -2014 - 2017)

#### **Introduction:**

Education plays an important role in the overall development of a human being as well as the nation. It is a unique investment in the present and for the future. Every country develops its own system of education to express and promote its unique socio-cultural identity besides meeting the challenges of time to leverage the existing potential opportunities. India, at present, is recognized as one of the youngest nations of the world with over 50% of population under the age of 30 years. It is estimated that by 2025, India will have 25% of the world's total workforce. In order to harness the full demographic dividend, India needs high quality educational system which is affordable, flexible and relevant to the individuals, as well as to needs of the society as a whole. Today, the country faces a demand – supply mismatch as the economy needs more 'skilled' workforce as also the managers and entrepreneurs than produced annually. In fact, majority of the contemporary institutions of higher learning remain almost disconnected with the requirements of the workplace. The higher education system has to incorporate the requirements of various industries in its curriculum, in an innovative and flexible manner while producing well groomed graduates. UGC introduced two schemes known as – Community Colleges and B.Voc. Degree Program in universities and colleges during the XII Plan. However, there is a need for taking integrated initiatives towards knowledge acquisition and up-gradation of skilled human competencies in universities and colleges to address the emerging needs of the economy so as to ensure that the graduates have adequate knowledge and skills to get appropriately employed or become entrepreneurs and, thereby, meet the economic and industrial needs at the regional and national level. Government of India, taking note of the requirement for skill development among students developed National Vocational Education Qualification Framework (NVEQF) which was later on assimilated into National Skills Qualifications Framework (NSQF). Various Sector Skill Councils (SSCs) are developing Qualification Packs (QPs), National Occupational Standards (NOSs) and assessment mechanisms in their respective domains, in alignment with the needs of the industry.

In view of this, the UGC implemented the scheme of Community Colleges from 2013-14 in pilot mode on the initiative of the MHRD. However, realizing the importance and the necessity for developing skills among students, and creating work ready manpower on large scale, the Commission decided to implement the scheme of Community Colleges as one of its independent schemes from the year 2014-15. The Commission also launched another scheme of B.Voc. Degree program to expand the scope of vocational education and also to provide vertical mobility to the students admitted into Community Colleges for Diploma programs to a degree program in the

Universities and Colleges. While these two schemes are being implemented, it is also realized that there is a need to give further push to vocational education on a even larger scale. It is therefore proposed to establish as many as 100 'Deen Dayal Upadhyay Centres for Knowledge Acquisition and Up gradation of Skilled Human Abilities and Livelihood (KAUSHAL)' during the XII Plan period. These Centers would take-up the vocational education to new levels and offer courses beyond B.Voc. degree also. These Centres would also embed and follow the guiding principles of NSQF, QPs, and NOSs for their programs and would not focus on skilling alone but also develop entrepreneurship traits. The Centres may endeavor to maintain a pyramidal structure of student enrolment with respect to Diploma, Advanced Diploma, B.Voc. and further studies.

### **Objectives of the Scheme:**

The main objectives of these centers are to:

- a) create skilled manpower for industry requirements at various levels. The scheme provides for vertical mobility from short term certificate courses to full-fledged post graduate degree program, and further research in specialized areas. The courses would be planned/ designed to have provision of multiple entry and exit at various levels culminating up-to a research degree level. These shall also include courses which are offered under the Community College Scheme and B.Voc. degree program of UGC.
- b) Formulate courses at postgraduate level keeping in mind the need of i) Industry in specialized areas; ii) Instructional design, curriculum design and contents in the areas of Skills Development; iii) Pedagogy, assessment for skills development education and training; iv) trained faculty in the areas of skill development; and v) Entrepreneurship; etc.
- c) work for coordination between the higher education system and industry to become a Centre of Excellence for skill development in specialized areas.
- d) network with other such centers and universities and colleges imparting vocational education under the scheme of Community Colleges and B.Voc degree program in their region and coordinate with them for targeted development of skill oriented education.
- e) undertake R&D in the areas related to skill education & development, entrepreneurship, employability, labour market trends etc. at the post-graduate and research level.
- f) act as finishing school by providing supplementary modular training programs so that a learner, irrespective of his/her training background, is made job ready with necessary work skills (soft, communication, ICT skills etc) and fill the gaps in the domain skills measured against QPs/NOSs.
- g) provide for Recognition of Prior Learning (RPL) framework for job roles at NSQF Level 4 onwards by conducting assessment and certification with respective Sector Skill Councils (SSCs) / Directorate General of Employment and Training (DGET).
- h) Maintain 'Labour Market Information' for respective regions in coordination with other government agencies and industry associations.
- i) develop and aggregate curriculum, content and learning materials for skills development in different sectors.

