St Aloysius College (Autonomous)

Mangaluru

Re-accredited by NAAC "A" Grade

Bachelor of Vocational Studies

In

ANIMATION & MULTIMEDIA

CREDIT BASED SEMESTER SYSTEM

(2018 –19 ONWARDS)

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(ಸ್ವಾಯತ್ತ)

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ST ALOYSIUS COLLEGE
(Autonomous)
P.B.No.720
MANGALURU- 575 003, INDIA
Phone:+91-0824 2449700,2449701
Fax: 0824-2449705
Email: principal_sac@yahoo.com
Website: www.staloysius.edu.in

Re-accredited by NAAC with 'A' Grade - CGPA 3.62
Ranked 94 in College Category – 2018 Under NIRF, MHRD, Government of India
Recognised by UGC as "College with Potential for Excellence"
College with 'STAR STATUS' conferred by DBT, Government of India

Date: 22-02-2019

NOTIFICATION

Sub: Syllabus of **B.Voc. in Animation & Multimedia** Course under Credit Based Semester System.

Ref: 1. Academic Council decision dated 15-11-2018
2. Office Notification dated 05-02-2019

Pursuant to the Notification cited under reference (2) above, the Syllabus of **B.Voc. in Animation & Multimedia** Course under Credit Based Semester System is hereby notified for implementation with effect from the academic year **2018-19**.

PRINCIPAL **REGISTRAR**

To:

1. The Chairman/Dean/HOD.
2. The Registrar
3. B.Voc. Office
4. Library

STRUCTURE – B.VOC. - ANIMATION & MULTIMEDIA

SEMESTER - I		
Course Code	**Title**	**Credits**
BV 151.1	Language 1(English)	3
BV 150.1 BV 152.1	Language 2 Kannada Hindi	3
BV 153.1	Value Education	3
BV 154.1	Computer Fundamentals	3
BV 155 .1	Foundation Arts	3
BV 156.1	Computer Graphics	3
BV 157.1	Stop Motion and Cut out Animation	3
BV 158.1P	Computer Fundamentals Lab	3
BV 159.1P	Computer Graphics Lab	3
BV 160.1P	Stop Motion Lab	3
	Total	**30**

SEMESTER - II		
Course Code	**Title**	**Credits**
BV 151.2	Language 1(English)	3
BV 150.2 BV 152.2	Language 2 Kannada Hindi	3
BV 153.2	Environmental Science	3
BV 154.2	History of Animation	3
BV 155 .2	2D Character & Environment Sketching	3
BV 156.2	3D Modeling	3
BV 157.2	Comic Art and Design	3
BV 158.2P	3D Modeling Lab	3
BV 159.2P	Animation Production Lab	3
BV 160.2P	Comic Art and Design Lab	3
	Total	**30**

SEMESTER - III		
Course Code	**Title**	**Credits**
BV 151.3	Language 1(English)	3
BV 152.3	Health, Safety & Environment	3
BV 153.3	Fundamentals of Indian Constitution	3
BV 154.3	Soft Skill	3
BV 155 .3	Production Techniques	3
BV 156.3	2D Animation	3
BV 157.3	Introduction to 3D Texturing	3
BV 158.3P	Production Techniques Lab	3
BV 159.3P	2D Animation Lab	3
BV 160.3P	Minor Projects	1
	Total	**28**

SEMESTER - IV		
Course Code	**Title**	**Credits**
BV 151.4	Language 1(English)	3
BV 152.4	Behavior Skill	3
BV 153.4	Human Rights & Value Education	3
BV 154.4	Fundamentals of Business	3
BV 155 .4	Web Technology	3
BV 156.4	3D Lighting & Camera	3
BV 157.4	Multimedia Techniques	3
BV 158.4P	Web Technology Lab	3
BV 159.4P	3D Texturing & Lighting Lab	3
BV 160.4P	Minor Projects	1
	Total	**28**

SEMESTER - V		
Course Code	**Title**	**Credits**
BV 151.5	Gender Equity	3
BV 152.5	Legal & ethical aspects of Business	3
BV 153.5	Interactive Animation	3
BV 154.5	Post Production	3
BV 155 .5	Advanced Character Design	3
BV 156.5	3D Rigging & Animation	3
BV 157.5	Visual Effects	3
BV 158.5P	3D Animation Lab	3
BV 159.5P	Video compositing Lab	3
BV 160.5P	Project	2
	Total	**29**

