SHIVAJI UNIVERSITY KOLHAPUR

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With 3.52

Faculty of Interdisciplinary Studies
Structure, Scheme and Syllabus for
Bachelor of Vocation (B. Voc.)

Chemical & Petrochemicals / Chemical Technology

Part I- Sem. I & II

Syllabus to be implemented from June 2022

As Per National Education Policy 2020

SHIVAJI UNIVERSITY, KOLHAPUR

STRUCTUCTURE AND SYLLABUS OF B.VOC.

Bachelor of Vocation (B.Voc.) – Chemical & Petrochemicals / Chemical Technology

TITLE : B.Voc.(Chemical and Petrochemicals / Chemical Technology) Syllabus (Semester Pattern) Under Faculty of Interdisciplinary Studies

YEAR OF IMPLEMENTATION : Syllabus will be implemented from June 2022

DURATION : B. Voc. Part I, II and III (Three Years)
B. Voc. Part I - Diploma (One Year)
B. Voc. Part II - Advanced Diploma (Second Year)
B. Voc. Part III – Degree (Third Year)

PATTERN OF EXAMINATION : Semester Pattern

- **Theory Examination**–At the end of semester as per Shivaji University Rules
- **Practical Examination**– i) In the1st,3rd and 5th semester of B.Voc. there will be internal assessment of practical record, related report submission and project reports at the end of semester.
  ii) In the second semester of B. Voc. I, there will be internal practical examination at the end of semester.
  iii) In the 4th and 6th semester of B. Voc. there will be external practical examination at the end of semester.

MEDIUM OF INSTRUCTION : English

STRUCTURE OF COURSE : B. Voc. Part – I, II and III
Two Semester Per Year
Two General Papers per year / semester Three
Vocational Papers per Year / Semester Three
Practical papers per Year / Semester
One Project / Industry Visit/ Study Tour / Survey

SCHEME OF EXAMINATION

A) THEORY

- The theory examination shall be at the end of the each semester.
- All the general theory papers shall carry 40 marks and all vocational theory papers shall carry 50 marks.
- Evaluation of the performance of the students in theory shall be on the basis of semester examination as mentioned above.
- Question paper will be set in the view of entire syllabus preferably covering each unit of the syllabus.

- **Nature of question paper for Theory examination** (Excluding Business Communication Paper)–

i. There will be seven questions carrying equal marks.
ii. Students will have to solve any five questions.

Q. No. 1 : Multiple Choice Question (Ten Question)
Q. No. 2 : Short answer type question with internal choice (Five out of Seven)
Q. No. 3 : Long answer type questions (Five out of Seven)
Q. No. 4 : Short Notes with internal choice (Two out of Three)

B) PRACTICAL

Evaluation of the performance of the students in practical shall be on the basis of semester examination (Internal assessment at the end of Semester I, II and III and V and external examination at the end of Semester IV and VI as mentioned separately in each paper.

Standard of Passing :

As per the guidelines and rules for B. Voc. (Attached Separately – Annexure I)

Eligibility Criteria:

1. The Eligibility for admission is 10+02 or equivalent, in any stream (Arts/ Commerce/ Science) from any recognized board or University.
2. The candidates after with 10+02 year ITI course/ in any branch / trade also eligible for course.
3. The candidates graduate from any faculty or engineering degree / diploma holders are also eligible.

Structure of the Course
B. Voc. – I (Diploma) Semester – I

Sr. No	Paper No.	Title	Theory /Practical /Project	Marks	Distribution of Marks		Credits	
					Theory	Practical	Theory	Practical
1	**I**	**General Education Components**						
2	**BVT101**	Business Communication (I)	Theory /Practical	50	40	10	3	
3	**II**	**Skill Development Components**						
4	**BVT102**	Fundamental Chemistry (I)	Theory	50	50	--	3	
5	**BVT103**	Fundamental Industrial Chemistry (I)	Theory	50	50	--	3	
6	**BVT104**	Elementary Physics & Mathematics	Theory	50	50	--	3	
7	**III**	**Laboratory Work**						
8	**BVP101**	General Practical of Chemistry	Practical	50	--	50		4
9	**BVP102**	Laboratory Work : Fundamental Chemistry (I)	Practical	50	--	50		4
10	**BVP103**	Laboratory Work: Fundamental Industrial Chemistry (I)	Practical	50	--	50		4
11	**BVP104**	Laboratory Work : Elementary Physics	Practical	50		50		4
12	**IV**	**Field Work**						
13		Project / Seminar	-	50	--	50		2
14	**V**	**Non Credit Courses**						
15		Democracy, Elections and Good Governance	Theory	50	50	--	--	--
		Total Marks and Credit for Semester-I		450			30	