## Basic Principles for Curriculum Design:

While formulating the curriculum under the scheme, the Centers may:

- a) follow credit based semester system;
- b) provide for provision for credit transfer across courses;
- c) ensure alignment of skill component with the QPs/NOSs of the relevant job roles based on the exit profiles of the students. The focus of skill development components should be to equip students with appropriate knowledge, practice and attitude, so as to make them work ready. The skill development components should be relevant to the industries as per their requirements;
- d) provide credits for practical work, apprenticeship, on the job training, and project work;
- e) provide multiple exit and entry points with provision for vertical and horizontal mobility;
- f) assess and certify the skill competence for the selected job roles through the respective SSCs / DGET;
- g) provide credits for general education component and skill component broadly in the ratio of 40 : 60. The general education will also include credits in communication skills, ICT skills, soft skills, critical thinking, problem solving, environmental studies and value education.
- h) review the courses periodically in accordance with the changing requirements of the industry and regional / national economic priorities.
- i) follow UGC guidelines for skill development courses at different levels specified under Community Colleges, B.Voc. degree program and as may be prescribed from time to time.

**Programs and Curricula:** (UGC guidelines for curricular aspects, assessment criteria and credit system in skill based vocational courses under national skills qualification framework (NSQF))

In order to make education relevant and to create 'industry fit' skilled workforce, the institutions recognized under Community Colleges / B.Voc Degree program, and Deen Dayal Upadhyay KAUSHAL Kendras offering skill based courses will have to be in constant dialogue with the industry and respective Sector Skill Council(s) so that they remain updated on the requirements of the workforce for the local economy. There will be credit-based modular programs, wherein banking of credits for skill and general education components shall be permitted so as to enable multiple exit and entry. This would enable the learner to seek employment after any level of Award and join back as and when feasible to upgrade her / his qualification / skill competency either to move higher in her / his job or in the higher educational system. This will also provide the learner an opportunity for vertical mobility to second year of B.Voc degree program after one year diploma and to third year of B.Voc degree program after a two year advanced diploma. The students may further move to masters and research degree programs (NSQF Level 8 – 10)

**Degree of Bachelor of Vocation in  
Pharmaceutical Analysis & Quality Assurance  
(B.Voc. – Pharm. Analysis & QA) Degree Course**

**Ordinance, Regulations and Examination Scheme :**

**O.S. B.Voc.- Pharm. Analysis & QA – 1 :**

**Admission Eligibility:** There may be three types of learners getting admission to first semester of skill based courses under NSQF:

**Category – 1 :** students already acquired NSQF certification Level 4 in a particular industry sector and opted admission in the skill based courses under NSQF in the institutions recognized under Community Colleges / B.Voc Degree program / DDU KAUSHAL Kendras in same trade with job role for which he / she was previously certified at school level.

**Category – 2 :** students who have acquired NSQF certification Level 4 but may like to change their trade and may enter into skill based courses in a different trade.

**Category – 3 :** students passed 10+2 examination with conventional schooling without any background of vocational training.

Candidate who have passed an equivalent examination from any other board or examining body and is seeking admission to the Bachelor of Vocation – Pharm. Analysis & QA (B.Voc.- Pharm. Analysis & QA) course will be required to provide necessary eligibility certificate.

**Lateral Entry :**

Candidate seeking admission directly in third semester of Bachelor of Vocation – Pharm. Analysis & QA (B.Voc.- Pharm. Analysis & QA) must have passed Examination of either Diploma in Chemical Engineering or Diploma in Pharmacy **OR** B.Sc. first year (candidate has to take up Skill Bridge course during semester 3) from any UGC recognized University.

**O.S. B.Voc.- Pharm. Analysis & QA – 2 :**

The duration of the course will be of three full time academic years. No candidate will be allowed to join any other course or service simultaneously. The examination for the Bachelor of Vocation – Pharm. Analysis & QA (B.Voc.- Pharm. Analysis & QA) course will be divided into six semesters.

**Multi-level Exit :**

Candidate will be eligible to receive Diploma(NSQF Level 5) after first 2 semesters and Advance Diploma (NSQF Level 6) after 4 semesters according to guidelines of UGC.

