

# ANDHRA UNIVERSITY



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All Official letters, packages etc, should be addressed to the Registrar by designation and not by name.

Visakhapatnam,  
Dt: 22-12-2022

No. LI (1&2)/U.G. SEC's Courses/ Syllabi & MQP/2020-21

From: **THE REGISTRAR**

To

The Controller of Examinations,  
Andhra University,  
Visakhapatnam.

Sir,

Sub: Approval of Syllabus & Model Question Papers – Reg.  
Ref: B.A. B.Sc. Syllabus & Model Question Papers.

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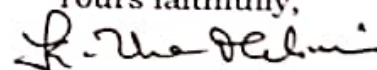
With reference to the above, I am by direction to inform you that the Choice Based Credit System, U.G. Skill Enhancement Courses (w.e.f. 2020-2021) Syllabus & Model Question Papers have been approved as detailed below:

S.No.	Subject/Email dated	Name & Designation	Name of the College	Syllabus & Model question paper	Name of the Paper
1.	B.Sc. Chemistry / 07-12-2022	Chairman	-	Syllabus & Model Question Papers	1.Course 6A: Synthetic Organic Chemistry. 2.Course 7A: Analysis of Organic Compounds. 3.Course 6B: Analytical Methods in Chemistry-1. 4.Course 7B: Analytical Methods in Chemistry-2. 5.Course 6C: Industrial Chemistry-1. 6.Course 7C: Industrial Chemistry-2. 7.Paper-^D: Environmental Chemistry. 8.Paper 7D: Green Chemistry & Nanotechnology. 9.Corse 6E: Analytical Methods in Chemistry. 10.Course 7E: Cosmetics and Pharmaceutical Chemistry.

2.	TIM 07-12-2022	/	-	-	Syllabus & Model Question Papers	1.Course 6A: Service Marketing of Tourism 2.Course 7A: Consumer Behaviour and Customer Relationship Management 3.Course 6B: Sales and Distribution Management 4.Course 7B: Selling and Negotiation Management 5.Course 6C: Tourism Destination Marketing 6.Course 7C: Itinerary Preparation and Tour Packaging. 7.course 6D: Digital Marketing for Tourism Business 8.Course 7D:Advertising and Brand Management for Tourism
3.	Physics 08-12-2022	/	Chairman	-	Model Question Paper	1.Optical Instruments and optometry 6A 2.Low Temperature Physics and Refrigeration 6B. 3.Application of Electricity and Electronics 6C. 4.Electronic Instrumentation 7C. 5.Solar Energy and Applications 7B 6.Optical Imaging and Photography 7A

Hence, I request to arrange to circulate the same among the Teaching Staff and Students concerned and placed in A.U. website.

Yours faithfully,



(K. UMA MAHESWARI)  
DEPUTY REGISTRAR (ACADEMIC)

**Copies to:**

1. The Dean of Academic Affairs, A.U., VSP.
2. The Dean, U.G. & P.G, Professional Courses, A.U., Vsp.
3. The Dean, CDC, A.U., Vsp.
4. The Dean, Confidential, A.U., Vsp.
5. All Principals, A.U. Affiliated Colleges Offered in U.G. courses.
6. The Superintendent S.I Section for taking necessary further action.
7. The Secretary to V.C., Rector Table, P.A. to Registrar, A.U., Vsp.
8. The Director, Computer Centre, A.U., Vsp.
9. O.C. & O.O.F.

# ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

REVISED UG SYLLABUS UNDER CBCS  
(Implemented from Academic Year, 2020-21)  
PROGRAMME: FOUR YEAR B.Sc.(Hons)  
Domain Subject: CHEMISTRY

*Skill Enhancement Courses (SECs) for Semester V, from 2022-23 (Syllabus with Learning Outcomes, References, Co-curricular Activities & Model Q.P. Pattern)*

## Structure of SECs for Semester-V

*(To choose One pair from the Five alternate pairs of SECs)*

Univ. Code	Course NO. 6&7	Name of Course	Th.Hrs / Week	IE Mar-ks	EE Mar-ks	Credits	Prac. Hrs./ Wk	Mar-ks	Credits
	6A	Synthetic Organic Chemistry	3	25	75	3	3	50	2
	7A	Analysis of Organic Compounds	3	25	75	3	3	50	2

OR

	6B	Analytical Methods in Chemistry-I	3	25	75	3	3	50	2
	7B	Analytical Methods in Chemistry-I	3	25	75	3	3	50	2

OR

	6C	Industrial Chemistry-1	3	25	75	3	3	50	2
	7C	Industrial Chemistry-2	3	25	75	3	3	50	2

OR

	6D	Environmental Chemistry	3	25	75	3	3	50	2
	7D	Green Chemistry and Nanotechnology	3	25	75	3	3	50	2

OR

	6E	Analytical Methods in Chemistry	3	25	75	3	3	50	2
	7E	Cosmetics and Pharmaceutical Chemistry	3	25	75	3	3	50	2

**Note-1:** For Semester-V, for the domain subject Chemistry, any one of the five pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A&7A or 6B&7B or 6C&7C or 6D&7D or 6E&7E. The pair shall not be broken (ABC allotment is random, not on any priority basis).

**Note-2:** One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in



A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Four-year B.Sc.(Hons)

Course Code:

Domain Subject: **CHEMISTRY**

IV Year B.Sc.(Hons) –Semester–V

Max Marks: 100+50

**Course6-A: Synthetic Organic Chemistry**  
(Skill Enhancement Course (Elective), Credits: 05)

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of reagents used in the synthesis of organic compounds.
2. Acquire knowledge on basic concepts indifferent types of pericyclic reactions.
4. Understand the importance of retro synthesis in organic chemistry.
5. Comprehend the applications of different reactions in synthetic organic chemistry.

**II. Syllabus :** ( Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

**Unit-1: Per cyclic reactions**

**12 hours**

1. A brief introduction to synthetic organic chemistry
2. Features and classification of per cyclic reactions: Phases, nodes and symmetry properties of molecular orbital's in ethylene, 1, 3-butadiene, 1, 3, 5-hexatriene, alkylation and ally radical. Thermal and photochemical reactions.
3. Electro cyclic reactions: Definition and examples, definitions of con and dis rotation, Woodward- Hoffmann selection rules.(Correlation diagrams are not required)
4. Cyclo addition reactions: Definition and examples, definitions of supra facial and an tar facial addition, Woodward- Hoffmann selection rules. (Correlation diagrams are not required)

**Unit-2: Organic photochemistry**

**8hours**

1. Jablonski diagram-singlet and triplattates
2. PhotochemistryofCarbonylcompounds- $n-\pi$ and $\pi-\pi^*$ transitions,Norrishtype-1and type-2 reactions
3. Paterno – Buchi reaction.

**Unit-3: Retro synthesis**

**12 hours**

1. Important terms in Retro synthesis with examples-Disconnection, Target molecule, FGI, Synthons, Retro synthetic analysis, chemo selectivity, region selectivity
2. Importance of Order of events in organic synthesis
3. Retro synthetic analysis of the compounds: a. cyclohexene, b.4-Nitro toluene, c. Paracetamol.



#### **Unit-4: Synthetic Reactions**

**8 hours**

Shapiro reaction, Stork - enamine reaction (only alkylation), Wittig reaction, Robinson annulation, Bailys-Hillman reaction, Heck reaction, Suzuki coupling. Synthesis of aldehydes and ketones using 1, 3-Dithiane.

#### **Unit-5: Reagents in Organic Chemistry**

**10 hours**

Oxidizing agents: PCC, PDC,  $\text{SeO}_2$  (Riley oxidation), NBS.

Reducing agents:  $\text{LiAlH}_4$  (with mechanism), LTBA, Metal-solvent reduction (Birch reduction), Catalytic reduction.

#### **III. References**

1. Peri cyclic reactions by Ian Fleming, Second edition, Oxford University press.
2. Peri cyclic Reactions-A Text book: Reactions, Applications and Theory by S.Sankararaman, WILEY-VCH.
3. Reaction Mechanism in Organic Chemistry by S.M. Mukherji and S.P.Singh, Revised edition, Trinity Press.
4. Pericyclic reactions-A Mechanistic study by S.M.Mukherji, Macmillan India.
5. Organic synthesis: The disconnection approach by Stuart Warren, John Wiley & Sons.
6. Organic chemistry by Jonathan Clayden, Nick Greeves and Stuart Warren, Second edition, Oxford university press.
7. Reactions, Reagents and Rearrangements by S.N. Sanyal, Bharati Bhawan Publishers & Distributors.

## Course6-A: Synthetic Organic Chemistry-PRACTICAL SYLLABUS

### IV. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Perform the organic qualitative analysis for the detection of N, S and halogens using the green procedure.
2. Learn the procedure for the separation of mixture of amino acids using paper Chromatography.
3. Prepare the TLC plates for TLC chromatography.
4. Acquire skills in conducting column chromatography for the separation of dyes in the given mixture.

### V. Practical (Laboratory) Syllabus :(30hrs)

(Max.50 Marks)

1. Green procedure for organic qualitative analysis: Detection of N, S and halogens
2. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
3. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
4. Separation of mixture of methyl orange and methyl orange by column chromatography
5. Separation of food dyes using Column Chromatography
6. Separation of triglycerides using TLC

### VI. Lab References:

1. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
3. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
4. Mann F. G and Saunders B.C, Practical Organic Chemistry, Pearson Education.

### VII. Co-Curricular Activities

a) **Mandatory:** (Lab/field training of students by teacher: (lab: 10+field:05):

1. **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of detection of N, S and halogens using the green procedure, preparation of TLC plates, detection of organic compounds using  $R_f$  values in TLC/ paper chromatography, loading of column, selection of solvent system for column chromatography, separation of amino acids and dye mixture using chromatographic techniques.
2. **For Students:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the synthetic reactions. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
3. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.
4. Unit tests (IE).

**b) Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of relevant videos and material.
3. Visits of abilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

**VIII. Suggested Question Paper Pattern:**

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

PART-A: Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

PART- B: Consists of FIVE internal choice essay questions. Each question carries 10 marks.

A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject: **CHEMISTRY**  
IV Year B.Sc.(Hons) –Semester–V

Max Marks: 100+50

**Course 7-A: Analysis of Organic Compounds**  
(Skill Enhancement Course (Elective), Credits: 05)

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of mass spectrometry in the structural elucidation of organic compounds.
2. Acquire the knowledge on structural elucidation of organic compounds.
3. Understand various chromatography methods in the separation and identification of organic compounds.
4. Demonstrate the knowledge gained in solvent extraction for the separate the organic compounds.

**II. Syllabus :** (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

**Unit-1: Mass Spectrometry**

**10 hours**

A brief introduction to analysis of organic compounds

Basic principles, Instrumentation - Mass spectrometer, electron Ionization (Electron Impact ionization, EI), Molecular ions, metastable ions, Isotope abundance. Basic fragmentation types. Fragmentation patterns in Toluene, 2-Butanol, But aldehyde, Propionic acid.

**Unit-2: Structural elucidation of organic compounds using IR, NMR, mass spectral data-**

**8 hours**

2, 2, 3, 3-Tetra methyl butane, Butane-2, 3-dione, Prop ionic acid and methyl propionate.

**Unit-3: Structural elucidation of organic compounds using IR, NMR, Mass spectral data-**

**8 hours**

Phenyl acetylene, ace to phenomenon amici acid and p-nitro aniline.

**Unit-4: Separation techniques-1**

**12 hours**

1. Solvent extraction-Principle and theory, Batch extraction technique, application of batch extraction in the separation of organic compounds from mixture- acid & neutral, base & neutral.
2. Chromatography- Principle and theory, classification, types of adsorbents, eluents, R<sub>f</sub> values and factors affecting R<sub>f</sub> values.
3. Thin layer chromatography-principle, experimental procedure, advantages and applications.



**12 hours**

### **Unit-5: Separation techniques-2**

1. Paper chromatography- Principle, experimental procedure, ascending, descending, radial and two dimensional, applications.
2. Column chromatography-Principle, classification, experimental procedure, applications.
3. HPLC-Principle, Instrumentation-block diagram and applications.

### **III. References**

1. Organic Spectroscopy by William Kemp, Third Edition, Palgrave USA.
2. Introduction to Spectroscopy by Pavia, Lamp man, Kriza nd Vyvyan, Fifth edition, Cen gage.
3. Organic Spectroscopy: Principles and Applications by Jag Mohan, Second edition, Alpha Science.
4. Spector's copy of Organic Compounds by P.S.Kalsi, Seventh edition, New Age International.
5. Spectroscopic Methods in Organic Chemistry by Ian Fleming and Dudley Williams, Seventh edition, Springer.
6. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cen gage.
7. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug, Seventh edition, Wiley.
8. Quantitative analysis by R.A.Day Jr. and A.L.Underwood, Sixth edition, Pearson.
9. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

## Course7-A: Analysis of Organic Compounds - PRACTICAL SYLLABUS

### IV. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Prepare acetanilide using the green synthesis.
2. Demonstrate the preparation of azodye.
3. Acquire skills in the separation of organic compounds in the given mixture using solvent extraction

(Max.50 Marks)

### V. Practical (Laboratory) Syllabus:(30hrs)

1. Identification of various equipment in the laboratory.
2. Acetylating of 1<sup>o</sup> amine by green method: Preparation of acetanilide
3. Rearrangement reaction in green conditions: Benzil - Benzilic acid rearrangement
4. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
5. Green oxidation reaction: Synthesis of adipic acid
6. Preparation and characterization of biodiesel from vegetable oil/ waste cooking oil
7. Photo reduction of Benzophenone to Benzopinacol in the presence of sunlight.
8. Separation of organic compounds in a mixture (acidic compound + neutral compound) using solvent extraction.
9. Separation of organic compounds in a mixture (basic compound +neutral compound) using solvent extraction.

### VI. Lab References:

1. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
3. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
4. Mann F.G and Saunders B.C, Practical Organic Chemistry, Pearson Education.

### IV. Co-Curricular Activities:

a) **Mandatory:**(Lab/field training of students by teacher:(lab:10+field:05):

5. **For Teacher:** Training of students by teacher in laboratory and field for not less than15 hours on the field techniques/skills of preparation of acetanilide, preparation of azodye, use of separating funnel for solvent extraction, separation of organic compounds in a mixture.
6. **For Student:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the techniques used for the separation of organic compounds. Write their observations and submit a handwritten fieldwork/project work report not exceeding10 pages in the given format to the teacher.
7. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.
5. Unit tests (IE).

### b) Suggested Co-Curricular Activities

1. Training of students' by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of videos and other material



### **VIII. Suggested Question Paper Pattern:**

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

PART-A: Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

PART- B: Consists of FIVE internal choice essay questions. Each question carries 10 marks.

A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject: **CHEMISTRY**  
IV Year B.Sc.(Hons)-Semester-V

Max Marks: 100+50

**Course6-B: Analytical Methods in Chemistry-1**  
(Skill Enhancement Course (Elective), Credits: 05)

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of solvent extraction and ion exchange method.
2. Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
3. Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
4. Understand the theories of different types of titrations.
5. Gain knowledge on different types of errors and their minimization methods.

**II. Syllabus:**

*(Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)*

**Unit-1: Quantitative analysis-1**

**8 hours**

1. A brief introduction to analytical methods in chemistry
2. Principles of volumetric analysis, concentration terms- Molarity, Molality, Normality, v/v, w/v, ppm and ppb, preparing solutions- Standard solution, primary standards and secondary standards.
2. Description and use of common laboratory apparatus- volumetric flask, burette, pipette, beakers, measuring cylinders.

**Unit-2: Quantitative analysis-2**

**12hours**

1. Principles of volumetric analysis: Theories of acid-base (including study of acid-base titration curves), redox, complex metric, iodometric and precipitation titrations-choice of indicators for the saturations.
2. Principles of gravimetric analysis: precipitation, coagulation, peptization, co precipitation, post precipitation, digestion, filtration, and washing of precipitate, drying and ignition.

**Unit-3: Treatment of analytical data**

**8hours**

Types of errors- Relative and absolute, significant figures and its importance, accuracy - methods of expressing accuracy, errors- Determinate and indeterminate and minimization of errors, precision-methods of expressing precision, standard deviation and confidence interval.

#### **Unit-4: separation techniques**

**12 hours**

1. Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism. Application-Determination of Iron (III).
2. Ion Exchange method: Introduction, action of ion exchange resins, applications.

#### **UNIT-5: Analysis of water**

**10hours**

Determination of dissolved solids, total hardness of water, turbidity, alkalinity, Dissolved oxygen, COD, determination of chloride using Mohr's method.

#### **III. References**

1. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and KevinA.Schug,Seventh edition, Wiley.
3. Quantitative analysis by R.A.DayJr. And A.L.Underwood, Sixth edition, Pearson.
4. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
5. Text book of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & CoLtd.

## Course6-B: Analytical methods in chemistry-1-PRACTICALSYLLABUS

### IV. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Estimate Iron(II) using standard Potassium dichromate solution
2. Learn the procedure for the estimation of total hardness of water
3. Demonstrate the determination of chloride using Mohr's method
4. Acquire skills in the operation and calibration of pH meter
5. Perform the strong acid vs strong base titration using pH meter

### V. Practical (Laboratory)Syllabus:(30hrs)

(Max.50 Marks)

1. Estimation of Iron(II) using standard Potassium dichromate solution (using DPA indicator)
2. Estimation of total hardness of water using EDTA
3. Determination of chloride ion by Mohr's method
4. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures.
5. Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid, (ii) Ammonium chloride-ammonium hydroxide.
6. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base.
7. Determination of dissociation constant of a weak acid.

### VI. Lab References:

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

### VII. Co-Curricular Activities:

**a) Mandatory:**(Lab/field training of students by teacher:(lab:10+field:05):

8. **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of calibration of pH meter, Strong acid vsstrongbasetitrationusingpHmeter,determinationofchlorideion,estimationofwaterqualityparametersand estimation of Iron(II).
9. **For Student:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe various methods used for the analysis of water. Write their observations and submit a hand written fieldwork/project work report not exceeding10 pages in the given format to the teacher.
10. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.*
5. Unit tests (1E).