General Education Components: The subject (Department/Discipline) in which a student takes admission.
Skill Development Components: The subject closely related to a student's major subject
Non Credi Courses: Six courses are of general nature and are compulsory

Structure of the Course
B. Voc. – I (Diploma) Semester – II

Sr. No.	Paper No.	Title	Theory /Practical /Project	Marks	Distribution of Marks		Credits	
					Theory	Practical	Theory	Practical
1	**I**	**General Education Components**						
2	**BVT201**	Business Communication (II)	Theory /Practical	50	50		3	
3	**II**	**Skill Development Components**						
4	**BVT202**	Analytical and Electrochemistry	Theory	50	50	--	3	
5	**BVT203**	Chemistry of Surfactants	Theory	50	50	--	3	
6	**BVT204**	Surface Coating Techniques	Theory	50	50	--	3	
7	**III**	**Laboratory Work**						
8	**BVP201**	Laboratory Work : Analytical Chemistry	Practical		--	50		4
9	**BVP202**	Laboratory Work: Electrochemistry	Practical		--	50		4
10	**BVP203**	Laboratory Work : Chemistry of Surfactants	Practical		--	50		4
11	**BVP204**	Laboratory Work : Surface Coating Techniques	Practical		--	50		4
12	**IV**	**Industrial Visit**	-		--	50		2
13	**V**	**Non Credit Courses**						
14		E-Banking and Financial Services	Theory	50	50	--	--	--
15		**Total Marks and Credit for Semester-II**		450			30	

General Education Components: The subject (Department/Discipline) in which a student takes admission**.**
Skill Development Components: The subject closely related to a student's major subject
Non Credit Courses: Six courses are of general nature and are compulsory

Theory and Practical Workload of the Course
B. Voc. – I (Diploma) Semester – I

Scheme of Teaching: B. Voc. – Part I (Diploma) Semester – I

Sr. No.	Paper No.	Title	Distribution of Workload (Per Week)		
			Theory	Practical	Total
1	**BVT101**	Business Communication (I)	3	--	3
2	**BVT102**	Fundamental Chemistry (I)	3	-	3
3	**BVT103**	Fundamental Industrial Chemistry (I)	3	-	3
4	**BVT104**	Elementary Physics and Mathematics	3	--	3
5	**BVP101**	Laboratory Work : General Practical in Chemistry		5	5
6	**BVP102**	Laboratory Work : Fundamental Chemistry (I)	-	5	5
7	**BVP103**	Laboratory Work: Fundamental Industrial Chemistry (I)	-	5	5
8	**BVP104**	Laboratory Work : Elementary Physics and Mathematics	-	5	5
9		Project	-	-	-
		Total --	**12**	**20**	**32**

Scheme of Teaching: B. Voc. – Part I (Diploma) Semester – II

Sr. No.	Paper No.	Title	Distribution of Workload (Per Week)		
			Theory	Practical	Total
1	**BVT201**	Business Communication-(II)	3	-	3
2	**BVT202**	Analytical & Electrochemistry	3	-	3
3	**BVT203**	Chemistry of Surfactants	3	-	3
4	**BVT204**	Surface Coating Techniques	3	-	3
5	**BVP201**	Laboratory Work : Analytical Chemistry	-	5	5
6	**BVP202**	Laboratory Work: Electrochemistry	-	5	5
7	**BVP203**	Laboratory Work : Chemistry of Surfactants	-	5	5
8	**BVP204**	Laboratory Work : Surface Coating Techniques		5	
9		Study Tour	-	-	-
		Total-	**12**	**20**	**32**

Eligibility for Admission **:** 10 + 2 from any faculty or equivalent Diploma /Advanced Diploma in any related stream.