**O.S. B.Voc.- Pharm. Analysis & QA – 3 ::**

Subject to the provisions laid down in Ordinance O.S. B.Voc.- Pharm. Analysis & QA – 2, a candidate who has passed the B. Voc. semester I & II/ B. Voc. semester III & IV of this University and if there is a break in the studies for any reason and if there is a change in the courses from semester system to annual part Examination system, the candidate will be admitted to B.Voc. Part II / B.Voc. Part III and the marks/ credits obtained by the candidate in his previous examination of this University in B.Voc. semester I and II will be carried forward and the result of the B.Voc. Second/ Final Examination will be declared accordingly.

**O.S. B.Voc.- Pharm. Analysis & QA – 4 :**

No candidate will be admitted to any semester examination for Bachelor of Vocation – Pharm. Analysis & QA (B.Voc.- Pharm. Analysis & QA) unless a student has put on at least 80% of the total lecture periods and practical periods in each subject in each semester.

**O.S. B.Voc.- Pharm. Analysis & QA – 5 :**

No candidate will be permitted to reappear at any semester examination, which he has already passed. The marks of successfully completed paper will be carrying forwarded for the award of class.

**O.S. B.Voc.- Pharm. Analysis & QA – 6 :**

There shall be an examination at the end of each semester to be known as Pre Diploma (first semester) examination, Diploma (second semester-NSQF Level-5) examination, Pre Advanced Diploma (third semester) examination, Advanced Diploma (fourth semester-NSQF Level-6) examination, Pre B.Voc. Degree (fifth semester) examination and B.Voc. Degree (sixth semester-NSQF Level-7) examination. At which a student shall appear in that portion of theory papers, practical and viva – voce if any, for which he has kept the semester in accordance with the regulations in this behalf.

A candidate whose term is not granted for what so ever reason shall be required to keep attendance for that semester or term when the relevant papers are actually taken at the college.

**O.S. B.Voc.- Pharm. Analysis & QA – 7 :**

Guidelines to keep term of B.Voc. Pharm. Analysis & QA;

A candidate will be permitted to continue his/her study up to the 4<sup>th</sup> semester examination without passing his/her previous semester examination.

A candidate can take admission to fifth (pre-ultimate) semester if he/she is failing in NOT more than two subjects of previous (1 to 4) semesters.

A candidate can take admission to Sixth (Ultimate/Final) Semester if he/she is not failing in more than two subjects of 5<sup>th</sup> Semester. Provided he/she should have cleared all 1 to 4 semester.

## **R.S.B.Voc.- Pharm. Analysis & QA**

### **Standard of Passing**

The standard of passing for Bachelor of Vocation – Pharm. Analysis & QA (B.Voc.- Pharm. Analysis & QA) degree examination will be as under :

- 1) To pass any semester examination of the Bachelor of Vocation – Pharm. Analysis & QA (B.Voc.- Pharm. Analysis & QA) degree, a candidate must obtain at least 40% marks in the University examination separately in each course of theory and practical.
- 2) Total marks of each theory paper are 100 (External examination 70 marks + Internal examination 30 marks)
- 3) No internal examination marks in practical and project-viva papers.
- 4) Total marks of Entrepreneurship Development & Soft skill Training is 100. This subject will be evaluated either orally &/or practically on the basis of Project report submitted by the student.
- 5) Those of the successful candidates who obtain 50% or more marks in the aggregate of all the semester taken together will be placed in the Second class and those who obtain 60% or more marks in the aggregate of all the semester taken together will be placed in the First class. The successful candidates who obtain 70% or more marks in the aggregate of all the semester taken together will be declared to have passed the examination in the First class with Distinction.
- 6) A result of candidate who have obtained admission directly in Bachelor of Vocation – Pharm. Analysis & QA (B.Voc.- Pharm. Analysis & QA) semester – III will be declared by considering his marks of semester III to VI in aggregate and accordingly class will be awarded as per normal percentage of marks fixed for other candidate.

## B.Voc. Pharm. Analysis & QA

Name of the Program(s) (Diploma, Adv. Diploma, Degree)	Semesters	No. of Credits <b>30 Cr./Sem</b>	Job Roles and <b>NSQF</b> -Levels
Diploma in <b>Laboratory Techniques in Chemistry</b>	1	60 Credits	<b>NSQF Level 5</b> Supervisor
	2		
Advance Diploma in <b>Analytical Chemistry</b>	3	60 Credits	<b>NSQF Level 6</b> Technician / Trainer
	4		
B.Voc. in <b>Pharm. Analysis &amp; Quality Assurance</b>	5	60 Credits	<b>NSQF Level 7</b> B.Voc. Graduate
	6		

*Note: A student has to earn additional 1 credit per year for Universal Human Value Education Course.*