#### **b) Suggested Co-Curricular Activities**

1. Training of students' by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics).
3. Visits to facilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

### **VIII. Suggested Question Paper Pattern:**

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

**PART-A:** Consists of EIGHT short answer questions out of which 5 are to be answered.  
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A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject: **CHEMISTRY**  
IV Year B.Sc.(Hons)–Semester–V

Max Marks: 100+50

**Course7-B: Analytical Methods in Chemistry-2**  
(Skill Enhancement Course (Elective), Credits: 05)

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of chromatography in the separation and identification of compounds in a mixture
2. Acquire a critical knowledge on various chromatographic techniques.
3. Demonstrate skills related to analysis of water using different techniques.
4. Understand the principles of spectro chemistry in the determination of metal ions.
5. Comprehend the applications of atomic spectroscopy.

**II. Syllabus : ( Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)**

**Unit-1: Chromatography-Introduction and classification** **10 hours**  
Principle, Classification of chromatographic methods, Nature of adsorbents, eluents,  $R_f$  values, factors affecting  $R_f$  values.

**UNIT-2: TLC and paper chromatography** **12 hours**  
1. Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbents and solvents, development of chromatogram, detection of spots, applications and advantages.  
2. Paper Chromatography: Principle, Experimental procedure, choice of paper and solvents, various modes of development- ascending, descending, radial and two dimensional, applications.

**UNIT-3: Column chromatography** **12 hours**  
1. Column chromatography: Principle, classification, Experimental procedure, stationary and mobile phases, development of the Chromatogram, applications.  
2. HPLC: Basic principles, instrumentation –block diagram and applications.

**UNIT-4: Spectrophotometry** **8 hours**  
Principle, Instrumentation: Single beam and double beam spectrometer, Beer-Lambert's law- Derivation and deviations from Beer-Lambert's law, applications of Beer-Lambert's law-Quantitative determination of  $\text{Fe}^{+2}$ ,  $\text{Mn}^{+2}$  and  $\text{Pb}^{+2}$ .

## **UNIT-5: Atomic spectroscopy**

**8hours**

Types, atomizer, atomic absorption and emission and applications.

### **III. References**

1. Fundamental so Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, Purnendu K.Dasgupta and Kevin A.Schug, Seventh edition, Wiley.
3. Quantitative analysis by R.A.Day Jr. and A.L.Underwood, Sixth edition, Pearson.
4. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition/ Pearson.

## Course7-B: Analytical Methods in Chemistry-2- PRACTICAL SYLLABUS

### V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Perform the separation of a given dye mixture using TLC
2. Learn the preparation of TLC plates
3. Demonstrate the separation of mixture of amino acids using paper chromatography
4. Acquire skills in using column chromatography for the separation of dye mixture

### VI. Practical (Laboratory) Syllabus: (30hrs)

(Max.50Marks)

1. Separation of a given dye mixture (methyl orange and methylene blue) using TLC (using alumina as adsorbent).
2. Separation of mixture of methyl orange and methylene blue by column chromatography.
3. Separation of given mixture of amino acids (glycine and phenyl alanine) using ascending paper chromatography.
4. Separation of food dyes using Column Chromatography
5. Separation of triglycerides using TLC
6. Verification of Beer lambert's law. (Using potassium permanganate solution) using colorimeter /spectrophotometer.

### VII. Lab References:

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
1. Vogel A. I. Practical Organic Chemistry, Longman Group Ltd.
2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley- Eastern.
3. Ahluwalia V. K. and Aggarwal R. Comprehensive Practical Organic Chemistry, University press.
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### VII. Co-Curricular Activities:

*a) Mandatory:(Lab/field training of students by teacher ( lab:10+field:05):*

11. **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field techniques/skills of determination of hardness of water, using the calorimeter and or Spectrophotometer, preparation of TLC plate, identification of spots in TLC and Paper chromatographic techniques, loading of column, selection of solvent system, separation of amino acids and dyes mixture using chromatographic techniques.
12. **For Student:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the chromatographic techniques used for the separation of compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
13. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.*
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### **b) Suggested Co-Curricular Activities**

1. Training of students by related industrial experts.
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For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

**PART-A:** Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

**PART- B:** Consists of FIVE internal choice essay questions. Each question carries 10 marks.

A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject: **CHEMISTRY**  
IV Year B.Sc.(Hons)-Semester-V

Max. Marks : 100+50

**Course6-C: Industrial Chemistry-I**  
(Skill Enhancement Course (Elective), Credits: 05)

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of different surface coatings.
2. Acquire a critical knowledge on manufacture of ceramics and cement.
3. Understand various steps in the manufacture of cane sugar.
4. Explain the manufacture of pulp and paper.

**II. Syllabus : ( Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)**

**Unit-1: Fertilizers**

**10 hours**

A brief introduction to industrial chemistry

Different types of fertilizers. Manufacture of the following fertilizers: Urea, Ammonium nitrate, Calcium ammonium nitrate, Ammonium phosphates; Polyphosphate, Superphosphate, Compound and mixed fertilizers.

**Unit-2: Silicates**

**10hours**

1. **Ceramics:** Important clays and Felds par. Ceramics-types, uses and manufacture. High technology ceramics and their applications.
2. **Cements:** Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

**Unit-3: Surface Coatings**

**12 hours**

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, modified oils, Pigments, toners and lake pigments, fillers, thinners, enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Water and Oil paints.

**Unit-4: Sugar Chemistry**

**08hours**

Introduction-Manufacture and recovery of cane sugar from molasses, manufacture of sucrose from beat root, testing and estimation of sucrose.

**Unit-5: Paper Industry**

**10hours**

**Pulp and Paper-**Introduction, Manufacture of pulp, sulphate or Kraft pulp, soda pulp, sulphite pulp, rag pulp, beating, refining, filling, sizing and colouring of pulp, manufacture of paper.



### III. References:

1. E.Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd.UK
2. J.A.Kent: Riegel's *Hand book of Industrial Chemistry*, CBS Publishers, New Delhi.
3. P.C.Jain, M.Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
4. R. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering Chemistry*, Vikas Publications, New Delhi.
5. B.K.Sharma: *Engineering Chemistry*, Goel Publishing House, Meerut
6. O. P. Vermani, A. K. Narula: *Industrial Chemistry*, Galgotia Publications Pvt. Ltd., New Delhi.

### Course 6 C: Industrial Chemistry-I- PRACTICAL SYLLABUS

#### IV. Lab work-Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Determine free acidity in ammonium sulphate fertilizer.
2. Learn the procedure for the Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Demonstrate skills on Estimation of phosphoric acid in superphosphate fertilizer.
4. Acquire skills in using colorimetry for the estimation of sucrose.

#### V. Practical(Laboratory)Syllabus:(30hrs)

(Max.50 Marks)

1. Determination of free acidity in ammonium sulphate fertilizer.
2. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Estimation of phosphoric acid in superphosphate fertilizer.
4. Estimation of sucrose by colorimetry.

#### VI: Lab References

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
2. Text book on Experiments and Calculations in Engineering Chemistry, S.S.Dara, S.Chand.
3. R.Gopalan, D.Venkappayya, S.Nagarajan: Engineering Chemistry, Vikas Publications.
4. B.K.Sharma: Engineering Chemistry, Goel Publishing House, Meerut

#### VII. Co-Curricular Activities:

**a) Mandatory:** (Lab/field training of students by teacher: (lab:10+field:05):

1. **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on field related skills in determination of free acidity, estimation of calcium and phosphoric acid in a fertilizer, use of colorimeter to estimate sucrose.
2. **For Student:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the surface coatings of surfaces used to prevent the corrosion. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
3. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.*
5. Unit tests (IE).

#### b) Suggested Co - Curricular Activities

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics).

### **VIII. Suggested Question Paper Pattern:**

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

PART-A: Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

PART- B: Consists of FIVE internal choice essay questions. Each question carries 10 marks.

A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject: **CHEMISTRY**  
IV Year B.Sc.(Hons)-Semester-V

Max Marks: 100

**Course7-C: Industrial Chemistry-2**  
(Skill Enhancement Course (Elective), Credits: 05)

**Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Identify the importance of industrial waste management.
2. Acquire a critical knowledge on the preparation and applications of organic polymers.
3. Demonstrate the analysis of water quality parameters.
4. Explain the sources of air pollution.

**II. Syllabus :** (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

**Unit-1: Organic Polymers-1**

**10 hours**

Basic definitions, degree of polymerization, classification of polymers- Natural and Synthetic polymers, Organic and In organic polymers, Thermoplastic and Thermo setting polymers, Plastics, Elastomers, Fibers and Resins, Linear, Branched and Cross-Linked polymers.

**Unit-2: Organic Polymers-2**

**10 hours**

Addition polymers and Condensation polymers, mechanism of polymerization- Free radical, ionic and Zeigler-Natta polymerization. Industrial manufacturing and applications of following polymers, Polystyrene, Poly acrylonitrile, Poly methacrylate, Poly methyl-methacrylate.

**Unit-3: Air Pollution**

**8 hours**

Sources of air pollution, acid rain, photochemical smog, Greenhouse effect, Formation and depletion of ozone, sources and effects of various gaseous pollutants: NO<sub>x</sub>, SO<sub>x</sub>, SPM, CO, hydrocarbons, controlling methods of air pollution.

**Unit-4: Analysis of water**

**10hours**

Determination of total hardness of water, Dissolved oxygen, BOD, COD, total dissolved solids, turbidity, alkalinity, determination of chloride using Mohr's method.

**Unit-5: Industrial Waste Management 12hours**

Waste water treatment - primary, secondary & tertiary treatment. (All treatment methods in detail). Characteristics of solid wastes, methods of solid waste treatment and disposal, microbiology involved in solid waste disposal, methods of solid waste disposal- composting, sanitary landfilling- economic, aesthetic and environmental problems.



### III. References:

1. E.Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd.UK
2. J.A.Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
3. P.C.Jain, M.Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
4. R. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering Chemistry*, Vikas Publications, New Delhi.
5. B.K.Sharma: *Engineering Chemistry*, Goel Publishing House, Meerut
6. O. P. Vermani, A. K. Narula: *Industrial Chemistry*, Galgotia Publications Pvt. Ltd., New Delhi.
7. A.K.De, *Environmental Chemistry*: New Age International Pvt, Ltd, New Delhi.
8. C.k.Varshney: *Water Pollution and Management*, Wiley Eastern Limited, Chennai.
9. S.S. Dara and D.D. Mishra: *Textbook of Environmental Chemistry and Pollution Control*, Revised edition, S.C.Hand & Co Ltd.

### Course 7-C: Industrial Chemistry-2-PRACTICAL SYLLABUS

#### IV. Lab work-Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Learn the procedures for the determination of BOD and COD.
2. Demonstrate skills in the determination of chloride in the given water sample.
3. Acquire skills in determining the hardness of water.

#### V. Practical (Laboratory) Syllabus:(30hrs)

(Max.50 Marks)

1. Determination of Hardness of water by EDTA titration.
2. Determination of Chemical Oxygen Demand (COD)
3. Determination of Biological Oxygen Demand (BOD)
4. Determination of chloride using Mohr's method.
5. Determination of pH, turbidity and total solids in water sample.
6. Determination of  $\text{Ca}^{+2}$  and  $\text{Mg}^{+2}$  in soil sample by flame photometry.
7. Determination of Ph in soil samples using pH metry.

#### VI. Lab References:

1. Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
2. Textbook on Experiments and Calculations in Engineering Chemistry, S.S.Dara, S.Chand.

#### VII. Co-Curricular Activities

a) **Mandatory:** (Student training by teacher in field related skills: inlab: 15, in field: 05 hours):

1. **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on the field related skills in determination of hardness of water, estimation of COD and BOD in water sample, determination chloride ion in water sample.
2. **For Student:** Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the measurement of water quality parameters. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
3. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings, and*

A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject: **CHEMISTRY**  
IV Year B.Sc.(Hons)–Semester –V (from 2022-23)

**Course6-D: Environmental Chemistry**  
(Skill Enhancement Course (Elective), Credits -05      Max Marks: 100+50)

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Understand the environment functions and how it is affected by human activities.
2. Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services.
1. Engage in simple and advanced analytical tools used to measure the different types of pollution.
4. Explain the energy crisis and different aspects of sustainability.
5. Analyze key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life.

**II Syllabus :** (Total Hours: 90, including Teaching, Lab, Field Skills Training, Unit tests etc.)

**UNIT-I Introduction      10h**

Environment Definition – Concept of Environmental chemistry- Scope and importance of environment in nowadays – Nomenclature of environmental chemistry – Segments of environment– Effects of human activities on environment – Natural resources–Renewable Resources–Solar and biomass energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydro logical cycle.

**UNIT-II**

**Air Pollution 10h**

Definition – Sources of air pollution – Classification of air pollution – Ambient air quality standards- Climate change – Global warming – Pollution from combustion systems- Acid rain – Photochemical smog – Greenhouse effect – Formation and depletion of ozone – Bhopal gas disaster–Instrumental techniques to monitor pollution – Controlling methods of air pollution.

**UNIT-III**

**Water pollution      10h**

Unique physical and chemical properties of water – Water quality standards and parameters – Turbidity- pH Dissolved oxygen – BOD, COD, Suspended solids, total dissolved solids, alkalinity– Hardness of water–Methods to convert temporary hard water in to soft water – Methods to convert permanent hard water into soft water – eutrophication and its effects –Industrial waste water treatment.



## VI. List of Reference books:

1. A Text Book of Quantitative Inorganic Analysis (3<sup>rd</sup> Edition)–A.I.Vogel
2. Water pollution, Lalude, MC Graw Hill
3. Environmental analysis, SM Khopkar ( IIT Bombay )
4. Web related references suggested by teacher.

## VII. Co-Curricular Activities:

a) **Mandatory:** (Training of students by teacher on field related skills: 15hrs)

1. **For Teacher:** Skills training of students by the teacher in classroom, lab and field for not than 15 hours on field related quantitative techniques for the water quality parameters, soil pollution and air pollution.
2. **For Student:** Individual visit to any one of the local field agencies/research laboratories universities/research organizations/private sector culminating writing and submission of a written fieldwork/project work Report not exceeding 10 pages in the given format.
3. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details places visited, observations, findings and acknowledgements.*
5. Unit tests (IE).

### b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Visits to research organizations and laboratories.
3. Invited lectures and presentations on related topics by field / industrial experts.
4. Assignments.
5. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
6. Preparation of videos on tools, techniques and applications of spectrophotometry.

## VIII. Suggested Question Paper Pattern and Model (Theory):

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

**PART-A:** Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

**PART- B:** Consists of FIVE internal choice essay questions. Each question carries 10 marks.

2. Microwave assisted reaction in water –Hoffmann elimination – methyl benzoate to benzoic acid – oxidation of toluene and alcohols–microwave assisted reactions in organic solvents. Diels-Alder reactions and decarboxylation reaction.

3. Ultrasound assisted reactions–sonochemical Simmons–Smith reaction (ultrasonic alternative to iodine)

#### UNIT – V Nanotechnology in Green chemistry

10 hrs

Basic concepts of Nano science and Nanotechnology – Bottom-up approach and Top down approaches with examples – Synthesis of Nano materials – Classification of Nanomaterial – Properties and Application of Nanomaterial. Chemical and Physical properties of Nanoparticles – Physical synthesis of nanoparticles – Inert gas condensation - aerosol method - Chemical Synthesis of nanoparticles – precipitation and co-precipitation method, sol-gel method.

#### III. Lab work - Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in the laboratory.
2. Learn the procedures of green synthesis.
3. Demonstrate skills in the preparation of Nanomaterials.
4. Acquire skills in Microwave assisted organic synthesis.
5. Perform some applications of Nanomaterials.

#### IV. Practical (Laboratory) Syllabus: (30 hrs.) (Max.50 Marks).

1. Identification of various equipment in the laboratory.
2. Acetylation of 1<sup>o</sup> amine by green method: Preparation of acetanilide
3. Rearrangement reaction in green conditions: Benzil - Benzilic acid rearrangement
4. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
5. Green oxidation reaction: Synthesis of adipic acid
6. Preparation and characterization of biodiesel from vegetable oil/ waste cooking oil
7. Preparation and characterization of Nanoparticles of gold using tea leaves.
8. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.
9. Photo reduction of Benzophenone to Benzopinacol in the presence of sunlight.

#### V. Reference books:

1. Green Chemistry Theory and Practical. P.T.Anatas and J.C. Warner
2. Green Chemistry V.K. Ahluwalia Narosa, New Delhi.
3. Real world cases in Green Chemistry M.C. Cann and M.E. Connelly
4. Green Chemistry: Introductory Text M.Lancaster: Royal Society of Chemistry (London)
5. Principles and practice of heterogeneous catalysis, Thomas J.M., Thomas M.J., John Wiley
6. Green Chemistry: Environmental friendly alternatives R S Sanghli and M.M Srivastava, Narosa Publications
7. Nanotechnology: Health and Environmental Risks, Jo Anne Shatkin, CRC Press (2008).
8. Green Processes for Nanotechnology: From Inorganic to Bioinspired Nanomaterials, Vladimir A. Basiuk, Elena V. Basiuk Springer (2015)
9. Web related references suggested by teacher.

## **VI. Co-Curricular Activities:**

**a) Mandatory:** (*Training of students by teacher on field related skills: 15 hours*)

**1.For Teacher:** Training of students by the teacher in the classroom or in the laboratory for not less than 15 hours on field related quantitative techniques for Enzymatic catalysis, Microwave assisted organic synthesis, Biodiesel preparation etc.

**2.For Student:** Individual visit to any one of the local field agencies, research laboratories in universities/research organizations/private sector culminating writing and submission of a hand-written fieldwork/project work Report not exceeding 10 pages in the given format.