Eligibility for Faculty : 1) M. Sc. / M.Tech Chemistry/ Chemical Technology with NET / SET/Ph.D.
2) M. A (English) with NET/SET for Functional English & Office Automation Tools

Eligibility for Laboratory Assistant : B.Sc.(Chemistry) / Diploma in Chemical Technology

Staffing Pattern:

Teaching:

In 1st Year of B. Voc. - 1 Full Time and 1 Part Time Lecturer and 1 CHB Lecturer for Business Communication
In 2nd Year of B. Voc.–Total requireent of faculty (Inclusive of 1st Year) will be 3 Full time and 1CHB Lecturer for Financial Accounting 1 CHB Lecturer for Business Communication
In 3rd Year of B.Voc.–Total requireent of faculty (Inclusive of 1st & 2nd Year) will be 4 Full time and 1 part time and 1 CHB Lecturer for Business Communication

Lab Assistant: **For 1st Year of B. Voc. - 1 Part time**

For 2nd and 3rd Year (Inclusive of 1st Year) of B. Voc. – 1 Full Time

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SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper – BVT101: Business Communication-I

Units Prescribed for Theory: **50 Marks.**

Unit1: Use of English in Business Environment Topics:

Business Vocabulary: Vocabulary for banking, marketing and for maintaining public relations
What is a sentence?
Elements of a sentence
Types of sentence: Simple, compound, complex

Unit 2: Writing a Letter of Application and CV/Resume

Topics:
Structure of a letter of application for various posts
CV/ Resume and its essentials

Unit 3: Presenting Information/Data

Topics:
Presenting information / data using graphics like tables, pie charts, tree diagrams, bar diagrams, graphs, flow charts

Unit 4: Interview Technique

Topics:
Dos and don'ts of an interview
preparing for an interview
Presenting documents
Language used in an interview

Reference Books:

1. Sethi, Anjanee & Bhavana Adhikari. Business Communication. New Delhi: Tata Mc Graw Hill Tickoo, Champa & Jaya Sasikumar. Writing with a Purpose. New York: OUP, 1979.
2. Sonie, Subhash C. Mastering the Art of Effective Business Communication. New Delhi: Student Aid Publication,2008.
3. Herekar, Praksh. Business Communication. Pune: Mehta Publications, 2007.
4. Herekar, Praksh. Principals of Business Communication. Pune: Mehta Publications, 2003.
5. Rai, Urmila & S.M. Rai. Business Communication. Himalaya Publishing House, 2007.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper – BVT102: Fundamental Chemistry (I)

Objectives: **50 Marks**

To study fundamentals of various branches of Chemistry.

Unit I: IUPAC Nomenclature of organic compounds, Chemistry of alkanes, alkenes and alkynes, Haloalkanes, Alcohols, Aldehydes and ketones, Carbon acids, Carboxylic acids and derivatives

Unit II: Chemical kinetics, Thermodynamics of surfaces , Liquid- liquid and solid liquid interfaces, Surfactants, Disperse systems

Unit III: Ionic, Covalent and Polar Bonds, Functional groups, Inductive effect, resonance and hyper conjugation. Bronsted-Lowry acid and bases, strengths of acid and bases, buffer solution, PH, Indicators, Lewis acid and bases, acidic and basic oxides.

Unit IV: Theory of Qualitative organic analysis: Preliminary test, element determination test, functional group test, derivation Mole concept, composition relationship and Stoichiometry.

Reference Books:

1. Organic Chemistry, L.G. Wade Jr, Pearson Education
2. Organic Chemistry, T.W.G. Solomons, C.B. Fryhle, John Wiley and Sons Inc
3. Organic Chemistry, J. McMurry, Brooks/Cole
4. Organic Chemistry, Paula Y. Bruice, Pearson Education
5. Introduction to colloid and surface chemistry – D.J.shaw, Butterworth publications
6. Surfaces interfaces and colloids- Drew Myers- Wiley VCH
7. Surfactants and interfacial phenomena- Milton J Rosen – Wiley Interscience
8. Industrial utilization of surfactants principles and applications – M.J. Rosen and M Dahanayake,
9. AOCS Press
10. Foundations of Colloid science – Robert J Hunter – Oxford university Press
11. Chemical Process Principles, Hougen O.A., Watson K. M.
12. Basic Principles and Calculations in Chemical Engineering, Himmelblau,
13. Stoichiometry, Bhatt B.I. and Vora S.M

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B. Voc. Part - I, (Diploma), Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper – BVT103: Fundamental Industrial Chemistry (I)

Objectives: **50 Marks**

To study fundamentals of Industrial Chemistry.