**B.Voc.- Pharmaceutical Analysis & QA  
Semester-I**

S.N.	Paper No.	Subject	Credit	Marks
1	BVPAQA-101	Pharmaceutical Inorganic Chemistry	3	100
2	BVPAQA-102	Unit Operations- I	3	100
3	BVPAQA-103	Fundamental Analytical chemistry (PA-I)	3	100
4	BVPAQA-104	Functional English & OAT-I	3	100
5	BVPAQA-105	Practical 1, 2, 3 & 4(OAT)	18	300
<b>Total Credit Semester-I</b>			<b>30</b>	<b>700</b>

**B.Voc.- Pharmaceutical Analysis & QA  
Semester-II**

S.N.	Paper No.	Subject	Credit	Marks
1	BVPAQA-201	Pharmaceutical Analysis (PA-II)	3	100
2	BVPAQA-202	Pharmaceutical Physical Chemistry	3	100
3	BVPAQA-203	Industrial Hazards, Safety and GLP	3	100
4	BVPAQA-204	Functional English & OAT-II	3	100
5	BVPAQA-205	Training/Project Report	3	150
6	BVPAQA-206	Practical 1, 2 & 4(OAT)	15	250
<b>Total Credit Semester-II</b>			<b>30</b>	<b>800</b>

**B.Voc.- Pharmaceutical Analysis & QA  
Semester-III**

S.N.	Paper No.	Subject	Credit	Marks
1	BVPAQA-301	Industrial Analysis	3	100
2	BVPAQA-302	Fundamental Biochemistry	3	100
3	BVPAQA-303	Pharmaceutical organic Chemistry- I	3	100
4	BVPAQA-304	Unit Operations- II	3	100
5	BVPAQA-305	Practical 1, 2, 3 & 4	18	300
<b>Total Credit Semester-III</b>			<b>30</b>	<b>700</b>

**B.Voc.- Pharmaceutical Analysis & QA  
Semester-IV**

S.N.	Paper No.	Subject	Credit	Marks
1	BVPAQA-401	Pharmaceutical Engineering	3	100
2	BVPAQA-402	Food & Beverages Analysis	3	100
3	BVPAQA-403	Pharmaceutical organic Chemistry- II	3	100
4	BVPAQA-404	Pharmaceutical Technology-I	3	100
5	BVPAQA-405	Training/Project Report	3	150
6	BVPAQA-406	Practical 1, 2, 3 & 4	15	250
<b>Total Credit Semester-IV</b>			<b>30</b>	<b>800</b>

**B.Voc.- Pharmaceutical Analysis & QA  
Semester-V**

<b>S.N.</b>	<b>Paper No.</b>	<b>Subject</b>	<b>Credit</b>	<b>Marks</b>
1	BVPAQA-501	Spectroscopy	3	100
2	BVPAQA-502	Medicinal Chemistry-I	3	100
3	BVPAQA-503	Pharmaceutical Technology -II	3	100
4	BVPAQA-504	Chemistry of Natural Products	3	100
5	BVPAQA-505	Practicals-1, 2, 3 & 4	18	300
<b>Total Credit Semester-V</b>			<b>30</b>	<b>700</b>

**B.Voc.- Pharmaceutical Analysis & QA  
Semester-VI**

<b>S.N.</b>	<b>Paper No.</b>	<b>Subject</b>	<b>Credit</b>	<b>Marks</b>
1	BVPAQA-601	Chromatographic Techniques	3	100
2	BVPAQA-602	Medicinal Chemistry-II	3	100
3	BVPAQA-603	QC & QA	3	100
4	BVPAQA-604	Entrepreneurship Development & Soft skill Training	3	100
5	BVPAQA-605	Training/Project Report	3	150
6	BVPAQA-606	Practicals-1, 2 & 3	15	250
<b>Total Credit Semester-VI</b>			<b>30</b>	<b>800</b>