3. Max marks for fieldwork/project work Report: 05.

4. Suggested Format for fieldwork/project work: *Title page, student details, index page, details of places visited, observations, findings and acknowledgements.*

5. Unit tests (IE).

### **b) Suggested Co-Curricular Activities:**

1. Training of students by related industrial experts.
2. Visits to research organizations and laboratories.
3. Invited lectures and presentations on related topics by field / industrial experts.
4. Assignments.
5. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
6. Preparation of videos on tools, techniques and applications of Green chemistry and Nano synthesis.

## **VII. Suggested Question Paper Pattern/ Model (Theory):**

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

**PART-A:** Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

**PART- B:** Consists of FIVE internal choice essay questions. Each question carries 10 marks.

A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject - **CHEMISTRY**  
IV Year B. Sc.(Hons)-Semester –V (from 2022-23)  
Course6-E: Analytical Methods in Chemistry  
(Skill Enhancement Course (Elective), Credits: 05)

Max Marks: 100+50

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Understand the various methods involved in Quantitative analysis.
2. Acquire a critical knowledge on separation techniques.
3. Demonstrate skills related to Chromatographic techniques through hands on experience.
4. Able to engage in safe and accurate laboratory practices by handling laboratory glassware, Equipment and chemical reagents appropriately.
5. Comprehend the applications of Chromatographic techniques in different fields.

**II. Syllabus: Total Hours: 90, including Teaching, Lab, Field Skills Training, Unit tests etc.)**

**Unit-1: Quantitative analysis (10hrs)**

Importance in various fields of science, steps involved in chemical analysis. Principles of volumetric analysis: Theories of acid-base, redox, complex metric, iodometric and precipitation titrations. Detection of end point in redox titration, choice of indicators for the saturations. Principles of gravimetric analysis: precipitation, coagulation, peptization, co-precipitation, post-precipitation, digestion, filtration and washing of precipitate, drying and ignition.

**Unit-2: Treatment of analytical data: (10hrs)**

Types of errors, significant figures and its importance, accuracy-methods of expressing accuracy, absolute and relative errors, error analysis and minimization of errors.

Precision - methods of expressing precision, standard deviation and confidence limit. The correlation coefficient.

**Unit-3: Separation techniques in Chemical analysis: (10hrs)**

Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism. Application- Determination of Iron (III).

Ion Exchange: Introduction, action of ionex change resins, separation of inorganic mixtures, applications.

**Unit- 4: Chromatography: Part - I (10hrs)**

Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems,  $R_f$  values, factors effecting  $R_f$  values.

Paper Chromatography: Principles,  $R_f$  values, experimental procedures, choice of paper and solvent systems, developments of chromatogram-ascending, descending and radial. Two dimensional chromatography, applications.

A.P. State Council of Higher Education  
Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.Sc. (Hons)  
Domain Subject - **CHEMISTRY**  
IV Year B. Sc.(Hons)–Semester –V (from 2022-23)  
Course6-E: Analytical Methods in Chemistry  
(Skill Enhancement Course (Elective), Credits: 05)  
Max Marks: 100+50

**I. Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Understand the various methods involved in Quantitative analysis.
2. Acquire a critical knowledge on separation techniques.
3. Demonstrate skills related to Chromatographic techniques through hands on experience.
4. Able to engage in safe and accurate laboratory practices by handling laboratory glassware, Equipment and chemical reagents appropriately.
5. Comprehend the applications of Chromatographic techniques in different fields.

**II. Syllabus: Total Hours: 90, including Teaching, Lab, Field Skills Training, Unit tests etc.)**  
(10hrs)

**Unit-1: Quantitative analysis**

Importance in various fields of science, steps involved in chemical analysis. Principles of volumetric analysis: Theories of acid-base, redox, complex metric, iodometric and precipitation titrations. Detection of end point in redox titration, choice of indicators for the saturations. Principles of gravimetric analysis: precipitation, coagulation, peptization, co-precipitation, post-precipitation, digestion, filtration and washing of precipitate, drying and ignition.

**Unit-2: Treatment of analytical data:**

(10hrs)

Types of errors, significant figures and its importance, accuracy-methods of expressing accuracy, absolute and relative errors, error analysis and minimization of errors.

Precision - methods of expressing precision, standard deviation and confidence limit. The correlation coefficient.

**Unit-3: Separation techniques in Chemical analysis:**

(10hrs)

Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism. Application- Determination of Iron (III).

Ion Exchange: Introduction, action of ionex change resins, separation of inorganic mixtures, applications.

**Unit- 4: Chromatography: Part - I (10hrs)**

Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems,  $R_f$  values, factors effecting  $R_f$  values.

Paper Chromatography: Principles,  $R_f$  values, experimental procedures, choice of paper and solvent systems, developments of chromatogram-ascending, descending and radial. Two dimensional chromatography, applications.

## Unit- 5: Chromatography: Part - II (10hrs)

Thin layer Chromatography (TLC): Advantages. Principles, factors effecting  $R_f$  values. Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation techniques, Applications. HPLC: Basic principles and applications.

### III. Lab work-Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Analytical Chemistry lab.
2. Learn the procedures of preparation of primary and secondary standard solutions.
3. Demonstrate skills in the preparation of Paper, Thin layer and column Chromatography.
4. Acquire skills in observing the Chromatogram.
5. Perform some separation techniques of Organic compounds.

### IV. Practical (Laboratory) Syllabus :( 30hrs) (Max.50Marks).

1. Identification and handling of various laboratory equipment.
2. Determination of Zn(II)/ Mg(II) using EDTA
3. Determination of Fe (II) present in an Iron tablet using  $\text{KMnO}_4$  .Redox titration.
4. Determination of Saponification value of oil and Iodine value of oil.
5. Paper chromatographic separation of  $\text{Fe}^{3+}$ ,  $\text{Al}^{3+}$ , and  $\text{Cr}^{3+}$ .
6. Separation and identification of the monosaccharaides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the  $R_f$  values.
7. Chromatographic separation of the active ingredients of plants, flowers and juices by TLC.
8. Separation by Column Chromatography – Mixture of Ortho and Para Nitro anilines.

### V. List of Reference Books

1. Analytical Chemistry by Skoog and Miller
2. A text book of qualitative in organic analysis by A.I.Vogel
3. Nano chemistry by Geoffrey Ozin and Andre Arsenault
4. Stereo chemistry by D.Nasipuri
5. Organic Chemistry by Clayden
6. Analytical Chemistry by Gary D. Christian, 6<sup>th</sup> edition
7. Chemistry experiments for instrumental methods, Donald T Sawyer William
8. Instrumental methods of analysis, Willard, Merit, Dean, 6<sup>th</sup> edition.
9. Web related references suggested by teacher.

### VI. Co-Curricular Activities:

a) **Mandatory:** (training of students by teacher on field related skills: 15 hrs.)

1. **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on field related Quantitative techniques like Separation techniques, preparation by Column, preparation of TLC and determination of the purity of the sample.
2. **For Student:** Individual visit to any one of the Field agency, research laboratories in universities/research organizations/private sector culminating writing and submission of a hand-written fieldwork/project work Report not exceeding 10 pages in the given format.
3. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of places visited, observations, findings and acknowledgements.*
5. Unit tests (IE).

**b) Suggested Co-Curricular Activities:**

1. Training of students by related industrial experts.
2. Visitor research organizations and laboratories.
3. Invited lectures and presentations on related topics by field / industrial experts.
4. Assignments.
5. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
6. Preparation of videos on tools, techniques and applications of chromatography.

**VII. Suggested Question Paper Pattern and model :**

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

**PART-A:** Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

**PART- B:** Consists of FIVE internal choice essay questions. Each question carries 10 marks.

Four-year B.Sc. (Hons)  
Domain Subject: Chemistry  
IV Year B. Sc.(Hons)- Semester – V (from 2022-23)

MaxMarks: 100+50

Course7- E: Cosmetics and Pharmaceutical Chemistry  
(Skill Enhancement Course (Elective), Credits- 05)

### I. Learning Outcomes:

Students after successful completion of the course will be able to:

1. Explain the principles of formulation and application of Cosmetics & perfumes.
2. Acquire a critical knowledge on synthetic techniques of drugs.
3. Demonstrate the skills in various aspects of the fermentation technology and apply for production.
4. Comprehend the applications offer mentation.

II. Syllabus: Total Hours: 90, including Teaching, Lab, Field Skills Training, Unit tests etc.)

#### Unit- I Chemistry of Cosmetics

(8hrs)

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours.

#### Unit- II Chemistry of Perfumes

(8hrs)

Essential oils and their importance in cosmetic industries with reference to Eugenol, Geranial, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmine, Civet one, Mascon.

#### Unit-III Drugs & Pharmaceuticals – I

(10hrs)

Drug discovery, design and development; Basic Retrosynthetic approach. Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, anti-inflammatory agents (Aspirin, paracetamol, ibuprofen)

#### Unit-IV Drugs & Pharmaceuticals - II

(12hrs)

Synthesis of the representative drugs of the following classes: Antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam), Cardiovascular (Glycerol triturate), antilaprosy (Daps one), HIV-AIDS related drugs (AZT-Zidovudine).

#### Unit – V Fermentation (12hrs)

Aerobic and anaerobic fermentation. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin, (iii) Lysine, Glutamic acid, Vitamin B<sub>2</sub>, Vitamin B<sub>12</sub> and Vitamin C.

### III. Lab work-Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. The ability to develop comprehensive product development programs to meet new product criteria and timing.
2. Acquire skills in the preparation of Cosmeceuticals.
3. Demonstrate proficiency in the experimental techniques for fermentation and microbial production of enzymes.

6. Critically develop, apply, report, interpret and reflect on strategies for collecting data in the lab and field.

#### IV. Practical (Laboratory) Syllabus :( 30hrs) (Max.50Marks)

1. Identification of various equipment in the laboratory
2. Preparation of talcum powder.
3. Preparation of shampoo.
4. Preparation of hair remover.
5. Preparation of face cream.
6. Preparation of nail polish and nail polish remover.
7. Preparation of Aspirin and it's analysis.
8. Preparation of Magnesium bisilicate (Antacid).
9. Fermentation process.

#### V. Reference Books:

1. A handbook of Industrial Organic Chemistry by Samuel P Sadtler, JB Lippincott company.
2. Handbook Industrial Chemistry by Mohammad Farhat Ali Khan, First edition
3. Related online methods available.
4. Industrial Chemistry, E. Stocchi: Vol -I, Ellis Horwood Ltd. UK.
5. Engineering Chemistry P.C. Jain, M. Jain, Dhanpat Rai & Sons, Delhi.
6. Industrial Chemistry, Sharma, B.K. & Gaur, , Goel Publishing House, Meerut(1996)
7. Introduction to Medicinal Chemistry, G.L. Patrick: Oxford University Press, UK.
8. Medicinal and Pharmaceutical Chemistry, Hakishan, V.K. Kapoor:, Vallabh Prakashan, Pitampura, New Delhi.
9. Principles of Medicinal Chemistry, William O. Foye, Thomas L., Lemke, David A. William: B.I. Waverly Pvt. Ltd. New Delhi.
10. Industrial Microbiology, 3rd Edition, JR Casida L.E. (2015) New Age International (P) Limited Publishers, New Delhi, India.
11. Industrial Microbiology: An Introduction. 1st Edition, Waites M.J., Morgan N.L., Rockey J.S. and Highton G. (2001) Blackwell Science, London, UK.
12. Microbiology. 5th Edition, Pelczar M.J., Chan E.C.S. and Krieg N.R. (2003) Tata McGraw-Hill Publishing Company Limited, New Delhi.

#### VI. Co-Curricular Activities:

##### a) Mandatory :( Training of students by teacher on field related skills: 15hrs)

1. **For Teacher:** Training of students by the teacher in laboratory and field for not less than 15 hours on field skills/techniques like purification of the crude, Separation techniques, synthesis of simple drugs etc.
2. **For Student:** Individual visit to any one of the related local agencies, cosmetic industry, pharmaceutical laboratories in universities / research organizations / private sector culminating writing and submission of a hand-written fieldwork/project work Report not exceeding 10 pages in the given format.
3. Max marks for Fieldwork/project work Report: 05.
4. Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of places visited, observations, findings and acknowledgements.*
5. Unit tests (IE).

##### b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identifying tools in plant biotechnology and their handling, operational techniques with safety and security, IPR)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on tools and techniques in plant biotechnology.
5. Collection of material/sources/photos related to products of plant tissue culture writing and

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**Model Papers**

**For Domain Subject: Chemistry**

Question Paper pattern for **affiliated colleges** of '**Andhra University**' region is as described below:

- The Semester-V question paper consists of two Parts / Parts.
- PART-A: Consists of EIGHT short answer questions out of which 5 are to be answered. Each question carries 5 marks.
- PART- B: Consists of FIVE internal choice essay questions. Each question carries 10 marks.

7. Invited lectures and presentations on related topics by field/industrial experts.

### **Suggested Question Paper Pattern and Model:**

For Domain Subject: Chemistry

Question Paper pattern for affiliated colleges of 'Andhra University' region is as described below:

The Semester-V question paper consists of two Parts / Sections.

PART-A: Consists of EIGHT short answer questions out of which 5 are to be answered.  
Each question carries 5 marks.

PART- B: Consists of FIVE internal choice essay questions. Each question carries 10 marks.

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**MODEL PAPER**  
**B. Sc, DEGREE THIRD YEAR EXAMINATIONS**  
**Course 6-A: Synthetic Organic Chemistry**

Time: 3 hours

Maximum Marks: 75

**PART-A**

5 X 5 = 25 Marks

Answer any FIVE of the following questions.

1. Construct the  $\pi$  - molecular orbitals of 1, 3-butadiene.  
1, 3-బ్యూటాడయాన్ యొక్క  $\pi$  - అణు ఆర్బిటాళ్ళను నిర్మింపుము.
2. Give the differences between thermal and photochemical reactions.  
ఉష్ణ మరియు కాంతి-రసాయన చర్యల మధ్య తేడాలను తెలియజేయుము.
3. What is Paterno - Buchi reaction and give an example.  
Paterno - Buchi చర్య అనగానేమి? ఒక ఉదాహరణ ఇమ్ము.
4. Write short notes on singlet and triplet states.  
సింగ్లెట్ మరియు ట్రిప్లెట్ స్థాయిలపైన లఘు వ్యాఖ్య వ్రాయుము.
5. Define the terms disconnection, synthon and target molecule.  
డిస్కనెక్ట్, సింథాన్ మరియు టార్గెట్ మాలిక్యుల్ (అణువు) అనే పదాలను నిర్వచింపుము.
6. Discuss about Wittig reaction.  
విట్టిగ్ చర్యను గూర్చి చర్చింపుము.
7. Write briefly about Stork - enamine reaction.  
స్టోర్క్-యినమైన్ చర్యను గూర్చి వ్రాయుము.
8. Explain the mechanism of allylic bromination with NBS reagent.  
NBS కారకంతో అలైలిక్ బ్రోమినేషన్ యొక్క చర్యా విధానం ను వివరింపుము.

**PART-B**

5 X 10 = 50 Marks

Answer ALL the questions.

9. a) What are electrocyclic reactions and explain  $4n \pi e^-$  electrocyclization using Woodward-Hoffmann selection rules.  
ఎలక్ట్రోసైక్లిక్ చర్యలు అంటే ఏమిటి మరియు వుడ్‌వార్డ్-హాఫ్మన్ ఎంపిక నియమాలను ఉపయోగించి  $4n \pi e^-$  ఎలక్ట్రోసైక్లిజేషన్‌ను వివరింపుము.  
(Or)  
b) What are cycloaddition reactions and explain  $(4\pi + 2\pi)$  cycloaddition using Woodward-Hoffmann selection rules.  
సైక్లో ఎడిషన్ (వలయ సంకలన) చర్యలు అంటే ఏమిటి మరియు వుడ్‌వార్డ్-హాఫ్మన్ ఎంపిక నియమాలను ఉపయోగించి  $(4\pi + 2\pi)$  సైక్లో ఎడిషన్ ను వివరింపుము.
10. a) Discuss various physical processes in Jablonski diagram.  
జాబ్లన్స్కీ రేఖాచిత్రంలో వివిధ భౌతిక ప్రక్రియలను చర్చింపుము.  
(Or)  
b) Explain Norrish type-1 and type-2 reactions with suitable examples.  
నార్రిష్ టైప్-1 మరియు టైప్-2 చర్యలను తగిన ఉదాహరణలతో వివరింపుము.
11. a) Give the retro synthetic analysis of cyclohexene.  
సైక్లోహెక్సేన్ యొక్క రిట్రో సింథటిక్ విశ్లేషణను ఇవ్వండి తెలుపుము.  
(Or)  
b) Give the retro synthetic analysis of 4-Nitro toluene.  
4-నైట్రో టోలీన్ యొక్క రిట్రో సింథటిక్ విశ్లేషణను తెలుపుము.

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12. a) Explain Baily-Hillman and Heck reactions with mechanisms.

బైలిస్-హిల్మాన్ మరియు హెక్ చర్యలను చర్యా విధాన సహితంగా వివరింపుము.

(Or)

b) Explain Shapiro reaction and Suzuki coupling with mechanism.

మెకానిజంట్ షాపిరో చర్య మరియు సుజుకి కప్లింగ్‌ని వివరింపుము.

13. a) Discuss about the PCC and  $\text{SeO}_2$  oxidations.

PCC మరియు  $\text{SeO}_2$  ఆక్సీకరణాలను గూర్చి చర్చింపుము.

(Or)

b) Discuss about the  $\text{LiAlH}_4$  reduction mechanism.

$\text{LiAlH}_4$  క్షయకరణ విధానంను గూర్చి చర్చింపుము.

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**MODEL PAPER**  
**B. Sc, DEGREE THIRD YEAR EXAMINATIONS**  
**Course7-A: Analysis of Organic Compounds**  
**Maximum Marks: 75**

Time: 3 hours

**PART-A**

**5 X 5 = 25 Marks**

Answer any FIVE of the following questions.