Unit I: Overview of Indian chemical industry, raw material and energy sources, role of catalysis, inorganic products, organic intermediates and final products,

Unit II: Petroleum refining and cracking operation , Organic chemicals based on methanol and ethanol, Petrochemicals, Polymers, analysis, and selection of coal

Unit III: Carbonization , Hydrogenation, Complete gasification of coal, Fuel oil specifications, Combustion of solid, liquid, and gaseous fuels.

Unit IV: Classification of solvent, Characteristics properties of solvents, Liquid ammonia, Chemical reaction in liquid ammonia. Hybridization, Salient features of phenomenon of hybridization.

Reference Books:

1. Encyclopedia of Chemical Technology, Kirk-Othmer
2. Ulmann's Encyclopedia of Industrial Chemistry
3. Industrial Organic Chemistry, Weissermel&Arpe
4. Chemical Process Industries, Shreve B. Austin
5. Chemical Process Technology, Moulijn, M. and van Dippen
6. Dryden's Outlines of Chemical Technology
7. Elements of Fuels, Furnaces and Refractories, O.P. Gupta
8. Fuels handbook, Johnson

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper –BVT104: Elementary Physics and Mathematics

Objectives: **50 Marks**

To study Elementary Physics.

Unit I: Introduction to different elastics constant, Practical applications of elasticity, Fluid Mechanics, Optics and Fiber Optics. Lasers, Ultrasound

Unit II: Ohm's Law and Concept of Resistance, Series and Parallel Connections of Resistance, e.m.f., Introduction to PN Junction Diode, LED and Photo Diode.

Unit III: Taylor's theorem for multivariable functions and its application to error calculations, Maxima/Minima, Integral Calculus: Beta and Gamma functions.

Unit IV: Differentiation under the integral sign, surface integrals, volume integrals.

Reference Books:

1. Physics: Vols. I and II – D. Halliday and R. Resnick, Wiley Eastern.
2. Lectures on Physics: Vols. I, II and III – R. P. Feynman, R. B. Leighton and M. Sands, Narosa.
3. Concepts of Modern Physics – A. Beiser, Mc Graw-Hill.
4. Introduction to Modern Optics – G. R. Fowles , Dover Publications.
5. A Course of Experiments with LASERs – R. S. Sirohi, Wiley Eastern.
6. Optical Fibre Communication – G. Keiser, McGraw-Hill.
7. Optoelectronics – J. Wilson and J. F. B. Hawkes, 2nd ed, Prentice-Hall India.
8. Ultrasonics: Methods and Applications – J. Blitz, Butterworth.
9. Applied Sonochemistry – T. J. Mason and J. P. Lorimer, Wiley VCH.
10. Optics – by Ajay Ghatak
11. Lasersb- by Svelto
12. University physics – I & II
13. Advanced Engineering Mathematics, Erwin Kreyszig, John-Wiely.
14. Introductory Methods Of Numerical Analysis, S. S. Sastry, PHI.
15. A First Course in Probability, Sheldon Ross, Pearson Prentice Hall
16. Probability and Statistics in Engineering , W.W. Hines, D. C. Montgomery, D.M. Goldsman.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma) Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper – BVP101 : Laboratory Work : General Practical in Chemistry

Objectives: **Total Marks: 50 Marks**

To study the basic instrumentation in chemistry.

Practical :

1. Conductometry
2. Potentiometery
3. pH-Metry
4. Spectrophotometry
5. Find out the amount / percentage of **Iron** per gram of soap sample colorimetrically
6. Find out the percentage of '**Magnesium**' in a given sample of Talcum powder complexometrically.
7. Determine the concentration in mg/lit of sulphate ion in the given sample of water nephelometrically.

Reference Books:

1. F A Henglein: Chemical Technology (Pergamon)
2. R.W. Thomas and P. Farago: Industrial Chemistry (HEB)
3. R.N. Shreve: Chemical processes Industrial, McGraw Hill Book Company Inc, New York 1956.
4. K. Bhogavathi Somdavi: Applied Chemistry, MJP Publications, 2006
5. Riegels: Industrial Chemistry (Reinhold)
6. B. K. Sharma: Industrial Chemistry, Goel Publishing House, Meerut, 2011

Scheme of practical evaluation

Internal practical evaluation	50 Marks
1. Practical	25 Marks
2. submission Practical record book & project report	15 Marks
3. viva-voce	10 Marks

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma) Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper – BVP102 : Laboratory Work : Fundamental Chemistry (I)

Objectives: **Total Marks: 50 Marks**

To identify the organic compound
To estimate organic compound.