**Saurashtra University**  
**B. Voc. Pharm. Analysis & QA**  
**SEMESTER I**

**BVPAQA-101: Pharmaceutical Inorganic Chemistry**

1. **Introduction** to Pharmaceutical Chemistry and pharmacopeia.
2. **Impurities in Pharmaceuticals:** Sources of impurities, tests for purity and Identity, limit tests for iron, arsenic, lead, heavy metals, chloride, sulphate
3. **Inorganic pharmaceuticals included in the current pharmacopoeia: An outline of method of preparation, uses, special tests if any of the following class:**
  - **Acids and Bases:** Buffers, Waters
  - **Gastrointestinal agents:** Acidifying agents, Antacids, Protective and adsorbents, Cathartics.
  - **Major cellular electrolytes (Intra and extra):** Physiological ions, electrolytes used for replacement therapy, acids-base balance and combination therapy
  - **Essential and trace elements:** Transition elements and their compounds of pharmaceutical importance: Iron and haematinics, mineral supplements
  - **Topical agents:** Protective, Astringents and Anti-infectives
  - **Gases and Vapours:** Oxygen and Respiratory Stimulants.
  - **Dental products:** Dentifrices, Anti-carries agents. Complexing and Chelating agents used in therapy.
  - **Miscellaneous agents:** Sclerosing agents, Expectorants, Emetics, poisons and Anti-dotes, Sedatives etc.
  - **Pharmaceutical Aids:** Anti-oxidants, preservatives, Filter aids, Adsorbents, Diluents,

**Books Recommended:**

1. Inorganic Medicinal and Pharmaceutical Chemistry : J. H. Block, E. B. Roche, T. O. Soine, C. O. Wilson, Varghese Publishing House, First Indian Reprint, 1986.
2. Bentley and Driver's Textbook of Pharmaceutical Chemistry: Revised by L. M. Atherden, Oxford University Press, 8th Ed. 1969.
3. The Indian Pharmacopoeia, Latest Edition, Controller of Publications, Delhi.
4. Practical Pharmaceutical Chemistry edited by A. H. Beckett, J. B. Stenlake, CBS Publishers, and First Indian edition 1987.
5. Vogel's Qualitative Inorganic Analysis Revised by G. Svehla, Longman Gr. Ltd., 7th Ed.1996.

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**B. Voc. Pharmaceutical Analysis & QA**  
**SEMESTER I**

**BVPAQA-102: Unit Operations-I**

**1. Sedimentation:**

Introduction, mechanism of settling, Laboratory batch settling test, the thickener, door thickener, settling zones in continuous thickeners

**2. Humidification:**

Definition-Saturated gas, Relative humidity, Percentage humidity, Humid heat, Humid volume, Dew point, Total enthalpy, Adiabatic saturation temperature, Wet bulb temperature, Measurement of humidity from humidity chart, Constructional details and working of Humidifier's, Dehumidifier's

**3. Heat exchangers:**

Construction and Working of Shell & tube type heat exchangers, finned tube exchanger, Plate type heat exchangers.

**4. Transport Equipments:**

Fans, Blowers, Compressors, Reciprocating pump, Centrifugal pumps, Gear pumps.

**5. Utilities in Industry:**

Fuel: Types of fuels – advantages and disadvantages. Combustions of fuels, Calorific value, Specifications of fuel oil.

Water: Specifications for Industrial use, various water treatments.

**6. Boilers:**

Types of boilers and their functioning, Steam generation and uses, Specifications of air and its industrial use, Processing of air

**Reference Book:**

1. Industrial Chemistry, Regregel, Reinhold Publication.
2. Unit Operations in chemical Engineering, McCabe & Smith, McGraw Hill Book Comp.
3. Unit Operations I & II, D.D. Kale Pune Vidyarthigriha Prakashan-Pune.
4. Chemical Engineer Hand Book, J. H. Perry, McGraw Hill Book Comp.
5. Introduction to Chemical Engineering, Badger Banchemo McGraw Hill Comp.
6. Fuels & Combustion by Samir Sarkar
7. Engineering Chemistry by S.S. Dara.

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**SEMESTER I**

**BVPAQA-103: Fundamental Analytical Chemistry**

**1. Basics of drugs and formulation analysis :**

- Weights, balances, importance of analysis, quality control and quality assurance, analytical methods (classification, validation parameters), requirements –chemicals (types, purification, checking purity), glass wares (types, calibration, cleaning), sampling techniques, sampling error minimization. Units of concentrations. Errors science, errors minimization.

**2. Volumetric analysis (Titrimetric analysis)**

**Acid-base titrations:**

- Relative strength and its effect on titration, common ion effect, pH, Henderson- Hesselbach equation, buffers, neutralization curve, acid bas indicators, theory of indicators, back titrations, biphasic titrations, pharmacopoeial applications, hydrolysis of salts, ionic products of water and law of mass action.

**Redox titrations:**

- Theory of redox titrations, redox indicators, types of redox titrations, iodometry, cerrimetry, mercury metry, diazotization nitrite titrations, 2,6-dichlorophenol, indophenol titrations, titration curve and calculations of potentials during course of titrations.

**Argentometric or precipitation titrations:**

- Mohrs, Fajans and Volhard methods

**Nonaqueous titrations:**

- Nonaqueous solvents, titrants and indicators. Differentiating and levelling solvents.
- **Complexometric titrations:** Theory of the titrations, titrant, indicators and pharmacopoeial applications.
- **Miscellaneous titrations:** Karl-Fischer titrations, Kjeldahl method.