1. Write about the basic principles involved in mass spectrometry.  
మాస్ స్పెక్ట్రోమెట్రీలో (ద్రవ్యరాశి వర్ణపట శాస్త్రంలో) ఉన్న ప్రాథమిక సూత్రాలను గూర్చి వ్రాయుము.
2. Define and explain about molecular ions and metastable ions in mass spectrometry.  
మాస్ స్పెక్ట్రోమెట్రీలో అణు మరియు మెటాస్టేబుల్ అయాన్లను గూర్చి నిర్వచించి, వివరింపుము.
3. Write the structure elucidation of 2, 2, 3, 3-Tetra methyl butane.  
2, 2, 3, 3-టెట్రా మిథైల్ బ్యూటేన్ యొక్క నిర్మాణ విశదీకరణ/వివరణను వ్రాయుము.
4. Give the structure elucidation of cinnamic acid with the aid of IR, NMR and Mass spectra.  
IR, NMR మరియు మాస్ స్పెక్ట్రా సహాయంతో సిన్నమిక్ యాసిడ్ నిర్మాణాత్మక విశదీకరణను వివరింపుము.
5. What is solvent extraction? Explain.  
ద్రావణి నిష్కర్షణ అనగానేమి? వివరింపుము.
6. What are the advantages of thin layer chromatography (TLC)?  
సన్నని పొర క్రోమాటోగ్రఫీ (TLC) యొక్క ప్రయోజనాలు ఏమిటి?
7. Write any four applications of column chromatography.  
కాలమ్ క్రోమాటోగ్రఫీ యొక్క ఏవైనా నాలుగు అనువర్తనాలను వ్రాయుము.
8. Discuss the applications of paper chromatography.  
పేపర్ క్రోమాటోగ్రఫీ యొక్క అనువర్తనాలను చర్చింపుము.

**PART-B**

**5 X 10 = 50 Marks**

Answer ALL the questions.

9. a) Give the fragmentation for toluene and butyraldehyde in the mass spectrum.  
మాస్ స్పెక్ట్రంలో టోలీన్ మరియు బ్యూటిరాల్డిహైడ్ ల ఫ్రాగ్మెంటేషన్ ను తెలుపుము.  
(Or)  
b) Sketch the instrumentation diagram of mass spectrometry and explain.  
మాస్ స్పెక్ట్రోమెట్రీ యొక్క ఇన్స్ట్రుమెంటేషన్ రేఖాచిత్రాన్ని గీచి, వివరింపుము
10. a) Explain the structural elucidation of butane-2, 3-dione with the aid of IR, NMR and Mass spectra.  
IR, NMR మరియు మాస్ స్పెక్ట్రా సహాయంతో బ్యూటేన్-2, 3-డయోన్ యొక్క నిర్మాణాత్మక విశదీకరణను వివరింపుము.  
(Or)  
b) Explain the structural elucidation of propionic acid with IR, NMR and Mass spectra.  
IR, NMR మరియు మాస్ స్పెక్ట్రాతో ప్రొపియోనిక్ ఆమ్లం యొక్క నిర్మాణాత్మక విశదీకరణను వివరింపుము.

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11. a) Give the structural elucidation of phenylacetylene with IR, NMR and Mass spectra.  
IR, NMR మరియు మాస్ స్పెక్ట్రాతో ఫినైలాసిటిలీన్ యొక్క నిర్మాణాత్మక విశదీకరణను వివరింపుము.  
(Or)  
b) Give the structural elucidation of acetophenone with IR, NMR and Mass spectra.  
IR, NMR మరియు మాస్ స్పెక్ట్రాతో ఎసిటోఫీన్ యొక్క నిర్మాణాన్ని వివరింపుము.
12. a) Explain the application of batch extraction in the separation of organic compounds.  
కర్పన సమ్మేళనాల ను వేరుపరుచుటలో బ్యాచ్ డ్రావణి నిష్కర్షణ యొక్క అనువర్తనాన్ని వివరింపుము.  
(Or)  
b) Explain the principle and experimental procedure of TLC.  
TLC యొక్క సూత్రం మరియు ప్రయోగాత్మక విధానాన్ని వివరింపుము.
13. a) Explain the principle and experimental procedure of column chromatography.  
కాలమ్ క్రోమాటోగ్రఫీ సూత్రం మరియు ప్రయోగాత్మక విధానాన్ని వివరింపుము.  
(Or)  
b) Draw the block diagram for HPLC and explain the functions of the various components.  
HPLC బ్లాక్ రేఖాచిత్రాన్ని గీసి, వివిధ భాగాల విధుల విధులను వివరింపుము.

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**MODEL PAPER**  
**B.Sc., DEGREE EXAMINATION**  
**COURSE-6B – ANALYTICAL METHODS IN CHEMISTRY-1**

Time: 3 hours

Maximum Marks: 75

**PART-A**

Answer any FIVE the following questions. Each carry FIVE marks

5X5=25 Marks

1. What are primary and secondary standard Solutions?  
ప్రాథమిక మరియు ద్వితీయ ప్రామాణిక ద్రావణాలు అనగానేమి?
2. Write a short note on analytical methods in chemistry.  
రసాయన శాస్త్రంలో విశ్లేషణ పద్ధతులపై లఘు వ్యాఖ్యను వ్రాయుము.
3. Explain Iodometric titrations with a suitable example.  
అయోడోమెట్రిక్ టైట్రేషన్లను (అంశమాపనాలను) తగిన ఉదాహరణలతో వివరింపుము.
4. Discuss the choice of indicators in titrations with suitable examples.  
తగిన ఉదాహరణలతో టైట్రేషన్లలో సూచికల ఎంపికను గూర్చి చర్చింపుము.
5. Define and explain Precipitation and Coagulation.  
అవక్షేపనం మరియు స్కందనాలను నిర్వచించి, వివరింపుము.
6. What is Correlation coefficient?  
సహసంబంధ గుణకం అంటే ఏమిటి?
7. What are the methods of expressing Accuracy?  
ఖచ్చితత్వాన్ని వ్యక్తీకరించే పద్ధతులు ఏవి?
8. Define and explain DO and COD.  
DO మరియు COD లను నిర్వచించి, వివరింపుము.

**PART-B**

Answer ALL the questions. Each carry TEN marks 5X10=50 Marks

- 9 (a). Give the principles of volumetric analysis and explain Molarity and Normality with examples.  
ఘనపరిమాణత్మక విశ్లేషణా సూత్రాలను తెలిపి, మోలారిటీ మరియు నార్మాలిటీ ఉదాహరణలతో వివరింపుము.

(Or)

- (b) Write the Description and use of common laboratory apparatus.  
సాధారణ ప్రయోగశాల ఉపకరణాల వర్ణనను మరియు ఉపయోగాలను వ్రాయుము.

- 10.(a). Explain about acid-base titrations in detail.  
ఆమ్ల-క్షార అంశమాపనాలను గూర్చి సవివరంగా తెలుపుము.

(Or)

- (b) Explain complexometric titrations with examples.  
కాంప్లెక్సోమెట్రిక్ టైట్రేషన్లను ఉదాహరణలతో వివరింపుము.

- 11.(a). What is the principle involved in gravimetric analysis? Explain peptization and filtration?  
గ్రావిమెట్రిక్ విశ్లేషణలో ఇమిడి ఉన్న సూత్రం ఏమిటి? పెప్టైజేషన్ మరియు వడపోతలను వివరింపుము.

(or)

- (b) Explain Co-Precipitation and Post-Precipitation in detail.



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సహ అవక్షేపనం మరియు ఉత్తర అవక్షేపనలను సవివరంగా తెలుపుము.

12.(a). Discuss various types of errors with suitable examples.

తగిన ఉదాహరణలతో వివిధ రకాల దోషాలను గూర్చి చర్చింపుము.

Or

(b) Give a brief account on standard deviation, accuracy and precision.

ప్రామాణిక విచలనం, ఖచ్చితత్వం మరియు సునిశ్చితత్వం పై సంక్షిప్త వివరణనిమ్ము.

13.(a) Describe methods for the conversion of permanent hard water to soft water.

శాశ్వత హార్డ్ వాటర్‌ను సాఫ్ట్ వాటర్‌గా మార్చే పద్ధతులను వివరింపుము.

Or

(b) Describe the determination of chloride using Mohr's method.

మోర్ పద్ధతిని ఉపయోగించి క్లోరైడ్ నిర్ధారణను వివరింపుము.

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**MODEL PAPER**  
**B.Sc., DEGREE EXAMINATION PAPER**  
**COURSE-7B – ANALYTICAL METHODS IN CHEMISTRY-2**

Time: 3 hours

Maximum Marks: 75

**PART-A**

Answer any FIVE the following questions. Each Carry FIVE marks

5X5=25 Marks

1. What is the retardation factor (Rf)? Give the factors affecting the Rf value.  
రిటార్డేషన్ ఫ్యాక్టర్ (Rf) అంటే ఏమిటి? Rf విలువను ప్రభావితం చేసే అంశాలను తెలుపుము.
2. Discuss about the classification of chromatographic methods.  
క్రోమాటోగ్రాఫిక్ పద్ధతుల వర్గీకరణ గూర్చి చర్చింపుము.
3. Write the applications of Paper chromatography.  
పేపర్ క్రోమాటోగ్రఫీ యొక్క అనువర్తనాలను వ్రాయుము.
4. Write the applications of Column chromatography.  
కాలమ్ క్రోమాటోగ్రఫీ యొక్క అనువర్తనాలను వ్రాయుము.
5. What is isocratic elution in HPLC?  
HPLCలో ఐసోక్రటిక్ ఎల్యూషన్ అనగానేమి?
6. Explain the determination of  $Fe^{+2}$  by using a spectrophotometer.  
స్పెక్ట్రోఫోటోమీటర్ ఉపయోగించి  $Fe^{+2}$  నిర్ణయించుటను వివరింపుము.
7. Describe the working of a double beam spectrophotometer.  
డబుల్ బీమ్ స్పెక్ట్రోఫోటోమీటర్ యొక్క పని చేయు విధానాన్ని వివరింపుము.
8. Distinguish between atomic absorption and emission absorption.  
పరమాణు శోషణ మరియు ఉద్గార శోషణ మధ్య తేడాలను గుర్తింపుము.

**PART-B**

Answer ALL the questions. Each carry TEN marks 5 X 10 = 50 Marks

- 9 (a). Write about adsorbents and solvents used in TLC.  
TLCలో ఉపయోగించే శోషకాలు మరియు ద్రావణీలను గురించి వ్రాయుము.  
(Or)  
(b) Explain the principle and experimental procedure of TLC.  
TLC యొక్క సూత్రం మరియు ప్రయోగాత్మక విధానాన్ని వివరింపుము.
- 10.(a). Discuss different types of development techniques of paper chromatograms.  
పేపర్ క్రోమాటోగ్రామాల వివిధ రకాల అభివృద్ధి పద్ధతులను చర్చింపుము.  
(Or)  
(b) Explain the principle and experimental procedure of paper chromatography.  
పేపర్ క్రోమాటోగ్రఫీ యొక్క సూత్రం మరియు ప్రయోగాత్మక విధానాన్ని వివరింపుము.
- 11.(a). What is HPLC and its principle? Draw and describe the block diagram of HPLC.  
HPLC మరియు దాని సూత్రం ఏమిటి? HPLC యొక్క బ్లాక్ రేఖాచిత్రాన్ని గీచి వివరింపుము.  
(or)  
(b) Write about the principle and experimental procedure of Column chromatography.  
కాలమ్ క్రోమాటోగ్రఫీ సూత్రం మరియు ప్రయోగాత్మక విధానం గూర్చి వ్రాయుము.

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12.(a). Explain how  $Mn^{2+}$  is determined quantitatively using Beer-Lambert's law.

బీర్-లాంబెర్ట్ నియమాన్ని ఉపయోగించి  $Mn^{2+}$  పరిమాణాత్మకంగా ఎలా నిర్ణయించబడుతుందో వివరింపుము.

Or

(b) Derive Beer-Lambert's law. Give its deviations.

బీర్-లాంబెర్ట్ నియమాన్ని ఉత్పాదించుము. దాని విచలనాలను తెలుపుము.

13.(a) Explain the principle and instrumentation of Atomic Absorption Spectroscopy.

అటామిక్ అబ్సార్ప్షన్ స్పెక్ట్రోస్కోపీ సూత్రం మరియు సాధనాన్ని వివరింపుము.

Or

(b) Explain the applications of Atomic Absorption Spectroscopy.

అటామిక్ అబ్సార్ప్షన్ స్పెక్ట్రోస్కోపీ యొక్క అనువర్తనాలను వివరింపుము.

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**MODEL PAPER**  
**B.Sc., DEGREE EXAMINATION PAPER**  
**Course6-C: Industrial Chemistry-1**

Time:3 hours

Maximum Marks:75

**Part -- A**

Answer any FIVE questions from the following.

5 X 5 = 25 M

1. Explain compound fertilisers with examples.

మిశ్రమ ఎరువులను ఉదాహరణలతో వివరింపుము.

2. Give the composition of the superphosphate of lime.

సూపర్ ఫాస్ఫేట్ ఆఫ్ లైమ్ యొక్క సంఘటనాన్ని తెలుపుము.

3. Write the composition and uses of feldspar.

ఫెల్డ్స్పార్ యొక్క సంఘటనాన్ని మరియు ఉపయోగాలను వ్రాయుము.

4. Explain the setting process of cement.

సిమెంట్ సెట్టింగ్ విధానాన్ని వివరింపుము.

5. Define thinners and enamels with examples.

ఉదాహరణలతో థిన్నర్ లు మరియు ఎనామిల్ లను నిర్వచింపుము.

6. Describe the tests for the estimation of sucrose.

సుక్రోజ్ ను లెక్కగట్టుటకు పరీక్షలను తెలుపుము.

7. Write the systematic flow diagram for the manufacture of sugar.

చక్కెర తయారీకి క్రమబద్ధమైన ప్రవాహ రేఖాచిత్రాన్ని వ్రాయుము.

8. Discuss the terms filling and sizing in the paper industry.

కాగితం పరిశ్రమలో పూరించడం మరియు పరిమాణాన్ని మార్చడం అనే పదాలను చర్చించుము.

**Part -- B**

Answer ALL the following questions.

5 X 10 = 50 M

9. (a) Write about the classification of fertilisers.

ఎరువుల వర్గీకరణ గూర్చి వ్రాయుము.

(Or)

(b) Explain the process of industrial manufacture of ammonium nitrate.

అమోనియం నైట్రేట్ యొక్క పారిశ్రామిక తయారీ ప్రక్రియను వివరింపుము.

10. (a) Explain high technology ceramics with their applications.

హై టెక్నాలజీ సిరమిక్స్ ను వాటి అనువర్తనాలతో వివరింపుము.

(Or)

(b) Explain the manufacture of cement.

సిమెంట్ తయారీని వివరింపుము.

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11. (a) Write the objectives of surface coatings.

ఉపరితల పూత యొక్క లక్ష్యాలను వ్రాయుము.

(Or)

(b) Explain briefly eco paints and plastic paints.

ఎకో పెయింట్స్ మరియు ప్లాస్టిక్ పెయింట్స్ గురించి క్లుప్తంగా వివరింపుము.

12. (a) Explain the industrial process of manufacturing sugar from molasses.

మొలాసిస్ నుండి చక్కెరను తయారు చేసే పారిశ్రామిక విధానాన్ని వివరింపుము.

(Or)

(b) Explain the industrial process of preparation of sucrose from beetroot.

బీట్ రూట్ నుండి సుక్రోజ్ తయారీకి సంబంధించిన పారిశ్రామిక విధానాన్ని వివరింపుము.

13. (a) Give the preparation of kraft pulp and sulphate pulp.

క్రాఫ్ట్ గుడ్డు మరియు సల్ఫేట్ గుడ్డు తయారీని తెలుపుము.

(Or)

(b) Write about the different steps involved in preparation of paper in the paper industry.

కాగితపు పరిశ్రమలో పేపర్ తయారీలో ఉండే వివిధ దశలను గూర్చి వ్రాయుము.

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Domain Subject: CHEMISTRY

**MODEL PAPER**  
**B.Sc., DEGREE EXAMINATION PAPER**  
**Course7-C: Industrial Chemistry-2**

Time:3 hours

Maximum Marks:75

**Part -- A**

Answer any FIVE questions from the following.

5 X 5 = 25 M

1. Explain degree of polymerisation.

పాలిమరైజేషన్ (పాలిమరీకరణం) స్థాయిని వివరింపుము.

2. Write the differences between thermosetting and thermoplastic polymers.

థర్మోసెటింగ్ మరియు థర్మోప్లాస్టిక్ పాలిమర్ల మధ్య తేడాలను వ్రాయుము.

3. Write about condensation polymers.

కండెన్సేషన్ (సంఘనన) పాలిమర్ల గూర్చి వ్రాయుము.

4. Give the preparation process for acrylonitrile.

ఎక్రిలోనైట్రైల్ తయారీని ప్రక్రియను తెలుపుము.

5. Write a note on the greenhouse effect.

గ్రీన్ హౌస్ (హరిత గృహ) ప్రభావంపై లఘు వ్యాఖ్య వ్రాయుము.

6. Define and explain COD and BOD.

COD మరియు BOD లను నిర్వచించి, వివరింపుము.

7. Explain the pollution effect caused by Nitrogen oxides.

నైట్రోజన్ ఆక్సైడ్ల వలన కలిగే కాలుష్య ప్రభావాన్ని వివరింపుము.

8. Explain classification of solid waste.

ఘన వ్యర్థాల వర్గీకరణను వివరింపుము.

**Part -- B**

Answer ALL the following questions.

5 X 10 = 50 M

9. (a) Discuss briefly about the classification of polymers.

పాలిమర్ల వర్గీకరణ గురించి క్లుప్తంగా చర్చింపుము.

(Or)

(b) Explain linear and branched chain polymerization processes.