Practicals:

1. Identification of an organic compound through elemental analysis, group detection, physical constants (m.p and b.p.) .
2. Estimation of selected organic compounds like: aniline/phenol, formaldehyde/acetone, glucose, glycerol. Neutral equivalents of acids and bases, SAP value of an oil.
3. Volumetric Analysis : Preparation and Standardization of Volumetric solutions. Acid base reactions, titrationsof a mixture of (a) hydrochloric and acetic acid (b)Sulfuric and phosphoric acid (c) carbonate and bicarbonate.
4. To determine normality of each acid in given mixture of strong acid (A) and weak acid (B)
5. To determine relative strength of chloroacetic acid ($CH_2ClCOOH$) and acetic acid (CH_3COOH) conductometry.

Reference Books:

1. Organic Chemistry, L.G. Wade Jr, Pearson Education
2. Organic Chemistry, T.W.G. Solomons, C.B. Fryhle, John Wiley and Sons Inc
3. Organic Chemistry, J. McMurry, Brooks/Cole
4. Organic Chemistry, Paula Y. Bruice, Pearson Education
5. Introduction to colloid and surface chemistry – D.J.shaw, Butterworth publications
6. Surfaces interfaces and colloids- Drew Myers- Wiley VCH
7. Surfactants and interfacial phenomena- Milton J Rosen – Wiley Interscience
8. Industrial utilization of surfactants principles and applications – M.J. Rosen and M Dahanayake,

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma) Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper – BVP103: Laboratory Work : Fundamental Industrial Chemistry (I)

Objectives: **Total Marks: 50 Marks**

To learn Industrial chemistry.

Practicals:

1. Oxidation - reduction titrations involving permanganate, dichromate, ceric sulfate, iodine (tri-iodide) potassium bromate. Precipitation titration :Mohr's and Volhard's titrations. Complexometric titrations involving EDTA :
2. Determination of hardness of water. Determination of Manganese in pyrolusite. Gravimetric analysis :
3. Gravimetric determination of Fe, Ni, SO4 and Cl. Analysis of a Fe-Ni alloy. Suitable number of experiments from the above list will be performed. Ore analysis.
4. Prepare Copper Ferrite ($CuFe_2O_4$) & Find out percentage practical yield of the Copper Ferrite ($CuFe_2O_4$)
5. Prepare zinc ferrite & Find out percentage practical yield of the zinc ferrite.

Reference Books:

1. Encyclopedia of Chemical Technology, Kirk-Othmer
2. Ulmann's Encyclopedia of Industrial Chemistry
3. Industrial Organic Chemistry, Weissermel&Arpe
4. Chemical Process Industries, Shreve B. Austin
5. Chemical Process Technology, Moulijn, M. and van Dippen
6. Dryden's Outlines of Chemical Technology
7. Elements of Fuels, Furnaces and Refractories, O.P. Gupta
8. Fuels handbook, Johnson

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma) Semester - I
Chemical and Petrochemicals / Chemical Technology

Paper – BVP104: Laboratory Work : Elementary Physics

Practicals: **Total Marks: 50 Marks**

1. Viscosity
2. Thermal conductivity (Mention the actual solid-liquid pairs)
3. Laser for determination of molecular activities.
4. Design of regulated power supply
5. Basic Logic Gates
6. Solar Cell

Reference Books:

1. Physics: Vols. I and II – D. Halliday and R. Resnick, Wiley Eastern.
2. Lectures on Physics: Vols. I, II and III – R. P. Feynman, R. B. Leighton and M. Sands, Narosa.
3. Concepts of Modern Physics – A. Beiser, Mc Graw-Hill.
4. Introduction to Modern Optics – G. R. Fowles , Dover Publications.
5. A Course of Experiments with LASERs – R. S. Sirohi, Wiley Eastern.
6. Optical Fibre Communication – G. Keiser, McGraw-Hill.
7. Optoelectronics – J. Wilson and J. F. B. Hawkes, 2nd ed, Prentice-Hall India.
8. Ultrasonics: Methods and Applications – J. Blitz, Butterworth.
9. Applied Sonochemistry – T. J. Mason and J. P. Lorimer, Wiley VCH.
10. Optics – by Ajay Ghatak
11. Lasersb- by Svelto
12. University physics – I & II
13. Advanced Engineering Mathematics, Erwin Kreyszig, John-Wiely.
14. Introductory Methods Of Numerical Analysis, S. S. Sastry, PHI.
15. A First Course in Probability, Sheldon Ross, Pearson Prentice Hall
16. Probability and Statistics in Engineering , W.W. Hines, D. C. Montgomery, D.M. Goldsman, John-

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - I
Chemical and Petrochemicals / Chemical Technology

Project

Total Marks: 50 Marks

Objectives: To inculcate research mind in students

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical and Petrochemicals / Chemical Technology

Paper – BVT201: Business Communication-II

Total Marks: **50 Marks**

Objectives:

To understand Marketing, Negotiation & Group Discussion.