**3. Gravimetric analysis :**

Stability, solubility products, types of precipitations, precipitation techniques, Pharmacopoeial applications

**Reference Book:**

1. Pharmacopoeia: USP, B.P., I.P.
2. Practical Pharm. Chemistry, Vol. I – Backett, The athlone Press of University of London.
3. Fundamentals of Analytical Chemistry – Skoog, Harcourt College Publishers.
4. Quantitative chemical analysis – Vogel A. I., Pearson Education.
5. Text Book of Pharmaceutical Analsys – K. A. Connor, John Willey & Sons, NY.
6. Quantitative Chemical Analysis – Ayer by Harper & Row, New York.

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**SEMESTER I**

**BVPAQA -104: Functional English & Office Automation Tool (OAT)-1**

**A. Functional English-1**

**Grammar**

**1. Determiners**

**2. Tenses:** Defining a Verb, Chief forms of a Verb, Tense and Time, Further Division The Present Tense, The Past Tense, The Future Tense

**3. Active – Passive Voice:** Introduction, Defining the Voice, Some General rules regarding the change of voice

**4. Modals & Auxiliaries:** Introduction to Auxiliaries, The Primary Auxiliaries, Introduction to Modals, The Most Commonly used Modals, Important points about the Modals, Modals and Their Uses, prepositions / Prepositional Phrases

**Writing Comprehension**

**1. Business Letters:** Introduction, Functions of a Business Letter, Inward Structure / Layout of a Business Letter, Other Important Parts of Business Letter, Outward appearance of a business letter, Arrangement Style, Salient Features of a Business Letter, Legal Aspects of a business Letters, Kinds of Business Letter, Inquiry & Reply Order & Reply Cancellation of order Complaint / Adjustment Sales Letter

**2. Report Writing:** Introduction, The Nature of a Report, The P's of an Effective Report

**3. Functions of a Report, Preparing a Report, Types of Reports, Business report, Press report**

**4. Job Application / Resume Writing.** Introduction, A Cover Letter, Curriculum Vitae / Resume, Letters of Appointment & Resignation.

**B. Office Automation Tools-OAT-1**

**1. Introduction to MS Word:**

Introduction to word, the word window, Create a new document, Save, open and print document, Editing document, Formatting a Document, Insert elements to word document (Insert and delete page break, Insert page numbers, Insert symbols, Insert Shapes, Clip art, Insert picture, resize and reposition a picture), Changing Layout of document ( Adjust page margin & page size, Change page orientation, Set and change indention, Insert and clear tabs), Working with Tables (Insert a table, Navigate and select text in a table, Resize

parts of a table. Align text in a table, Format a table, Insert and delete columns and rows, Borders and shading, Merge table cells), Mail Merge, Spelling and grammar check, Auto correct

## **2. Internet:**

Introduction to Internet, Use of Internet, Applications of Internet, World wide web (web page, web site, web client and web server), Web browsers, Search engines, Email, Blogs and forums, Social media and chatting, Bookmarks, Internet Search, Basic search, Tips and Tricks for search, How to download and upload?

### **Reference Book:**

1. Windows-98 6 in 1 Practice Hall Publications.
2. BC of Word 97 by BPB Publication.
3. Computer Fundamentals P.K. Sinha by BPB Publication.
4. Internet-An Introduction, TATA McGraw Hill Publication.
5. High School English Grammar and Composition , Wren & Martin
6. Anthology of English language and communication skills, Sharma S R, Jacob John
7. Handbook of practical communication skills, Jaico Publication
8. Language and communication skills, Shastri, Rameshchandra

## **B. Voc. Pharmaceutical Analysis & QA SEMESTER I**

### **LABORATORY COURSE**

### **BVPAQA-105 PRACTICAL**

**Laboratory course of B.Voc -Pharm. Analysis & QA includes practical based on following subjects.**

- Pharmaceutical Inorganic Chemistry
- Unit Operations-I
- Fundamental Analytical Chemistry
- Office Automation Tool (OAT)-1

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**SEMESTER II**

**BVPAQA-201: Pharmaceutical Analysis**

1. **Basics of instrumental analytical methods:** Advantages, limitations, validation, signal to noise ratio.
2. **Electro-analytical methods:** Basics of electro-analytical methods
  - **Conductometry:** Conductance, factors affecting conductance, Kohlrausch law, conductivity cells, applications
  - **Potential and pH metric methods:** Standard reduction potentials, various electrodes, electrodes and cell potential, applications of potentiometry and pH metry.
3. **Polarography & amperometry:** Basics of current flow in polarography, dropping mercury electrode, diffusion current, half wave potential, modifications like pulsed and differential pulse polarography, amperometric titrations.
4. **Polarimetry:** Polarimeter, qualitative and quantitative applications