రేఖీయ మరియు శాఖాయిత శృంఖల పాలిమరీకరణ ప్రక్రియలను వివరింపుము.

10. (a) Explain Zeigler Natta's catalysis.

జీగ్లర్ నట్టా ఉత్ప్రేరకాన్ని వివరింపుము.

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(b) Explain the mechanism of ionic and free radical polymerization.

అయానిక్ మరియు ఫ్రీ రాడికల్ పాలిమరైజేషన్ యొక్క చర్యా విధానాన్ని వివరింపుము.

11. (a) Explain (i) photochemical smog (ii) Depletion of ozone layers.

(i) ఫోటోకెమికల్ స్మోగ్ (ii) ఓజోన్ పొరల క్షీణతను వివరింపుము.

(Or)

(b) Discuss the effect of different air pollutants.

వివిధ వాయు కాలుష్య కారకాల ప్రభావాన్ని చర్చింపుము.

12. (a) Explain the hardness of water. Explain methods to remove hardness of water.

నీటి కఠిన్యం మరియు నీటి కఠిన్యాన్ని తొలగించే పద్ధతులను వివరింపుము.

(Or)

(b) Write the experimental methods to determine the chloride and alkalinity in water.

నీటిలో క్లోరైడ్ మరియు ఆల్కలీనిటీని నిర్ణయించడానికి ప్రయోగాత్మక పద్ధతులను వ్రాయుము.

13. (a) Explain different steps involved in the wastewater treatment process.

వ్యర్థ జలాల శుద్ధి ప్రక్రియలో వివిధ దశలను వివరింపుము.

(Or)

(b) Explain the solid waste management briefly.

ఘన వ్యర్థ పదార్థాల నిర్వహణ గురించి క్లుప్తంగా వివరింపుము.

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**MODEL PAPER**  
**B. Sc, DEGREE THIRD YEAR EXAMINATIONS**  
**Paper-6D, ENVIRONMENTAL CHEMISTRY**

Time: 3 hours

Maximum Marks: 75

**Part - A**

Answer any five of the following questions.

5x5=25 Marks

- 1 Explain the terms with examples a) Pollutant b) Contaminant.  
ఎ) కాలుష్యకారిణి బి) మాలిన్యకారిణి పదాలను ఉదాహరణలతో వివరింపుము.
- 2 Write the reactions of atmospheric oxygen  
వాతావరణ ఆక్సిజన్ చర్యలను వ్రాయుము.
3. What are Acid rains?  
ఆమ్ల వర్షాలు అంటే ఏమిటి?
4. Write a short note on the Bhopal gas disaster.  
భోపాల్ గ్యాస్ దుర్ఘటనపై లఘు వ్యాఖ్యను వ్రాయుము.
5. Define and explain COD and BOD.  
COD మరియు BOD లను నిర్వచించి, వివరింపుము.
6. Explain classification of solid waste.  
ఘన వ్యర్థాల వర్గీకరణను వివరింపుము.
7. Describe Biodiversity at regional level.  
క్షేత్ర స్థాయిలో జీవవైవిధ్యాన్ని వివరింపుము.
8. Discuss briefly about the Carbon cycle.  
కార్బన్ వలయం గురించి క్లుప్తంగా చర్చింపుము.

**Part - B**

Answer any five of the following questions

5x10 = 50

- 9(a) Discuss about renewable energy resources.  
పునరుత్పాదక ఇంధన వనరుల గురించి చర్చింపుము.  
OR  
(b) Explain the scope and importance of the environment in now-a-days and write about Hydrological cycle.  
ప్రస్తుత రోజుల్లో పర్యావరణం యొక్క పరిధిని మరియు ప్రాముఖ్యతను వివరింపుము.  
హైడ్రాలజికల్ వలయం గురించి వ్రాయుము.
- 10(a) Explain the formation and depletion of the Ozone layer.  
ఓజోన్ పొర ఏర్పడటం మరియు క్షీణతను వివరింపుము.  
OR  
(b) Discuss about the sources and classification of Air Pollution.  
వాయు కాలుష్యం యొక్క మూలాలు మరియు వర్గీకరణ గురించి చర్చింపుము.
- 11(a) Describe the methods to convert permanent hard water to soft water.  
శాశ్వతకఠిన జలాన్ని మృదు జలంగా మార్చే పద్ధతులను వివరింపుము.  
OR  
(b) Discuss about the Industrial wastewater treatment.  
పారిశ్రామిక మురుగునీటి శుద్ధి ప్రక్రియను గురించి చర్చింపుము.
- 12 (a) what are the toxic effects of cyanide on the environment?  
పర్యావరణంపై సైనైడ్ యొక్క విషపూరిత ప్రభావాలు ఏమిటి?

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OR

(b) Describe the toxic effects of Lead and Mercury.

లెడ్ మరియు మెర్క్యురీ యొక్క విష ప్రభావాలను వివరింపుము.

13(a) Outline the functions and types of ecosystems.

పర్యావరణ వ్యవస్థల విధులు మరియు రకాలను వివరింపుము.

OR

(b) Write a detailed essay on biodiversity.

జీవవైవిధ్యంపై వివరణాత్మక వ్యాసాన్ని వ్రాయుము.

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**MODEL PAPER**

**B. Sc, DEGREE THIRD YEAR EXAMINATIONS**

**Paper-7D, GREEN CHEMISTRY & NANOTECHNOLOGY**

**Time: 3 hours**

**Maximum Marks: 75**

**Part -A**

**Answer any five of the following questions**

**5x5=25**

1. Discuss the need for green chemistry?

గ్రీన్ కెమిస్ట్రీ (హరిత రశాయన శాస్త్రం) అవశ్యకతను చర్చింపుము.

2. Write a short note on atom economy reactions.

పరమాణు ఆర్థిక పొదుపు చర్యలపై లఘు వ్యాఖ్యను వ్రాయుము.

3. Write short notes on Suzuki reaction.

సుజుకి చర్యపై లఘు వ్యాఖ్యను వ్రాయుము.

4. Explain solid supported synthesis.

ఘన సహాయక సంశ్లేషణను వివరింపుము.

5. Describe the advantages of Microwave Assisted Organic Synthesis (MAOS).

మైక్రోవేవ్ అసిస్టెడ్ ఆర్గానిక్ సింథసిస్ ((MAOS) ప్రయోజనాలను వివరింపుము.

6. Write a Brief note about Bio catalysis.

జీవ ఉత్పరణ గూర్చి సంక్షిప్త వ్యాఖ్యను వ్రాయుము.

7. What is chemical vapour synthesis?

రసాయన ఆవిరి సంశ్లేషణ అంటే ఏమిటి?

8. Describe the sol-gel method.

సోల్-జెల్ పద్ధతిని వివరింపుము.

**Part - B**

**Answer any five of the following questions**

**5x10 = 50**

9(a) Explain the basic principles of green chemistry.

హరిత రశాయన శాస్త్రం యొక్క ప్రాథమిక సూత్రాలను వివరింపుము.

OR

(b) Illustrate the sonication method with any two reactions.

ఏవైన రెండు చర్యల ఉదాహరణలతో సోనికేషన్ పద్ధతిని వివరింపుము.

10(a) Describe the preparation and properties of supercritical carbon dioxide.

సూపర్ క్రిటికల్ కార్బన్ డయాక్సైడ్ తయారీ మరియు ధర్మాలను వివరింపుము.

OR

(b) Write in detail about Green energy and sustainability.

గ్రీన్ ఎనర్జీ మరియు సుస్థిరతల గురించి సవివరంగా వ్రాయుము.

11(a) Explain the synthesis of fused anthraquinones by MAOS.

MAOS ద్వారా ఫ్యూజ్డ్ (సంలీన) ఆంత్రాక్విన్స్ ల సంశ్లేషణను వివరింపుము.

OR

(b) Discuss about green synthesis of Aldol condensation and Cannizzaro condensation.

ఆల్డోల్ సంఘననం మరియు కెనిజారో చర్యల యొక్క హరిత సంశ్లేషణను గురించి చర్చింపుము.

12(a) How are adipic acid and catechol prepared by Green synthesis?

హరిత సంశ్లేషణ ద్వారా అడిపిక్ యాసిడ్ మరియు కాటెకాల్ ఎలా తయారు చేయబడతాయి?

OR



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(b) Describe the green synthetic procedure for the Diels-alder reaction and decarboxylation reaction.

డీల్స్-ఆల్డర్ మరియు డీకార్బాక్సిలేషన్ చర్యల హరిత సజ్లేషన విధానాన్ని వివరింపుము.

13(a) Discuss the classification and applications of Nanomaterials.

నానో మెటీరియల్స్ యొక్క వర్గీకరణ మరియు అనువర్తనాలను చర్చింపుము.

OR

(b) Give a detailed account on the chemical synthesis of nanoparticles.

నానో కణాల రసాయన సంజ్లేషణపై వివరణాత్మక సమాచారాన్ని తెలుపుము.

**MODEL PAPER**  
**B.Sc., DEGREE EXAMINATION**  
**COURSE-6E – ANALYTICAL METHODS IN CHEMISTRY**

Time: 3 hours

Maximum Marks: 75

**PART-A**

Answer any FIVE the following questions. Each carry FIVE marks

5X5=25 Marks

1. Explain Iodometric titrations with a suitable example.  
అయోడోమెట్రిక్ టైట్రేషన్‌లను (అంశమాపనాలను) తగిన ఉదాహరణలతో వివరింపుము.
2. Discuss the choice of indicators in titrations with suitable examples.  
తగిన ఉదాహరణలతో టైట్రేషన్‌లలో సూచికల ఎంపికను గూర్చి చర్చింపుము.
3. Define and explain Precipitation and Coagulation.  
అవక్షేపనం మరియు స్కందనాలను నిర్వచించి, వివరింపుము.
4. What are the methods of expressing Accuracy?  
ఖచ్చితత్వాన్ని వ్యక్తీకరించే పద్ధతులు ఏవి?
5. What is solvent extraction? Explain.  
ద్రావణి నిష్కర్షణ అనగానేమి? వివరింపుము.
6. What is the retardation factor (Rf)? Give the factors affecting the Rf value.  
రిటార్డేషన్ ఫ్యాక్టర్ (Rf) అంటే ఏమిటి? Rf విలువను ప్రభావితం చేసే అంశాలను తెలుపుము.
7. Discuss about the classification of chromatographic methods.  
క్రోమాటోగ్రాఫిక్ పద్ధతుల వర్గీకరణ గూర్చి చర్చింపుము.
8. Write the applications of Paper chromatography.  
పేపర్ క్రోమాటోగ్రఫీ యొక్క అనువర్తనాలను వ్రాయుము.

**PART-B**

5X10=50 Marks

Answer ALL the questions .Each carry TENmarks

- 9 (a). What is the principle involved in gravimetric analysis? Explain peptization and filtration?  
గ్రావిమెట్రిక్ విశ్లేషణలో ఇమిడి ఉన్న సూత్రం ఏమిటి? పెప్టైజేషన్ మరియు వడపోతలను వివరింపుము.  
(Or)  
(b) Explain complexometric titrations with examples.  
కాంప్లెక్సోమెట్రిక్ టైట్రేషన్‌లను ఉదాహరణలతో వివరింపుము.
- 10.(a). Discuss various types of errors with suitable examples.  
తగిన ఉదాహరణలతో వివిధ రకాల దోషాలను గూర్చి చర్చింపుము.  
Or  
(b) Give a brief account on standard deviation, accuracy and precision.  
ప్రామాణిక విచలనం, ఖచ్చితత్వం మరియు సునిశ్చితత్వం పై సంక్షిప్త వివరణనిమ్ము.
- 11.a) Explain the application of batch extraction in the separation of organic compounds.  
కర్పన సమ్మేళనాల ను వేరుపరుచుటలో బ్యాచ్ ద్రావణి నిష్కర్షణ యొక్క అనువర్తనాన్ని వివరింపుము.  
(Or)  
b) How is  $Fe^{3+}$  is determined by solvent extraction method?

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12. ద్రావణ నిష్కర్షణ ద్వారా  $Fe^{3+}$  ఎలా నిర్ణయించబడుతుంది?  
a) Discuss different types of development techniques of paper chromatograms.  
పేపర్ క్రోమటోగ్రామ్ల వివిధ రకాల అభివృద్ధి పద్ధతులను చర్చింపుము.  
(Or)  
b) Explain the principle and experimental procedure of paper chromatography.  
పేపర్ క్రోమటోగ్రఫీ యొక్క సూత్రం మరియు ప్రయోగాత్మక విధానాన్ని వివరింపుము.
13. a) Explain the principle and experimental procedure of column chromatography.  
కాలమ్ క్రోమటోగ్రఫీ సూత్రం మరియు ప్రయోగాత్మక విధానాన్ని వివరింపుము.  
(Or)  
b) Draw the block diagram for HPLC and explain the functions of the various components.  
HPLC బ్లాక్ రేఖాచిత్రాన్ని గీసి, వివిధ భాగాల విధుల విధులను వివరింపుము.

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**MODEL PAPER**  
**B.Sc., DEGREE EXAMINATION**  
**Course7- E: Cosmetics and Pharmaceutical Chemistry**

Time:3 hours

MaximumMarks:75

**PART-A**

Answer any FIVE the following questions. Each carry FIVE marks

5X5=25 Marks

1. Explain the preparation of talcum powder.  
టాల్కమ్ పౌడర్ తయారీని వివరింపుము.
2. Explain the importance of essential oils in the cosmetic industry.  
సౌందర్య సాధనాల పరిశ్రమలో ముఖ్యమైన నూనెల ప్రాముఖ్యతను వివరింపుము.
3. Write a short note on analgesics.  
బాధా నివారిణుల పై లఘు వ్యాఖ్య వ్రాయుము.
4. Outline the synthesis of Aspirin.  
ఆస్పిరిన్ సంశ్లేషణను వివరింపుము.
5. Give the structure of Phenobarbital. Give its therapeutic uses.  
ఫీన్ బార్బిటల్ యొక్క నిర్మాణాన్ని తెలుపుము. దాని చికిత్సా ఉపయోగాలు తెలియజేయుము.
6. Explain the discovery of Penicillin.  
పెన్సిలిన్ ఆవిష్కరణను వివరింపుము.
7. Write a note on the fermentation process for the synthesis of Lysine.  
కీణ్వ ప్రక్రియ ద్వారా లైసిన్ సంశ్లేషణపై లఘు వ్యాఖ్య వ్రాయుము.
8. Outline the production of Ethyl alcohol.  
ఇథైల్ ఆల్కహాల్ ఉత్పత్తిని వివరింపుము.

**PART-B**

Answer ALL the questions. Each carry TENmarks

5X10=50 Marks

9. a) Explain the preparation of different creams. Differentiate between vanishing and cold creams.  
వివిధ క్రీముల తయారీని వివరింపుము. వేనిషింగ్ మరియు కోల్డ్ క్రీమ్ల మధ్య తేడాను తెలుపుము.

(Or)

b) Differentiate between the following:

- i) Perfumes/Cologne and Aftershave ii) Perspiration/sweating and pheromones.  
కీందీ వాటి మధ్య భేదాలను తెలుపుము.
- i) పెర్ఫ్యూమ్లు/కొలోన్ మరియు ఆఫ్టర్ షేవ్ లు ii) చెమట మరియు ఫెరోమోన్ లు.



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10. a) Explain the role and significance of screening in Drug Development.  
ఔషధ అభివృద్ధిలో స్క్రీనింగ్ పాత్ర మరియు ప్రాముఖ్యతను వివరింపుము.  
(Or)

- b) Discuss the retro synthetic approach in drug development.  
ఔషధ అభివృద్ధిలో రెట్రో సింథటిక్ విధానాన్ని చర్చింపుము.

11. a) Discuss the production of Cephalosporin in detail.  
సెఫాలోస్పొరిన్ ఉత్పత్తిని సవివరంగా తెలుపుము.  
(Or)

- b) Outline the synthesis of Chloramphenicol.  
క్లోరాంఫినికాల్ యొక్క సంశ్లేషణను వివరింపుము.

12. a) Discuss how fermentation can be used for the industrial production of vitamin B12 & vitamin C.  
విటమిన్ B12 మరియు విటమిన్ C యొక్క పారిశ్రామిక ఉత్పత్తికి కిణ్వ ప్రక్రియను ఎలా ఉపయోగించవచ్చునో చర్చింపుము.  
(Or)

- b) Discuss the synthesis of Glycerol nitrate and give its medicinal importance.  
గ్లిసరాల్ నైట్రేట్ యొక్క సంశ్లేషణను చర్చింపుము మరియు దాని ఔషధ ప్రాముఖ్యతను తెలుపుము.

13. a) Outline the synthesis of Ibuprofen.  
ఐబుప్రోఫెన్ యొక్క సంశ్లేషణను వివరింపుము.  
(Or)

- b) Write in detail about the preparation of Shampoo.  
షాంపూ తయారీ గురించి వివరంగా వ్రాయుము.



**ADIKAVINANNAYAUNIVERSITY::RAJAHMAHENDRAVARAM**  
**B.A Tourism and Travel Management Syllabus (w.e.f:2020-21A.B)**

**Skill Enhancement Courses (SECs) for Semester -V,**

From 2022-23(Syllabus-Curriculum)

**Structure of SECs for Semester-V**

*(To choose One pair from the Four alternate pairs of SECs)*

Uni Code	Course No 6&7	Name of the Course	Hours/ Week	Credits	Marks	
					Internal Assmt: 20 Field Work/ Project Work: 5	Semester End
	6A	Service Marketing of Tourism	5	4	25	75
	7A	Consumer Behaviour and Customer Relationship Management.	5	4	25	75
OR						
	6B	Sales & Distribution Management	5	4	25	75
	7B	Selling & Negotiation Management	5	4	25	75
OR						
	6C	Tourism Destination Marketing	5	4	25	75
	7C	Itinerary Preparation and Tour Packaging	5	4	25	75
OR						
	6D	Digital Marketing for Tourism Business	5	4	25	75
	7D	Advertising and Brand Management for Tourism	5	4	25	75

**\*Note:** FIRST and SECOND PHASES (2 spells) of APPRENTICESHIP between 1st and 2nd year and between 2nd and 3rd year (two summer vacations)

**\*Note:** THIRD PHASE of APPRENTICESHIP Entire 6th Semester

**Note-1:** For Semester-V for the Subject Travel and Tourism Management any one of the Four Pairs of SECs shall be chosen as Courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C or 6D & 7D. The Pair shall not be broken (ABCD allotment is random, not on any priority basis).