Unit I : Group Discussion:

Preparing for a Group Discussion, Initiating a Discussion, Eliciting Opinions, Views etc. Expressing Agreement/ Disagreement
Making Suggestions; Accepting and Declining Suggestions Summing up.

Unit II : Business Correspondence:

Writing Memos, e- mails, complaints, inquiries, etc. Inviting Quotations
Placing Orders, Tenders, etc.

Unit III : English for Negotiation Topics:

Business Negotiations Agenda for Negotiation Stages of Negotiation

Unit IV : English for Marketing Topics:

Describing/ Explaining a Product/Service Promotion of a Product Dealing/ bargaining with Customers. Marketing a Product / Service: Using Pamphlets, Hoardings, Advertisement, Public Function/Festival.

Reference Books:

1. Herekar, Praksh. *Business Communication.*Pune: Mehta Publications, 2007.
2. Herekar, Praksh. *Principals of Business Communication.* Pune: Mehta Publications, 2003. John,
3. David. *Group Discussions*. New Delhi: Arihant Publications.
4. Kumar, Varinder.*Business Communication*. New Delhi: Kalyani Publishers, 2000.
5. Pardeshi, P. C. *Managerial Communication.* Pune: Nirali Prakashan, 2008.
6. Pradhan, N. S. *Business Communication.* Mumbai: Himalaya Publishing House, 2005 Rai,
7. Urmila & S. M. Rai. *Business Communication.* Mumbai: Himalaya Publishing House, 2007.
8. Sethi, Anjanee & Bhavana Adhikari. *Business Communication*. New Delhi: Tata Mc Graw Hill.
9. Sonie, Subhash C. *Mastering the Art of Effective Business Communication*. New Delhi: Student Aid Publication, 2008.
10. Tickoo, Champa & Jaya Sasikumar. *Writing with a Purpose*. New York: OUP, 1979.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical & Petrochemicals / Chemical Technology

Paper – BVT202: Analytical and Electrochemistry

Total Marks: **50 Marks**

Objectives:

To inculcate Analytical approach in students.

Unit I: Introduction , Volumetric &, Gravimetric analysis: Introduction, types, theory, indicators and applications, Aspects of analysis, Applied analysis, Chemistry and electricity, Electrochemical cells, Prediction and significance of cell potentials Nernst equation, Batteries and fuel cells Electrochemical Corrosion, Electrolytic cells

Unit II: Instrumental methods, Balancing chemical equations, Avogadro's number and the mole concept, Stoichiometric Calculations, yields of chemical reactions, Preparation and standardization of Solutions, Equivalent weight of acid and base.

Unit III: Thermal methods , Chromatographic and other separation methods. Conductometry: Introduction, arhenius ionic theory, conductivity of electrolytes, Conductance, factors affecting conductance, Kohlrausch law,conductivity cells, applications & advantages of conductometric titration

Unit IV: , Equivalent weight of acid salt, anion, Concept of Normality, Molarity, Molality. Molecular spectral methods, Atomic spectral methods, . Potentio and pH metric methods: introduction, acid – base neutralization titration, redox titration, precipitation titration.

Reference Books:

1. D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, Fundamentals of Analytical Chemistry
2. J.G. Dick, Analytical Chemistry, R.E. Krieger Pub
3. Environmental Chemistry, A. K. De, Wiley
4. Chromatography
5 Thermal Methods Electrochemical Engineering by Allen J. Bard, Digby Macdonald, Patrik Schmuki, Martin Stratman
6. Electrochemical Methods: Fundamentals and Applications by Allen J. Bard, Larry R. Faulkner.
7. Modern Electro chemistry series by Bockris and Reddy.
8. Electrochemistry by Samuel Glasstone.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical & Petrochemicals / Chemical Technology

Paper – BVT203: Chemistry of Surfactants

Objectives: **Total Marks:** 50 Marks

To study surfactant.