**Reference Books**

1. Pharmacopoeia: IP, BP, USP.
2. Practical Pharm. Chemistry, Vol. I – Backett, The athlone Press of University of London.
3. Fundamentals of Analytical Chemistry – Skoog, Harcourt College Publishers.
4. Quantitative chemical analysis – Vogel A. I., Pearson Education.
5. Text Book of Pharmaceutical Analysis – K. A. Connor, John Willey & Sons, New York.
6. Textbook of Pharmaceutical Analysis – J. W. Munson, Marcel Dekker Inc., New York.



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**SEMESTER II**

**BVPAQA-202: Pharmaceutical Physical Chemistry**

1. **The liquid state:** Physical properties surface tension, parachor, viscosity, refractive index, optical rotation, dipole moment of chemical constituents.
2. **Solutions:** Ideal and real solutions, solutions of gases in liquids, colligative properties, partition co-efficient, conductance and its measurement, Debye-Huckel theory.
3. **Thermodynamics:** Basic principles, First, Second and third laws, Zeroth Law, absolute temperature scale, thermo chemical equations, phase equilibria and phase rule, One and two component systems.
4. **Adsorption:** Basic principles, Freundlich and Gibbs adsorption isotherms, Langmuir theory of adsorption.
5. **Chemical kinetics:** Zero, first and second orders reactions, complex reaction, theories of reaction kinetics, characteristics of homogeneous and heterogeneous catalysts, acid-base enzyme catalysis.

**Reference Books**

1. Text book of Physical Chemistry: Samuel Glasstone, Macmillan India Limited, 2nd Ed. 1995.
2. Elements of Physical Chemistry; Peter Atkins, Julio de paula, Oxford University Press, 4th Ed. 2007.
3. Essentials of Physical Chemistry: Arun Bahl, B.S. Bahl, G.D. Tuli, S Chand & Co Ltd, 26th Ed. 2009.
4. Schaum's Outline of Theory and Problems of Physical Chemistry: Clyde R. Metz, Tata McGraw-Hill Publishing Company Ltd., New Delhi. 2nd Ed. 2004.
5. Physical Chemistry: Keith J. Laidler, John H. Meiser, CBS Publishers & Distributors, New Delhi. 2nd Ed. 2006.

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**SEMESTER II**

**BVPAQA-203: Industrial Hazards, Safety and GLP**

1. **Industrial hazards and safety:** Introduction, Principles of safety, Importance of Industrial safety, role of safety department, Safety committee and Function.
2. **Hazards due to harmful chemicals :** Chemical Safety, Dangerous properties of chemicals, major factors to be considered for safety due to chemicals, effect of chemicals on human body, Storage and handling of hazardous substances.
3. **Control of hazards in an industry:**  
  
Plant layout for safety considerations, Ventilation, Engineering control of chemical plants hazards, Color codes for a safety, Oxygen booth, Smoking Booth, Water wash shower.
4. **Hazards due to Fire and explosion:** Introduction of fire and explosion hazards, General causes and classification of fire, various types of fire extinguishers, extinguishing methods.
5. **Personal Protective Equipments:** Introduction, Legal Requirements, Selection Guideline, Training of use of PPE, Personal protective devices for head, ear, face, eye, foot, knee and body protection, Respiratory personal protective devices.
6. **GLP:** History of GLP, What is GLP, Fundamental points of GLP, Quality Assurance, Study Plans, SOPs, Inspection of Instrument, Understanding of receipt, handling, sampling and storage of chemicals, MSDS

**Reference Books**

- 1) Industrial Hazards and Plant Safety, By Sanjoy Banerjee, Taylor & Francis Group
- 2) Industrial Hazard and Safety Handbook: (Revised impression), Ralph W King, John Magid, Butterworth Scientific Publisher.
- 3) Handbook Good Laboratory Practices, Quality Practices for regulated non-clinical research and development, 2<sup>nd</sup> Edition.
- 4) Good Laboratory Practices by Jurg P. Seiler, Springer, ISBN-13:978-3-642-86880-1,
- 5) Hazardous Chemicals: Safety Management and Global Regulations By T.S.S. Dikshith, CRC Press, Taylor & Francis Group.