**Note-2:** One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

**ADIKAVIRANNA UNIVERSITY::RAJAHMAHENDRAVARAM****B.A Tourism and Travel Management Syllabus (w.e.f:2020-21A.B)**

<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:6A</b>	<b>Service Marketing Of Tourism</b>	<b>Hrs/Wk:5</b>

**Course outcomes:**

Students at the successful completion of the course will be able to

1. Understand the Services Marketing in Tourism Industry.
2. Aware of the services marketing system in Tourism
3. Demonstrate the marketing services in building and managing customer relationship.
4. Familiarize with the issues of Services Marketing in Tourism and related sectors.
5. Design strategies to deliver greater service quality in Tourism sector.

**Unit 1****Marketing of Tourism Services:**

Concept of Tourism marketing -Need -Importance of Tourism marketing

Types of Tourism marketing- Characteristics of Tourism Services

Classification of Tourism Services

**Unit 2:**

**Service Marketing System:** Importance of Services in Marketing

Services Marketing Mix in Tourism & Hospitality – Service Product Planning

Service Pricing Strategy – Services Distributions

Employees and Staff Roles in Service Delivery-Services Promotions – Physical Evidence

Role of Technology in Services Marketing

Sales force automation in services marketing.

**Unit 3****Customer Relationship in Tourism:**

Need for customer relationship

Strategic Goals of CRM in the Tourism Industry

Role of CRM – Techniques to Manage Relations

Present CRM Practices in Tourism and Hospitality Industry.

**Unit 4****Customer Experience in Service Quality:**

Tourism Service Delivery –Causes of Service Quality gaps in Tourism

Types of gaps - Measuring and improving service Quality in Tourism and hospitality industry

Strategies to resolve the gaps.

**Unit 5:**

**Services from Sectoral Perspective:** Travel & Tourism services – Hospitality

Airlines – Event Management – MICE

Healthcare & Medical- Retail Services.



**References:**

1. Services Marketing People, Technology, Strategy, Christopher Lovelock, Wirtz, Chatterjee, Pearson.
2. Services Marketing—Integrating Customer Focus Across the Firm, Valarie A. Zeithaml & Mary Jo Bitner: TMH.
3. Services Marketing – Concepts planning and implementation, Bhattacharjee, excel, 2009
4. Services Marketing, Srinivasan, PHI.
5. Services – Marketing, Operations and Management, Jauhari, Dutta, Oxford.
6. Services Marketing – Text and Cases, Rajendra Nargundkar, TMH.
7. Marketing of Services, Hoffman, Bateson, Cengage.
8. Service sector Management, C. Bhattacharjee, Jaico.

**Service Marketing for Tourism**

**Co-curricular activities:**

a) Mandatory (Training of the students by the teacher in field related skills: 10hrs.)

1. **For Teacher** : Training of students by a class teacher or by the executive at different tourism organizations / Tour operation companies for a total of 10hrs on the need and importance of Service quality & Service Marketing in tourism business, making the students to understand the process involved in Service Marketing by doing some mock interaction sessions between service providers & students and showing them different types of services involved in tourism activity by displaying some diagrams and flow charts related to the Service Marketing and preparation of customer database and service quality flow charts in a proper way.

2. **For students**: Individual field work on any of the tourism business operating units like travel agency or tour operations or allied sectors of tourism industry and submission of an and written report on Service Marketing in Tourism in a given method of format. Example: Identifying the Various services rendered at star hotel i.e., Novotel, Vijayawada. Another example: Various services being offered to the tourists while purchasing a group tour package at southern travels, Vijayawada

3. Max marks for field work report: 05

4. Suggested format for field work: Title page, student details, content page, introduction, content of work done, findings and conclusions.

5. Unit test

**b) Suggested Co-Curricular activities:**

- 1 Training of the students on tourism business by tourism Marketing & Sales experts.
- 2 Mock role plays on Tourism Service Marketing
- 3 Assignments on the Service Marketing in Travel and Tourism, Hospitality, event management, shopping at tourists spots.
- 4 Attend to the events & MICE programmes at local town, in and around your college premises.
- 5 Assignments on customer experiences on service quality in tourism industry in the context of AP.
- 6 Attend to the seminars, Workshops, Conferences regarding tourism & allied activities services
- 7 Invited lectures by marketing experts in the field of tourism and hospitality.



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<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:7A</b>	<b>Consumer Behavior and Customer Relationship Management</b>	<b>Hrs/Wk:5</b>

**Course outcomes**

**Students at the successful completion of the course will be able to-**

- Cognize the foundations of consumer behavior.
- Understand consumer decision making process and develop appropriate marketing strategies to enhance customer value in Tourism sector.
- apply the effective CRM in services sector and e-business
- Implement various technological tools for data mining and also successful implementation of CRM
- able to measure and evaluate the CRM practices in the organization

**Unit-I**

**Introduction to Consumer Behavior**

Evolution of consumer behavior-Interdisciplinary dimensions of consumer behavior  
Understanding consumers and market segments in Tourism

Factors Influencing Tourist Behavior

Strategic Applications of Consumer Behavior Models - Howard Model, Howard Sheth Model

**Unit-II**

**Foundations of Consumer Behavior in Tourism**

Consumer Motivation, Perception, Personality and Behavior

Attitude Formation and Attitude Change

Social and Cultural Environment, Economic, Demographic

Cross Cultural Influences, Reference Groups, Family, and Personal influence.

**Unit-III**

**Consumer Decision Processes in Tourism:**

Pre-purchase & Post Purchase processes

Consumption and evaluation- Brand Loyalty

Repeat Purchase Behavior in Tourism service

Consumerism in Tourism- Consumer information, environmental concerns

Consumer privacy and safety with reference to Tourism- Consumer Protection Act, 2019.

**Unit-IV**

**Introduction to CRM:**

Definition- Emergence of CRM practices

Conceptual frame work of CRM-Stages of relationship management

Customer profiling- Issues and Myths in CRM

Types of Customers-Customer Lifetime Value- Relationship Life Cycle.

**Unit-V**

**Analytical CRM:**

Relationship data management -Data analysis and data mining

Customer loyalty-Customer value assessment-Customer Centricity

IT and CRM-Changing patterns of CRM-Operational CRM

CRM in Tourism sector- Measuring the Effectiveness of CRM.



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**References:**

1. Ed Peelen: "Customer Relationship Management" Pearson, Education
2. Roger J Baran, Robert J Galka and Daniel P Strunk: "Customer Relationship Management" Cengage learning
3. S.Shanmugasundaram: "Customer Relationship Management" Prentice Hall of India.

**Co-curricular activities:**

c) Mandatory (Training of the students by the teacher in fieldrelatedskills:10hrs.)

**1. For Teacher :** Training of students by teacher or by visiting different tourism organizations /Tour operation companies for a total of 10hrs on the need and importance of CRM in tourism business, making the students to understand the process involved in CRM by doing some mock customer interaction sessions and showing them different types of consumer behaviors involved in tourism business by displaying some diagrams and flowcharts related to the CRM and preparation of tourism customer data base flow charts in a system aticway

**2. For students:** Individual field work on any of the tourism business operating units like travel agency or tour operations or sub sectors of tourism industry and submission of ah and written report on CRM in Tourism and its effects in the given method of format. Example: Identifying the Consumer behavior while purchasing tourism packages in Thomas Cook.

**3.Maxmarksforfieldworkreport:05**

**4.** Suggested format for field work: Title page, student details, content page, introduction, work done, finding s and conclusions.

**5.Unit Test**

**6. Suggested Co-Curricular activities:**

- 1 Training of the students on tourism business by tourism Marketing & Sales experts.
- 2 Mock tourism business role plays
- 3 Assignments on the Consumer Behavior & CRM in Travel and Tourism, Hospitality, eventmanagement, shopping and particularly consumer Behavior of tourists at heritage spots
- 4 Attend a Travel Trade Mart, Tourism Exhibitions & other MICE programmes.
- 5 Assignments on linkage between Tourism & CRM
- 6 Attend the seminars, Workshops, Conferences regarding tourism & allied activities
- 7 Invited lectures by Industry professionals & psychologists on behavioral studies to thestudents.



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<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:6B</b>	<b>Sales and Distribution Management</b>	<b>Hrs/Wk:5</b>

**Learning outcomes:**

Students at the successful completion of the course will be able to-

1. Understand the basics of selling process in tourism
2. Acquire the knowledge on process of salesmen recruitment and training
3. Analyze the evaluation of sales personnel and motivating them
4. Identify the marketing channels and tourism business organizational patterns
5. Obtain the skills upon selling and distribution in tourism business

**Syllabus:**

**Unit-I**

**Evolution of Sales Management:**

Types of Personal Selling, Nature and Scope of Sales Managements;  
Setting and Formulating Personal Selling Objectives; Selling Skills and Selling Strategies,  
The selling process in tourism industry

**Unit-II**

**Recruiting and Selecting Sales Personnel:**

Developing and Conducting Sales Training Programmes for Tourism;  
Designing and Administering Compensation Plans in tourism business,  
Supervising the Salesmen at travel organizations / fields.

**Unit-III**

**Sales Force Motivation:**

Sales Meetings and Sales Contests;  
Designing Territories and Allocating Sales  
Efforts; Objectives and Quotas for Sales  
Personnel; Evaluation of Sales Force;  
Performance Appraisal Process in tourism business

**Unit-IV Tourism Marketing**

**Channels:**

Structure, Functions and Relationships in Marketing Channels , Designing  
Customer Oriented Marketing Channels, Logistics Planning, tourism Inventory  
Management, Organizational Patterns in Marketing Channels, Managing tourism  
business Marketing Channels and Channel Member Behavior;

**Unit-V**  
**Tourism Information System and Channel Management:** Assessing  
Performance of Tourism Marketing Channels; International Channels of  
tourism business Distribution.

Assessing the performance of marketing channels

Types of Wholesalers & Retailers in Tourism



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**References:**

1. Anderson,R,ProfessionalSalesManagement:EnglewoodCliffs,NewJersey,PrenticeHallInc. 1992.
2. Anderson,R,ProfessionalPersonalSelling,EnglewoodCliffs,NewJersey,PrenticeHallInc1991
3. BuskirkR.H.andStanton.W.J.ManagementofSalesForce,HomewoodIllinois,Richard D.Irwin1983.
4. S.L.Gupta,M.K. Rampal,Cases inSales and Distribution Management,HPH, 2009.
5. K.SridharaBhat, Sales and Distribution Management, 1st,HPH, 2011.
6. S.A.Chunawalla,Sales andDistributionManagement,3rdedition,HPH.201
7. Webresourcessuggestedbytheconcernedteacherandthecollegelibrarianincludingreading material

**Co-curricular activities:**

- a. Mandatory (Training of the students by the teacher in field related skills :10hrs.)
1. **For Teacher :** Training of students by teacher or by visiting a nearby travel agency /Tour operation company for a total of 10hrs on the need and importance of sales in tourism business, making the students to understand the process involved in recruitment and selection by doing some mock travel recruitment sessions and showing them the different types of marketing channels involved in tourism business by displaying some diagrams and flow charts related to the distribution channels and preparation of tourism sales flow charts in a systematic way
  2. **For students:** Individual field work on any of the tourism business operating units like travel agency or tour operations or sub sectors of tourism industry and submission of a handwritten report on sales process sequences and techniques used in the sale in the given method or format. Example: Selling of a domestic golden triangle tour package or selling of an international tourism package.
  3. **Max marks for field work report: 05**
  4. Suggested format for field work: Title page, student details, content page, introduction, work done, findings and conclusions.

**5. Unit test**

**b) Suggested Co-Curricular activities:**

- 1 Training of the students on tourism business by tourism sales expert
- 2 Mock tourism business role plays using sales techniques
- 3 Assignments on the recruitment process, Sales Training Programmes; Designing and Administering Compensation Plans, Sales Meetings and Sales Contests; Designing Territories and Allocating Sales Efforts; Evaluation of Sales Force; Performance Appraisal Process in tourism business
- 4 Attend a travel trade mart. Tourism corporation exhibitions, Tourism Road shows and present a video on the Tourism business happened in travel mart and their interactions.
- 5 Arrange a travel exhibition sale and exhibit different travel business models and perform sale to the visitors
- 6 Seminars, Group discussions and Quiz on distribution channels in tourism business
- 7 Preparation of flow charts of sales processes, Distribution channels, Marketing techniques and steps involved in recruitment and selection.
- 8 Invited lectures and seminar presentations by travel industry experts.



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<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:7B</b>	<b>Selling and Negotiation Management</b>	<b>Hrs/Wk:5</b>

**Learning outcomes:**

Students at the successful completion of the course will be able to-

- Understand the need, scope and importance of selling as career in tourism industry
- Aware of the process of selling in detail
- Prepare the sales reports in tourism industry.
- Identify the types of negotiation skills in tourism industry
- Obtain the skills of negotiation management in tourism industry

**Unit-I:**

**Introduction to Personal Selling:**

Nature and importance of personal selling, myths of selling, Difference between Personal Selling, Salesmanship and Sales Management, Characteristics of a good salesman, types of selling situations, types of salespersons, Tourism Career opportunities in selling, Measures for making selling an attractive career in tourism industry.

**Unit-II**

**Selling Process:**

Buying motives and their uses in personal selling, Prospecting and qualifying in tourism industry; Pre-approach; Approach; Presentation and demonstration of tourism products in selling; Handling of objections; Closing the sale; Post sales activities

**Unit-III**

**Sales Reports:** Sales reports and documents; sales manual, Order Book, Cash Memo; Tour Diary, Daily and Periodical Tourism Reports;

Ethical aspects of tourism selling

**Unit-IV:**

**Negotiation Process** -Types of Negotiations, negotiation process, factors for successful negotiations, essential skills for negotiations, tricks used in negotiation process for tourism products, psychological advantage of negotiations, Techniques used in the negotiation process, issues in negotiations.

**Unit-V:**

**Negotiation strategies:** Strategy and tactics for tourism distributive bargaining, strategy and tactics for integrative negotiation, negotiation strategy and planning. Finding and using negotiation power, sources of power, Ethics in tourism negotiation.



**References:**

1. Spiro, Stanton, and Rich, Management of the Sales force, McGraw Hill.
2. Russell, F.A. Beach and Richard H. Buskirk, Selling: Principles and Practices, McGraw Hill
3. Futrell, Charles, Sales Management: Behaviour, Practices and Cases, The Dryden Press.
4. Still, Richard R., Edward W. Cundiff and Norman A.P. Govoni, Sales Management: Decision Strategies and Cases, Prentice Hall of India Ltd., New Delhi,
5. Johnson, Kurt and Schueing, Sales Management, McGraw Hill
6. Pedesson, Charles A. Wright, Milburn
7. And Weitz, Barton A., Selling: Principles and Methods, Richard, Irvin
7. Kapoor Neeru, Advertising and personal Selling, Pinnacle, New Delhi

**Co-curricular activities:**

- a. Mandatory (Training of the students by the teacher in field related skills :10hrs.)
  1. **For Teacher :** Training of students by teacher or by visiting a nearby Andhra Pradesh tourism development corporation marketing office/IRCTC tourism divisions sales and marketing division for a total of 10hrs to practically observe and understand the process of selling tourism products , making the students understand the process involved in selling and negotiation by doing some mock tourism products sales sessions and showing them the different types of selling skills and negotiation techniques involved in tourism business by showing some diagrams and flow charts related to the sales channels and preparation of sales reports in a systematic way
  2. **For students:** Individual field work on any of the tourism business operating units like travel agency / tour operations/Arts and handicrafts center/Activities at Tourist destinations and submission of a hand written report on selling process involved and negotiation techniques used in buying the product in a given method or format. Example: Selling of a arts and handicrafts items to tourists at destinations/ Tourists engaging in adventure activities at the destination and the selling process involved in it.
  3. Max marks for field work report: 05
  4. Suggested format for field work: Title page, student details, content page, introduction, work done, findings and conclusions.
  5. Unit test



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**b) Suggested Co-Curricular activities:**

1. Training of the students of tourism business by Tourism product Sales and marketing experts from APTDC/IRCTC/Private tourism players.
2. Mock tourism business role plays using live selling and negotiation of tourism products in the classrooms.
3. Assignments on the Buying motives, personal selling Presentation and demonstration; handling of objections; Closing the sale, Post sales activities and negotiation techniques. sales manual, Order Book, Cash Memo; Tour Diary, Daily and Periodical Reports
4. Attend APTDC/IRCTC marketing office, arts and handicrafts center, private travel agencies and present a video on the selling and negotiation activities happened in buying the product and their interactions.
5. Conduct a tourism product sale day in the college premises and exhibit different travel business models and perform sale to the other students in the college of another department.
6. Seminars, Group discussions and Quiz on distribution channels in tourism business
7. Preparation of flowchart of sales manual, Order Book, Cash Memo; Tour Diary, Daily and Periodical Reports
8. Invited lectures and seminar presentation from travel industries' sales & marketing experts.



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<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:6C</b>	<b>Tourism Destination Marketing</b>	<b>Hrs/Wk:5</b>

**Course outcomes:**

Students at the successful completion of the course will be able to-

1. Understand the typology of destinations in Tourism.
2. Analyze the Market environment of Tourism Destinations.
3. Learn about the planning and strategies of Destination Marketing.
4. Understand the different components of the Destination Marketing Mix.
5. Apply the destination promotional strategies in the Tourism Industry.