Unit I: Surface chemistry and catalysis

Unit II: Adsorption-frendlich adsorption isotherm, langmuir adsorption isotherm. Industrial applications of adsorption

Unit III: Catalysis, enzyme catalysis, michaelis-menton equation. industrial applications of catalysts. Polymer chemistry.

Unit IV: Surface active substances or surfactants are amphiphilic compounds having a lyophilic, in particular hydrophilic, part (polar group) and a lyophobic, in particular hydrophobic, part (often hydrocarbon chain).

Reference Books:

1. Surfactants and polymers in aqueous solution by Krister Holmberg, Bo Jonsson, Bengt Kronberg
2. Surface Chemistry of Surfactants and Polymers By Bengt Kronberg , Krister Holmberg , Björn Lindman.
3. Surface Chemistry Essentials By K. S. Birdi
4. Surfactants and Interfacial Phenomena by M. J. Rosen, Wiley, New York, NY, 2nd edn.
5. Surfactants in Solution, ed. K. L. Mittal and B. Lindman, Plenum, New York, 1984, vol. 1–3.
6. Surfactants in Solution, ed. K. L. Mittal and P. Bothorel, Plenum, New York, 1987, vol. 4–6

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical & Petrochemicals / Chemical Technology

Paper –BVT204: Surface Coating Techniques

Objectives: **Total marks 50**

To understand Surface Coating Techniques.

Unit I: Surface engineering

Unit II: Chemical Conversion Coating, Metallic coating, Coating from Vapour Phase

Unit III: Different methods for surface modification, Thermal spray coatings, Diffusion Coating.

Unit IV: Case studies based on coatings and surface modification of important engineering components.

Reference Books:

1. ASM Handbook: Surface Engineering, by Faith Reidenback, ASM-International, Metals Park, OH
2. Surface Engineering: Fundamentals of Coatings by P. K. Datta and J. S. Gray, Royal Society of Chemistry
3. Chemical Vapor Deposition (Surface Engineering Series, V. 2) by J.-H. Park and T. S. Sudarshan, ASM-International, Metals Park OH.
4. Advanced Surface Coatings: A Handbook of Surface Engineering, by D. S. Rickerby, A. Mathews, Blackie Academic and Professional Publ. .
5. Handbook of Hard Coatings, by R. F. Bunshah, William Andrew Publishing/Noyes.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical & Petrochemicals / Chemical Technology

Paper – BVP201: Laboratory Work : Analytical Chemistry

Objectives: **Total Marks: 50 Marks**

To develop Analytical practical knowledge of students

Practicals:

1. Determination of Redwood / Saybolt numbers, kinematic viscosity and viscosity index of Lubricating oils
2. Determination of flash point, fire point, cloud and pour point of oils
3. Determination of acid value and iodine value of oils
4. Determination of COD of water samples
5. Cement Analysis

Reference Books:

1. Herekar, Praksh. *Business Communication.*Pune: Mehta Publications, 2007.
2. Herekar, Praksh. *Principals of Business Communication.* Pune: Mehta Publications, 2003. John,
3. David. *Group Discussions*. New Delhi: Arihant Publications.
4. Kumar, Varinder.*Business Communication*. New Delhi: Kalyani Publishers, 2000.
5. Pardeshi, P. C. *Managerial Communication.* Pune: Nirali Prakashan, 2008.
6. Pradhan, N. S. *Business Communication.* Mumbai: Himalaya Publishing House, 2005 Rai,
7. Urmila & S. M. Rai. *Business Communication.* Mumbai: Himalaya Publishing House, 2007.
8. Sethi, Anjanee & Bhavana Adhikari. *Business Communication*. New Delhi: Tata Mc Graw Hill.
9. Sonie, Subhash C. *Mastering the Art of Effective Business Communication*. New Delhi: Student Aid Publication, 2008.
10. Tickoo, Champa & Jaya Sasikumar. *Writing with a Purpose*. New York: OUP, 1979.

Scheme of practical evaluation

Internal practical evaluation 50 Marks

1. Practical 25 Marks
2. submission Practical record book & Study Tour 15 Marks
3. viva-voce 10 Marks

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical & Petrochemicals / Chemical Technology

Paper – BVP202 : Laboratory Work : Electrochemistry

Objectives: **Total Marks: 50 Marks**

To understand basic Electrochemistry practically.