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**BVPAQA -204: Functional English & Office Automation Tool (OAT)-2**

**A. Functional English-2**

**1. Conversation Skills**

Conversations based on everyday situation / Dialogue, Writing, Introduction, Nature of Conversations, Purpose of conversation, Guidelines for Effective Conversation Skills, Proverbs used in Everyday Conversation with their Meanings / Explanations, Comparisons used in Everyday Conversation, Practical Conversations

**2. Communication Skills**

Communication – Meaning, Features & Process, Verbal & Non – Verbal comm., Verbal, Oral Communication, Written Communication, Non – Verbal, Body language, Space, Para language, Others, Group discussion skills: Meaning, Characteristic, Do's & Don'ts, Relevance, Moderating a group discussion, Presentation skills: Meaning, Planning a presentation skills, Preparing a presentation skills, Delivering a presentation skills, Presentation skills, Public Speaking: Meaning, Essential of effective public speaking, Facing Interviews: Importance, Do's & Don'ts

**B. Office Automation Tools- OAT-2**

**1. Spread Sheet Using MS Excel**

Sheet Introduction, Selecting row, column, cell, Inserting and deleting row, column, cell

Hide & unhide row & column, Changing height and width of row and column, Print Preview and Page Layout, Formula bar, Cell Referencing - Relative, Absolute, Mixed

Useful functions from Function Library, What if Analysis, Calculative Examples like salary sheet, mark sheet etc., Conditional formatting, Data sorting and Filter, Types of different chart & editing charts

**2. Presentation Using MS Power Point**

Inserting new slide, Different layout of slide, Inserting date, slide number, movie, sound, object, header and footer, Designing slide, Theme and background, Custom animation, Slide transition, Rehearse timings, Slide show, Setup slide show, Hide slide, Different views of slide, Use of slide master, Printing handout, slide, etc

### **Reference Books**

1. Windows-98 6 in 1 Practice Hall Publications.
2. BC of Word 97 by BPB Publication.
3. ABC of Excel by BPB Publication.
4. Computer Fundamentals P.K. Sinha by BPB Publication.
5. High School English Grammar and Composition , Wren & Martin
6. Anthology of English language and communication skills, Sharma S R, Jacob John
7. Handbook of practical communication skills, Jaico Publication
8. Language and communication skills, Shastri, Rameshchandra

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**BVPAQA-205: Training / Project Report**

**Training / Project Report based on following subjects:**

- Pharmaceutical Analysis
- Unit Operations in Pharmaceutical Industries
- Pharmaceutical Inorganic/Physical Chemistry
- Industrial Hazards, Safety and GLP

**B. Voc. Pharmaceutical Analysis & QA**  
**SEMESTER II**

**LABORATORY COURSE**

**BVPAQA-206 PRACTICAL**

**Laboratory course of B.Voc - Pharm. Analysis & QA includes practical based on following subjects.**

- Pharmaceutical Analysis
- Pharmaceutical Physical Chemistry
- Office Automation Tool (OAT)-2

## B. Voc. Pharmaceutical Analysis & QA

SEMESTER END UNIVERSITY EXAMINATION

THEORY QUESTION PAPER STYLE- Semester I & II

Time: 2:30 hrs

Theory- Total Marks-70

Que.:1 Objective type Q & A

- 30 Marks

SN	Type	No. of Que.	Weightage	Marks
I	MCQs	10	1 mark	10
II	MCQs	10	2 marks	20
<b>Total</b>				<b>30 marks</b>

Que.:2 Subjective type Q & A

- 20 Marks

Any **Four** out of Six Questions - Each carrying **5 marks**- Total- 20 marks

Que.:3 Subjective type Q & A

- 20 Marks

Any **Four** out of Six Questions - Each carrying **5 marks**- Total- 20 marks

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PRACTICAL - Semester I	PRACTICAL - Semester II
Days: 02 Time: 6 hrs/day	Days: 03 Time: 6 hrs/day
Practical - 250 Marks Viva voce - 50 Marks	Practical - 200 Marks Viva voce - 50 Marks
	Training Report or Project Report - 100 marks Viva voce - 50 Marks

## **B. Voc. Pharmaceutical Analysis & QA**

### **INTERNAL EVALUATION - THEORY**

**Semester I & II**

**Marks per Paper 30 marks**

<b>SN</b>	<b>Detail</b>	<b>Marks</b>
1	MCQ – Objective test	10
2	Attendance & Theoretical Assignment/ Seminar	10
3	Theoretical &/or Practical Assignment	10
<b>Total</b>		<b>30 marks</b>

**No Internal Evaluation for Practical & Project/Training Components**