**Course Contents:**

**Unit I**

**Destination development:**

Introduction, types of destinations

Characteristics, destination selection process

5 A's in Destination management

Destination Mapping - Destinations Analysis.-Tourism Vs Attractions.

**Unit II**

**Destination Planning & Development:**

Importance of Destination Planning, Destination Planning Process

Destination Planning Guidelines – National, State, & Regional Tourism Planning

Economic, Social, Cultural, and Environmental considerations in Tourism planning

Destination Development.

**Unit III**

**Destination Marketing–**

Introduction of Destination Marketing, Marketing environment

Destination Marketing Mix: Product, Price, Place, and

Promotion Product Strategies, Managing existing Tourism

Products,

New Product development in Tourism.

Pricing Strategies–Tourists Perception on Pricing –Doxey's irritation index.



#### **Unit IV**

##### **Destination Distribution and Image of Destination –**

Destination Distribution: Strategies, Channels

Developing a Destination Promotional  
strategies

Destination Image: Image Formation Process-Image strategies

Tourism Destination Cycle – Destination competitiveness .

#### **Unit V**

##### **Destination Publicity:**

Advertising - Sales Promotion, sales promotion techniques

Publicity: Role of AP Tourism & Ministry of Tourism, GOI, for the promotion of destinations

Tourism Marketing Communication: Importance, techniques,

Barriers, the process of communication – Trends in the Communication.

#### **References**

- The Routledge Handbook of Destination Marketing (Routledge Handbooks) by DoganGursoy and Christina G. Chi | 18 April 2018
- Marketing and Managing Tourism Destinations by Alastair M. Morrison | 6 September 2018
- Destination Marketing: Essentials by Steven Pike | 19 October 2020
- Destination Marketing Organisations: Bridging Theory and Practice (Advances in Tourism Research) – 13 November 2004 by Steven Pike
- Marketing and Managing Tourism Destinations by Alastair M. Morrison | 6 September 2018
- Advances in Tourism Destination Marketing: Managing Networks by MetinKozak, JuergenGnoth, et al. | 26 August 2015
- Tourism Planning and Destination Marketing by Mark Anthony Camilleri | 1 November 2018



**Co-curricular activities:**

**a. Mandatory (Training of the students by the teacher in field-related skills:10 hrs.)**

**1. For Teacher:** The teacher will train students for a total of 10 hours on the need and

importance of destination marketing in the tourism industry, as well as how to understand the national, state, and regional destination planning and development by showing them the Destination marketing mix and explaining the importance of the 5A's for the development of destination marketing through the use of strategies and advertisements provided by government organizations such as the APTDC and the Ministry of Tourism. Give the subject presentations through Power-Point Presentations and conduct Group discussions and quiz programs.

**2. For students:** Prepare destination marketing steps for the development of any destination in Andhra Pradesh, as well as research the government's publicity materials. Submission of a handwritten report on the role of destination marketing and the strategies implemented.

**3. Max marks for the report: 05 Marks.**

**4. The suggested format for report:** Title page, student details, content page, introduction, work done, findings, and conclusions.

**5. Students have to give seminars based on destination marketing and write the subject assignments.**

**b. Suggested Co-curricular Activities**

**1. Training to the students by a related field expert i.e., local tour operator & travel agent and tour guide etc, on the development of new destination.**

**2. Assignment given by the teacher on destination marketing**

**3. Seminars, Group discussions, quiz , presentations on destination marketing**

**4. Preparation of brochures on package tour destinations**

**5. Photo exhibition & Report writing on any given topic in the syllabus.**



**Co-curricular activities:**

**a. Mandatory (Training or the students by the teacher in field-related skills:10 hrs.)**

1. **For Teacher:** The teacher will train students for a total of 10 hours on the need and importance of destination marketing in the tourism industry, as well as how to understand the national, state, and regional destination planning and development by showing them the Destination marketing mix and explaining the importance of the 5A's for the development of destination marketing through the use of strategies and advertisements provided by government organizations such as the APTDC and the Ministry of Tourism. Give the subject presentations through Power-Point Presentations and conduct Group discussions and quiz programs.
2. **For students:** Prepare destination marketing steps for the development of any destination in Andhra Pradesh, as well as research the government's publicity materials. Submission of a handwritten report on the role of destination marketing and the strategies implemented.
3. Max marks for the report: 05 Marks.
4. The suggested format for report: Title page, student details, content page, introduction, work done, findings, and conclusions.
5. Students have to give seminars based on destination marketing and write the subject assignments.

**b. Suggested Co-curricular Activities**

1. Training to the students by a related field expert i.e., local tour operator & travel agent and tour guide etc, on the development of new destination.
2. Assignment given by the teacher on destination marketing
3. Seminars, Group discussions, quiz , presentations on destination marketing
4. Preparation of brochures on package tour destinations
5. Photo exhibition & Report writing on any given topic in the syllabus.



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<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:7C</b>	<b>Itinerary Preparation and Tour Packaging</b>	<b>Hrs/Wk:5</b>

**Learning Outcomes:**

**Students at the successful completion of the course will be able to-**

1. Understand concepts of travel itineraries and can able to prepare itinerary planning.
2. Able to prepare tour formulation and designing various types of tour packages.
3. Estimate the cost of the package tour & analyze the various companies pricing strategies.
4. Evaluate the tourist's feedback and change the services accordingly.
5. Understand the different online payment gateways for present business.

**Unit I**

**Itinerary Planning & Development:**

Meaning, Importance, Concept of Itinerary Planning  
 Resources and Steps for Itinerary Planning -Types of  
 Itinerary Do's and Don'ts of Itinerary Preparation  
 components of Itinerary, Relevance & scope.

**Unit II**

**Developing & Innovating Package Tour:**

Formulation and Designing Process of Tour: Free Independent Tours (FITs)

Group-Special Interest Tours (SITs),

Tour Packaging: Importance of Tour Packaging – Classifications of Tour Packages, Components of Package tour- Pre designed & Tailor made packages.

**Unit III**

**The concept of Costing:**

Types of Costs, Components of Tour Cost - Preparation of Cost Sheet  
 Tour Pricing - estimation of Tour Price – Pricing Strategies  
 Negotiations & contract with the suppliers  
 Tour Packages of Thomas Cook, SOTC, Cox&Kings and TCI.

**Unit IV**

**Operation of Package Tour:**

Confirmation of Tour, Issue of Tour Vouchers

Reconfirmation with Airlines, Hotel & Ground Service Providers

Distributing Customized Itinerary to Tour Leader, Tour Escort, Tour Guide,

Transportation, Standard Procedures for Pickup and Drop

Crisis Management in tour, Preparation of Feedback or Guest Comment Sheet.

**Unit V**

**Travel Documentation:**

Familiarization with TIM (Travel Information Manual)

Passport & VISA-Meaning, Types, Procedures, Validity

Necessary Information to fill the Passport and VISA Form for Issuance

Health Certificates, Currency, Travel Insurance

Types of payment methods: credit card, debit card, UPI, e-wallet, net- banking, mobile banking etc.





**Suggested Textbooks**

1. Swain, S.K. & Mishra, J.M. (2012). *Tourism Principles & Practices*, Oxford University Press, New Delhi.
2. Chand, M. (2002). *Travel Agency Management: An Introductory Text*, Anmol Publications Pvt. Ltd., New Delhi.

**Reference Books:**

1. Negi, J. (2005). *Travel Agency Operations: Concepts and Principles*, Kanishka, New Delhi.
2. Holloway, J.C. (2002). *The Business of Tourism*, Prentice Hall, London, pp. 220-279.
3. Roday S., Biwal A. & Joshi V. (2009). *Tourism Operations and Management*, Oxford University Press, New Delhi, pp. 164-296.
4. Goeldner, R. & Ritchie, B. (2010). *Tourism, Principles, Practices and Philosophies*, John Wiley & Sons, London.

**Co-curricular Activities:**

- a) **Mandatory:** (Training of the Students by the teacher in field related Skills 10 hours)
  2. For Teacher: Training of the students by the teacher in the classroom or in the field for total of 10hrs on identifying the local/city/district package tours and make practice such tour itineraries by focusing on individual student.
  3. For Student: Individual field work on the local package tour and itineraries and submission of hand written package tour and itinerary at their local area tours individually. And prepare Cost sheet of the present package tour & Identify the different package tours of their own like pilgrimage package tours, heritage tours, cultural package tours and natural/eco tourism package tours etc.
  4. Max Marks of the field work report 05.
  5. Suggested format for field work: Title page, student details, content page, introduction, work done, findings and conclusions.
  6. Unit Tests.
- b) **Suggested Co curricular Activities:**
  1. Training of the students by a related field expert i.e., local tour operator & travel agent and tour guide etc.
  2. Assignment given by the teacher by selected package tours and their itineraries of individual student.
  3. Seminars, Group discussions, quiz, presentations on selected package tours.
  4. Preparation of brochures on package tours & package tour cost sheets.
  5. Photo exhibition & Report writing on any given topic.

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<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:6D</b>	<b>D-Digital Marketing for Tourism Business</b>	<b>Hrs/Wk:5</b>

**Learning Outcomes:**

Students at the successful completion of the course will be able to-

1. Understand concepts of digital marketing in present tourism business.
2. Understand various applications of digital marketing in tourism and hospitality sector.
3. Familiarize with online marketing intermediaries and business models of E-commerce.
4. Assess the Impact of digital media and technology in a professional manner.
5. Equip the skills on the digital marketing techniques in travel and tourism sector.

**Unit I****Introduction to Digital Marketing:**

Definition, meaning, significance, key features of digital marketing

Applications of digital marketing in Tourism & Hospitality

Challenges of digital marketing

Brands in digital marketing.

**Unit II****Digital Marketing Environment**

Traveller analysis, demand analysis

Traveller behaviour in online, online marketing intermediaries,

Business models for e-commerce

Designing Web page- digital marketing strategies.

**Unit III****Impact of digital media and technology on the marketing mix**

Product-options for offering digital products

Pricing- price approaches,

Place- new channel structures,

Promotion-new promotional tactics, People, Process, Physical evidence

Mobile marketing & E- marketing.

**Unit IV****Digital Marketing Tactics:**

Content marketing

Social media marketing, SEM, Display advertising, email marketing

Affiliate marketing

Measuring digital marketing success.

**Unit V****Digitization of travel:**

E-tourism in India-Government Initiatives-Multi-lingual helpline

E-ticketing of monuments, E-tourist Visa

Online data base for cultural performers, Smart cities mission.

Digital transformation in travel: Characteristics of tech- friendly traveler

Major tools, technologies and platforms driving digital travel.



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**Text Books:**

1. Page, K., & Rowan, W. (n.d.). Digital Marketing: Using New Technologies to Get Closer to Your Customers.
2. Yamagishi, R. (n.d.). Digital Marketing in Asia A Start-Up Guide for Search Engine Marketing in APAC.
3. FERNANDES, JOSE. (2021). DIGITAL MARKETING WITH DRUPAL : the ultimate guide to building and deploying a full digital... marketing platform on top of drupal. PACKT PUBLISHING LIMITED.
4. Bhatia PuneethSingh, Fundamentals of digital Marketing 2<sup>nd</sup> Edition-Person.

**Reference Books:**

1. Strauss, J., & Frost, R. (2014). E-Marketing (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
2. Inbound Marketing: Attract, Engage, and Delight, by Brian Halligan and Dharmesh Shah.

Web link: [www.tourism.gov.in](http://www.tourism.gov.in)

**Co-curricular Activities:**

- a) **Mandatory:** (Training of the Students by the teacher in technical related Skills 10 hours)
  - **For Teacher:** Training of the students by the teacher in the classroom or lab in the field for total of 10 hrs on identifying different tourism and hospitality organizations digital marketing techniques and Online bookings of various tourism and hospitality services and practice on the focusing of individual student.
  - **For Student:** Practicing in lab for Individual technical work on digital and social media marketing and submission on hand written digital marketing and social media marketing techniques, and practicing the e-ticketing of airlines, railways, busses and cruise line tickets and entry tickets various monuments and theme parks bookings of individual student, Practicing the Indian Passport Slot booking procedure and e-tourist VISA bookings of various Countries Embassies.
  - Suggested format for field work: Title page, student details, content page, introduction, work done, findings and conclusions.
  - Unit test

**Suggested Co-curricular Activities:**

1. Training of the students by a related field expert i.e., travel and tourism professionals & technical experts of the digital and social media and computer teacher.
2. Assignment given by the teacher by selected tourism organizations of their digital and media and social media practices of marketing and promotional activities of individual student.
3. Seminars, Group discussions, quiz , technical presentations on selected digital media.
4. Downloading the different travel, tourism and hospitality Mobile Apps and practice it properly of their services i.e., IRCTC App, Incredible India App, Ministry of Tourism App , where is my train App etc.
5. Photo exhibition & Report writing on any given topic.

**ADIKAVINANNAYAUNIVERSITY::RAJAHMAHENDRAVARAM****B.A Tourism and Travel Management Syllabus (w.e.f:2020-21A.B)**

<b>B.A</b>	<b>Semester – V (Skill Enhancement Course- Elective)</b>	<b>Credits:4</b>
<b>Course:7D</b>	<b>Advertising and Brand Management for Tourism</b>	<b>Hrs/Wk:5</b>

**Learning Outcomes**

Students at the successful completion of the course will be able to-

1. Understand the role and types of Advertisements in tourism
2. Know the importance of Advertising as a Marketing Tool
3. Learn the role of Marketing Campaigns for the promotion of Tourism
4. Understand the significance of Brand Management, Positioning, and Value in the current tourism-marketing scenario.
5. evaluate the different brand strategies in the tourism industry.

**Unit-1****Advertising**

Introduction, History of Advertising,

Understanding Tourism Advertisement

Role of Advertising in the Tourism industry,

Types of Advertisements – Print & Electronic – Purpose of Advertisements

Content for Tourism Advertisements- Role of Social Media in Advertising.

**Unit-2****Advertisement Marketing**

Advertisers, Agencies, Media companies.

Advertising as a Marketing Tool

Marketing Vs Advertisement- Prepare the Travel Agencies' advertisement copyMarketing strategies.- Communication skills, process & Challenges.

**Unit-3****Marketing Advertisement Campaigns**

Role of Marketing Campaigns in the Tourism Industry

Incredible India as a Marketing Tool, Ministry of Tourism Marketing strategies

Strategic Advertisement campaigns- Advertising Campaign Planning Process

Preparation of Advertisement budget – Importance, methods, and factors influencing advertising budget.

**Unit-4****Brand Management**

Brand Positioning – Brand Value

Brand performance, Measuring the performance of brands

Designing brands – Growing and sustaining brands in Tourism Industry – Thomas Cook, Cox & Kings, etc.

**Unit-5****Brand Strategies**

Core values of Brand management- Brand Marketing

Brand Planning –Brand communications

Designing New Products and Brand Extensions

Advantages of Strategic Brand Management

Brand equity – Brand audit – Brand reality check, and Brand appraisal.



**Reference Books**

1. Advertising And Brand Management by Dr. Sunaina Kumar, Dr. Arvind&Sardana | 1 January 2015
2. Advertising and Brand Management by AmitaCharan and RekhaDahiya | 1 January 2018
3. Brand Equity on the Wheels of Advertising: A Practical Handbook on Advertising and Brand Management by NoopurAgrawal | 1 January 2009
4. Advertising, Brands And Consumer Behaviour: The Indian Context by S Rames Kumar and Anup Krishnamurthy | 1 April 2020

**Co-curricular activities:**

**a. Mandatory (Training or the students by the teacher in field-related skills:10 hrs.)**

- 1) **For Teacher:** The teacher will train students for a total of 10 hours for explaining the types of Advertisements both Print & Electronic and also discuss the pros & cons of Advertising. The role of Social Media in Advertising. Explain the Role of Brand Management, Positioning, and Value, in the current tourism-marketing scenario. Give the subject presentations through Power-Point Presentations and conduct Group Discussion, Unit tests.
- 2) **For students:** Designing the travel agency advertisements, and collection of Unique tourism-related advertisements, Newspaper advertisements. Participate in the Attending Trade Show/Expo. Submission of a handwritten report on the Advertising and Brand Management in Tourism.
- 3) Max marks for the report: 05 Marks.
- 4) The suggested format for report: Title page, student details, content page, introduction, work done, findings, and conclusions.
- 5) Students have to give seminars based on Advertising and Brand Management in Tourism and write the subject assignments.

**b. Suggested Co-curricular Activities**

- 8 Training to the students on Advertising and Brand Management by tourism Marketing & Sales experts.
- 9 Mock role plays on Tourism Advertising And Brand Management
- 10 Assignments on the Advertising and Brand Management in Travel and Tourism, Hospitality, event management.
- 11 Assignments on customer experiences on Advertising and Brand Management in tourism industry in the context of AP.
- 12 Attend to the seminars, Workshops, Conferences regarding tourism & allied activities services
- 13 Invited lectures by marketing experts on Advertising and Brand Management. And Photo Exhibition on Advertising And Brand Management



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**MODEL QUESTION PAPER (Sem-end. Exam)**  
**SEMESTER –V**  
**Course: 6A: Service Marketing of Tourism**

**Time: 3Hrs**

**Max. Marks:75**

**Section-A**

**(Total: 5 \*5 = 25 Marks)**

**(Answer any FIVE questions. Each answer carries 5 marks)**

1	Classification of Tourism Services
2	Service Pricing Strategy
3	Need for customer relationship
4	Types of gaps
5	Retail Services
6	Sales force automation in services marketing.
7	Travel & Tourism services
8	Marketing of Tourism Services

**Section-B**

**(Total: 5 \*10 = 50 Marks)**

**(Answer any FIVE questions. Each answer carries 10 marks)**

1	Define concept of tourism marketing. Explain the need and importance of tourism marketing.
2	Discuss various strategic goals of CRM in the Tourism Industry.
3	Explain the present CRM Practices in Tourism and Hospitality Industry.
4	Elaborate various measuring and improving service Quality in Tourism and hospitality industry.
5	Explain the Healthcare & Medical- Retail Services.
6	Briefly explain employees and staff roles in Service Delivery and Services Promotions.
7	Briefly explain the role of technology in Service Marketing.
8	Explain various characteristics of tourism services.