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Practicals:

1. The Electrochemical Series
2. Standard Electrode Potentials and the Mean Activity Coefficient
3. pH Measurements and Potentiometrically Indicated Titrations
4. Redox Titrations (Cerimetry)
5. Differential Potentiometric Titration
6. Potentiometric Measurement of the Kinetics of the Oxidation of Oxalic Acid
7. A Simple Relative Hydrogen Electrode

Reference Books:

1. D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, Fundamentals of Analytical Chemistry
2. J.G. Dick, Analytical Chemistry, R.E. Krieger Pub
3. Environmental Chemistry, A. K. De, Wiley
4. Chromatography
5 Thermal Methods Electrochemical Engineering by Allen J. Bard, Digby Macdonald, Patrik Schmuki, Martin Stratman
6. Electrochemical Methods: Fundamentals and Applications by Allen J. Bard, Larry R. Faulkner.
7. Modern Electro chemistry series by Bockris and Reddy.
8. Electrochemistry by Samuel Glasstone.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical and Petrochemicals / Chemical Technology

Paper – BVP203 : Laboratory Work : Chemistry of Surfactants

Objectives: **Total marks: 50**

To develop surfactant knowledge of students

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Practicals:

1. Density mesurements
2. conductance mesurements
3. partial volume mesurements
4. Viscosity mesurements
5. Specific heat mesurements

Reference Books:

1. Surfactants and polymers in aqueous solution by Krister Holmberg, Bo Jonsson, Bengt Kronberg
2. Surface Chemistry of Surfactants and Polymers By Bengt Kronberg , Krister Holmberg , Björn Lindman.
3. Surface Chemistry Essentials By K. S. Birdi
4. Surfactants and Interfacial Phenomena by M. J. Rosen, Wiley, New York, NY, 2nd edn.
5. Surfactants in Solution, ed. K. L. Mittal and B. Lindman, Plenum, New York, 1984, vol. 1–3.
6. Surfactants in Solution, ed. K. L. Mittal and P. Bothorel, Plenum, New York, 1987, vol. 4–6

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical & Petrochemicals / Chemical Technology

Paper – BVP204 : Laboratory Work : Surface Coating Technique

Objectives: **Total Marks: 50 Marks**

To develop Analytical practical knowledge of students

Practicals:

1. To study Metallic coating, Coating from, Vapour Phase
2. To study Different methods for surface modification, Thermal spray coatings, Diffusion Coating.
3. To study Case studies based on coatings and surface modification of important engineering components.

Reference Books:

1. ASM Handbook: Surface Engineering, by Faith Reidenback, ASM-International, Metals Park, OH
2. Surface Engineering: Fundamentals of Coatings by P. K. Datta and J. S. Gray, Royal Society of Chemistry
3. Chemical Vapor Deposition (Surface Engineering Series, V. 2) by J.-H. Park and T. S. Sudarshan, ASM-International, Metals Park OH.
4. Advanced Surface Coatings: A Handbook of Surface Engineering, by D. S. Rickerby, A. Mathews, Blackie Academic and Professional Publ. .
5. Handbook of Hard Coatings, by R. F. Bunshah, William Andrew Publishing/Noyes.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical & Petrochemicals / Chemical Technology

Industrial Visit

Total Marks: 50 Marks

Objectives:

Knowledge of Various Industry

Scheme of practical evaluation

Internal practical evaluation	50 Marks
1. Practical	25 Marks
2. submission Practical record book & Study Tour	15 Marks
3. viva-voce	10 Marks

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part - I, (Diploma), Semester - II
Chemical &Petrochemicals / Chemical Technology

THEORY QUESTION PAPER STYLE- Semester I & II

Time: 2 hrs Theory- Total Marks-50

Sr.No.	Type	Question to be Solve	Weightage	Marks
1.	MCQs	10 out of 10	1 mark	10
2.	Short Answer	5 out of 7	2 mark	10
3.	Long Answer	5 out of 7	4 mark	20
4.	Short Note	2 out of 3	5 mark	10
			Total	**50**

PRACTICAL - Semester I	**PRACTICAL - Semester II**
Days: 02 Time: 6 hrs/day	Days: 03 Time: 6 hrs/day
Practical - 200 Marks Project - 50 Marks Total Practical - 250 Marks	Practical - 200 Marks Project - 50 Marks Total Practical - 250 Marks