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**MODEL QUESTION PAPER (Sem-end. Exam)**  
**SEMESTER -V**

**Course: 7A: Consumer Behaviour and Customer Relationship Management**

**Time: 3Hrs**

**Max. Marks:75**

**Section-A**

**( Total: 5\*5 = 25 Marks)**

**(Answer any FIVE questions. Each answer carries 5 marks)**

1	Market segments in Tourism
2	Dimensions of consumer behavior
3	Consumer Motivation
4	Reference Groups
5	Repeat Purchase Behavior in Tourism service
6	Types of Customers
7	Relationship Data Management
8	Customer Value Assessment

**Section-B**

**(Total: 5 \*10 = 50 Marks)**

**(Answer any FIVE questions. Each answer carries 10 marks)**

1	Discuss various strategic applications of Consumer Behavior Models.
2	Explain Social and Cultural Environment, Economic, Demographic factors of Consumer Behaviour in Tourism.
3	Briefly explain Pre-purchase & Post Purchase processes of Decision Making in Tourism.
4	Explain the conceptual frame work of CRM and Stages of Relationship Management.
5	Discuss CRM in Tourism sector- and measuring the effectiveness of CRM.
6	What are the salient features of Consumer Protection Act, 2019?
7	Discuss the consumerism in Tourism Industry in India.
8	Explain the emergence of CRM practices.



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**MODEL QUESTION PAPER (Sem-end. Exam)**  
**SEMESTER –V**

**Course: 6B- Sales and Distribution Management**

**Time: 3Hrs**

**Max. Marks:75**

**Section-A**

**(Total: 5 \*5 = 25 Marks)**

(Answer any FIVE questions. Each answer carries 5 marks)

1	Personal Selling Objectives
2	Selling process in tourism industry
3	Sales Training Programmes for Tourism
4	Recruitment Process
5	Sales Meetings
6	Quotas for Sales Personnel
7	Customer Oriented Marketing Channels
8	Types of Wholesalers

**Section-B**

**(Total : 5 \*10 = 50 Marks)**

(Answer any FIVE questions. Each answer carries 10 marks)

1	Explain the nature, scope and importance of Sales Management.
2	Discuss Designing and Administering Compensation Plans in tourism business
3	Briefly explain the Performance Appraisal Process in tourism business industry.
4	Explain various functions and relationships in Marketing Channels of tourism industry.
5	Discuss the International Channels of tourism business Distribution.
6	Briefly explain tourism marketing channels in India.
7	What are the advantages and limitations of Tourism Inventory Management?
8	Briefly explain Tourism Information System.



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**MODEL QUESTION PAPER (Sem-end. Exam)**  
**SEMESTER -V**

**Time: 3Hrs**

**Course: 7B- Selling and Negotiation Management**

**Max. Marks:75**

**Section-A**

**(Total: 5 \*5 = 25 Marks)**

**(Answer any FIVE questions. Each answer carries 5 marks)**

1	Characteristics of a good salesman
2	Handling of objections
3	Buying Motives
4	Tour Dairy
5	Sales Report
6	Issues in negotiations
7	Ethics in tourism negotiation
8	Negotiation strategy

**Section-B**

**(Total: 5 \*10 = 50 Marks)**

**(Answer any FIVE questions. Each answer carries 10 marks)**

1	What are the measures for making selling an attractive career in tourism industry?
2	Explain presentation and demonstration of tourism products in selling.
3	Discuss ethical aspects of tourism selling.
4	What are the techniques used in the negotiation process?
5	Briefly explain strategy and tactics for tourism distributive bargaining.
6	Explain various types of Negotiations and factors for successful negotiations.
7	Distinguish between Personal Selling and Sales Management.
8	What are the essential skills for negotiations



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**MODEL QUESTION PAPER (Sem-end. Exam)**  
**SEMESTER -V**

**Course: 6C-Tourism Destination Marketing**

**Time: 3Hrs**

**Max. Marks:75**

**Section-A**

**(Total: 5 \*5 = 25 Marks)**

**(Answer any FIVE questions. Each answer carries 5 marks)**

1	5 A's in Destination management
2	Characteristics of Destination Management
3	Destination Development
4	Importance of Destination Planning
5	Marketing Environment
6	Tourism Destination Cycle
7	Destination Distribution Strategies
8	Trends in the Communication.

**Section-B**

**(Total : 5 \*10 = 50 Marks )**

**(Answer any FIVE questions. Each answer carries 10 marks)**

1	Briefly explain advantages and limitations of Destination Management
2	Explain economic, social, cultural, and environmental considerations in Tourism Planning.
3	Discuss New Product development in Tourism in India.
4	Explain developing destination promotional strategies.
5	Briefly explain the role of AP Tourism & Ministry of Tourism.
6	Explain various techniques and barriers of tourism marketing communication.
7	Briefly explain the Destination Marketing Mix.
8	What are the techniques for sales promotion?



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**MODEL QUESTION PAPER (Sem-end. Exam)**  
**SEMESTER –V**

**Course: 7C- Itinerary Preparation and TourPackaging**

**Max. Marks:75**

**Time: 3Hrs**

**Section-A**

**(Total: 5 \*5 = 25 Marks)**

**(Answer any FIVE questions. Each answer carries 5 marks)**

1	Preparation of Cost Sheet
2	Estimation of Tour Price
3	Types of Itinerary
4	Free Independent Tours (FITs)
5	Tour Packaging
6	Issue of Tour Vouchers
7	Crisis Management in tour
8	Travel Information Manual

**Section-B**

**(Total: 5 \*10 = 50 Marks)**

**(Answer any FIVE questions. Each answer carries 10 marks)**

1	Explain the resources and steps for Itinerary Planning.
2	Briefly explain classifications of Tour Packages.
3	Discuss tour packages of Thomas Cook, SOTC, Cox & Kings and TCI.
4	What is the Standard Procedures for Pickup and Drop?
5	Discuss the necessary information to fill the Passport and VISA form for Issuance.
6	Briefly explain the role and responsibilities of Tour Escort and Tour Guide.
7	What are the advantages and limitations of travel insurance?
8	Explain the various components of Itinerary.



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**MODEL QUESTION PAPER (Sem-end. Exam)**  
**SEMESTER –V**

**Course: 6D- Digital Marketing for Tourism Business**

**Time: 3Hrs**

**Max. Marks:75**

**Section-A**

**(Total: 5\*5 = 25 Marks)**

**(Answer any FIVE questions. Each answer carries 5 marks)**

1	Key features of digital marketing
2	Brands in digital marketing
3	Traveller analysis
4	Price approaches
5	E-Marketing
6	Content marketing
7	Characteristics of tech- friendly traveler
8	E-tourist Visa

**Section-B**

**(Total : 5 \*10 = 50 Marks )**

**(Answer any FIVE questions. Each answer carries 10 marks)**

1	Explain the applications of digital marketing in Tourism & Hospitality.
2	What factors influence digital media and technology on the marketing mix?
3	Discuss designing web page- digital marketing strategies.
4	Define Affiliate marketing. Explain its advantages and limitations.
5	Briefly explain the growth and challenges of E-tourism in India.
6	Define Digital Marketing. Explain its significance in India.
7	Explain various business models for E-commerce.
8	What are the advantages and limitations of Social media marketing?



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**MODEL QUESTION PAPER (Sem-end. Exam)**

**SEMESTER -V**

**Course: 7D- Advertising and Brand Management for Tourism**

**Time: 3Hrs**

**Max. Marks:75**

**Section-A**

**(Total: 5 \*5 = 25 Marks)**

**(Answer any FIVE questions. Each answer carries 5 marks)**

1	Types of Advertisement
2	History of Advertising
3	Marketing Vs Advertisement
4	Marketing strategies
5	Ministry of Tourism Marketing strategies
6	Brand Positioning
7	Brand performance
8	Brand Audit

**Section-B**

**(Total: 5 \*10 = 50 Marks)**

**(Answer any FIVE questions. Each answer carries 10 marks)**

1	Explain the role of advertising in the Tourism industry
2	Explain communication skills, process and Challenges of Advertisement Marketing.
3	What factors influencing advertising budget?
4	Define designing brands. Explain growing and sustaining brands in Tourism Industry.
5	What are the advantages and limitations of Strategic Brand Management?
6	Discuss the content for tourism advertisements and Role of social media in advertising.
7	What is meant by Brand Planning? Explain the advantages and limitations of Brand Planning.
8	Explain the role of Marketing Campaigns in the Tourism Industry.

**B.Sc DEGREE EXAMINATION**

**Fifth semester**

**PHYSICS.**

**optical instruments and optometry 6A**

**Time : Three hours**

**Maximum :75 Marks**

**SECTION A-(5\*10=50 marks)**

**Answer the following questions**

**1 (a) construct and explain working principle of compound microscope. Derive an expression for magnifying power .**

**(Or)**

**(b) Explain the construction working and uses of travelling microscope**

**2 (a) Explain construction working and magnifying power of astronomical telescope**

**( Or)**

**(b) Explain the working principle of binoculars and give the applications**

**3 (a) Explain different types of electron microscopes give their advantages**

**(Or)**

**(b) Briefly explain about optical solar infrared telescopes**

**4 (a) Draw the ray diagrams for the formation of image in the eye and the camera and explain**

**( Or)**

**(b) What is myopia and hypermetropia defects. What are the removal methods using ophthalmic lenses**

**5 (a) Explain ophthalmoscope and keratometer and their working principles**

**(Or)**

**(b) Explain the working principle and uses of simple phoropter**

SECTION B- (5\*5=25 marks)

Answer any five from the following Ten questions.

- 1 . Explain the construction of simple microscope
2. Explain the phase contrast microscope operating principle
3. Draw the neat diagram of terrestrial telescope ,explain briefly
4. Briefly explain about Binoculars
5. Explain about scanning acoustic microscope
6. Briefly explain the solar telescopes
7. Explain different types of contact lenses
8. What is far point and near points explain
9. Explain the power of a lens
10. Write a brief note on computer based eye testing.

B.Sc DEGREE EXAMINATION

Fifth semester

PHYSICS.

Low Temperature physics and Refrigeration 6B

Time : Three hours

Maximum :75 Marks

SECTION A-(5\*10=50 marks)

Answer the following questions

1 (a) Describe joule Thomson effect, derive an expression for joule Thomson cooling

(Or)

(b) Explain the liquification of hydrogen by joule Thomson process

2 (a) Explain about Gas thermometer and its correction and calibration

( Or)

(b) Explain the vapour pressure thermometers and give the advantages

3 (a)Describe the stages of refrigeration. Explain types of refrigerations

(Or)

(b) what is refrigeration cycle and explain with a block diagram

4 (a) Explain about different components of a refrigerator

( Or)

(b) explain Tons of refrigeration and energy efficiency ratio of a refrigerator

5 (a) explain the preservation of biological materials and liquid nitrogen and liquid hydrogen in medical field

(Or)

(b) explain the cryogenic racket propulsion system

**SECTION B- (5\*5=25 marks)**

**Answer any five from the following Ten questions.**

- 1 . What is freezing mixture Explain**
- 2. Explain about superconductivity**
- 3. What is meant by thermocouple explain briefly**
- 4. Explain the working principle of magnetic thermometer**
- 5. Explain the air condition system**
- 6. What is eco friendly refrepresents explain**
- 7. Explain the different types of compressors in refrigerating system**
- 8. What is meant by defrosting in a refrigerator explain about defrosting**
- 9. Explain I need to applications of low temperature**
- 10. explain briefly about domestic refrigerators**

**B.Sc DEGREE EXAMINATION**

**Fifth semester**

**PHYSICS.**

**Applications of Electricity and Electronics 6c**

**Time : Three hours**

**Maximum :75 Marks**

**SECTION A-(5\*10=50 marks)**

**Answer the following questions**

**1 (a) Compare the constructional features characteristics of paper, mica, ceramic, and plastic capacitors**

**(Or)**

**(b) Explain different types of inductors. Derive an expression of EMF induced in an inductor**

**2 (a) Describe the construction and electrochemistry of Nickel metal hybrid NI-MH battery**

**( Or)**

**(b) Give the construction of lithium- ion batteries. Explain its charging and discharging. what are the advantages and uses of this battery**

**3 (a) Explain the construction principle and working of AC generator**

**(Or)**

**(b) Explain the construction working principle of single phase motor give some applications of motors**

**4 (a) what is a DC regulated power supply ? Describe the construction of 5 volt regulated power supply**

**( Or)**

**(b) what is a switch mode power supply (SMPS) describe it in detail.**

**5 (a) draw neat labelled diagram to show the constructional features of a DC machine**

**(Or)**

**(b) what are the different types of dc generators? Also write the applications of each**

**SECTION B- (5\*5=25 marks)**



Answer any five from the following Ten questions.

- 1 . What is colour coding used in resistors?
2. Explain primary and secondary cells
3. Describe a switched mode power supply
4. Describe the construction of a transformer
5. Distinguish between step down and step Transformers
6. What is automatic frequency control explain
7. Explain LCR series resonance circuit.
8. What is the significance of back EMF in DC motors
9. Write the differences between DC and AC generators
10. Describe the split phase induction motor

B.Sc DEGREE EXAMINATION

Fifth semester

PHYSICS.

Electronic Instrumentation 7c

Time : Three hours

Maximum :75 Marks

SECTION A-(5\*10=50 marks)

Answer the following questions

1 (a) describe the block diagram of an electronic voltmeter and explain its working

(Or)

(b) what is a multimeter how do we measure voltage current and resistance using an analogue multimeter

2 (a) drawing a block diagram explain the constituents of vertical deflection system of a CRO

( Or)

(b) discuss the Lissajous method of frequency measurement using a CRO

3 (a) what are the various principles of operational capacitive transducers? Explain them .give merits and demerits

(Or)

(b) explain the construction and working of fibre optic sensor

4 (a) draw the structure of a LED and explain its operation. what are the conditions to be satisfied by the device for emission of visible light

( Or)

(b) what is the operating principle of LCD display compare LCD display with LED displays

5 (a) how is Doppler effect utilised in ultrasound scanning

(Or)

(b) what are the main components of MRI machine

SECTION B- (5\*5=25 marks)

Answer any five from the following Ten questions.

1. How can we measure DC voltage and DC current
2. What is the principle of working of an analog multimeter
3. What is the function of a horizontal amplifier in a CRO
4. What is the need of a storage oscilloscope
5. How does touch screen sensor works
6. Give the basic features of piezoelectric transducers
7. What are the advantages of using optical fibre sensor
8. Explain the operation of a LED
9. How to coloured pixels work in LCDs
10. How does a city scan work?

SECTION A-(5\*10=50 marks)

Answer the following questions

1 (a) Define solar constant. Explain how pyr heliometers is used to measure solar intensity.

(Or)

(b) Define the solar constant? What do you means by spectral distribution of extra terrestrial radiation.

2 (a) What is flate plate collector and how it works? Explain.

( Or)

(b) Briefly explain parameters decide performance of concentrating collectors?

3 (a) Explain different types of photovoltaic power systems?Mention the advantages and disadvantages of PV systems?

(Or)

(b) Advantages and disadvantages of using photovoltaic systems?

4 (a) Explain the construction and working of Caste/CdS Solar Cell and mention it's limitations.

( Or)

(b) Explain the construction and working of a thin film solar cells.Mention the advantages and disadvantages?

5 (a) What is meant by electro chemical energy? Explain the different types of electro- chemical energy?

Explain the differenet types of electro - chemical energy storage systems?

(Or)

(b) Explain the role of molten solvent batteries.

**SECTION B- (5\*5=25 marks)**

**Answer any five from the following Ten questions.**

- 1 . Explain the basic structure of a sun ?**
- 2. Write a short note on selective surfaces.**
- 3. Explain how the performance of liquid flat plate collector (LEP) can be improved using evacuated tube collector?**
- 4. What are tracking systems? Explain different concentrators.**
- 5. Define and explain photovoltaic effect?**
- 6. What are types and characteristics of solar cells.**
- 7. Explain the construction and Working of LEAD-ACID Batteries.**
- 8. Explain the construction and Working Li-ion batteries?**
- 9. Write a short note on applications of concentrating collectors.**
- 10. Classification of various types of PV Solar power Systems.**

**B.Sc DEGREE EXAMINATION**

**Fifth semester**

**PHYSICS.**

**Optical Imaging and Photography 7A**

**Time : Three hours**

**Maximum :75 Marks**

**SECTION A-(5\*10=50 marks)**

**Answer the following questions**

**1 (a) Explain the working principle of a camera. Briefly explain image formation in simple camera and human eye .**

**(Or)**

**(b) Explain Briefly Twin lens reflex camera and digital camera with suitable diagrams**

**2 (a) Explain different types of digital cameras and their parts**

**( Or)**

**(b) what are the digital camera image sensors explain briefly**

**3 (a) Explain in detail the need of light in photography**

**(Or)**

**(b) Explain briefly different types of light sources used in photography**

**4 (a) Explain the arrangement of lenses in a camera. Write different techniques involved in the use of DSLR camera**

**( Or)**

**(b) Explain the techniques in the underwater photography, medical photography**

**5 (a) Explain briefly equipment and materials used in developing the printing and image mixing**

**(Or)**

**(b) explain different types of image editing through software's like Adobe Photoshop**

SECTION B- (5\*5=25 marks)

Answer any five from the following Ten questions.

- 1 . Draw the ray diagram of single lens reflex camera and explain
2. Give the methods of care and maintenance of cameras
3. What are the types of pixels and their uses
4. Explain the terms exposure time, aperture ,shutter speed
5. Explain briefly about halogen light
6. How studio photography done explain
7. Describe the uses of filters in photography
8. Explain the high speed photography with motor driving camera
9. Explain the factors influencing quality of a digital image
10. Describe the different methods of storing images