SEMESTER - VI		
Course Code	**Title**	**Credits**
BV 151.6	General Project Management	3
BV 152.6	Inventory Management	3
BV 153.6	Entrepreneurship	3
BV 154.6	Advanced 3D Graphics	3
BV 155 .6	Dynamics & Effects	3
BV 156.6	Dynamics Lab	3
BV 157 .6	Script writing Lab	3
BV 158.6	Story boarding Lab	3
BV 159.6	Minor Projects (Animation Final Project)	3
BV 160.6	Main Project	2
	Total	**29**
	Grand Total (All Six Semesters)	**174**

Preamble

With the economic growth the demands for professionals and skilled manpower has increased manifold. This has given steep rise to demand for competent Professionals and skilled manpower in Retail industry.

This programme is designed to cater to demands of professionally trained human resource in the field of Interior Design.

The programme is highly relevant for all those who want to pursue a professional career in Interior Design practice, or in building industry, or in the field of marketing etc.

Aim: The programme aims to build individual capacities and train persons with adequate employability skills. The programme structure attempts to blend appropriate technical knowledge and skills, personal and professional skills and substantive 'hands-on' and field / site experience required in the trade.

Keeping in view the demands of the market and to provide flexible options for students the programme is designed in modular manner and allows entry and exit options at various levels. The learners will have flexibility to develop themselves according to their strengths and career interests.

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF (National skill Qualifications framework).The B.Voc.programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles along with broad based general education. This would enable the graduates completing B.Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

The proposed vocational programme in Retail Management will be a judicious mix of skills, professional education related to retail and also appropriate content of general education. It is designed with the objective of equipping the students to cope with the emerging trends and challenges in the retail management sector.

Silent feature of the Course:

1. Equipping students with knowledge, practice, & necessary job oriented skills enabling them to gain suitable employment..
2. Curriculum collaborated with the industry requirements.
3. Credit based Semester system
4. Exposure to real time application development at the end of each semester except first semester.
5. Certification of skill component by NSDC and various Sector Skill Council.
6. Collaborations with Industries for training and placements.
7. Internship in industry : partnership with 12 firms
8. Multiple exit points in 4 stages
9. Innovative and Career Oriented

1.TITLE : B. Voc. (Retail Management
Syllabus (Semester Pattern)

2. YEAR OF IMPLEMENTATION : Syllabus will be implemented from September 2018

3. DURATION :

B. Voc. Part I, II and III (Three Years)

B. Voc. Part I - Diploma (One Year)

B. Voc. Part II - Advanced Diploma (One Year)

B. Voc. Part III – Degree (One Year)

4. PATTERN OF EXAMINATION - Semester Pattern

- Theory Examination – At the end of semester as per Mangalore University Rules
- Practical Examination :
  i. In the 1st, 3rd and 5th semester of B. Voc. there will be internal assessment of practical record, related report submission and project reports.
  ii. In the second semester of B. Voc. I there will be internal practical examination.
  iii. In the 4th and 6th semester of B. Voc. There will be external practical examination at the end of the semester.

5. MEDIUM OF INSTRUCTION: English

6. STRUCTURE OF COURSE : B. Voc. Part – I, II and III

Two Semester Per Year

Three General Papers per year / semester

Three Vocational Papers per Year / Semester

Two Practical papers per Year / Semester

One Project / Industry Visit/ Study Tour / Survey

7. SCHEME OF EXAMINATION:

A) **THEORY** –The theory examination shall be at the end of the each semester.

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

B) PRACTICAL

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

STANDARD OF PASSING

As per the guidelines and rules of B. Voc.

ELIGIBILITY FOR ADMISSION

A pass in Plus Two or equivalent examination or an examination recognized as equivalent thereto by this University.

CURRICULUM

The curriculum in each of the years of the programme would be a suitable mix of general education and skill development components.

DURATION

The duration of the B. Voc. Animation and Multimedia shall be three years consisting of six semesters. The duration of each semester shall be five months inclusive of the days of examinations. There shall be at least 90 working days in a semester.

ELIGIBILITY FOR HIGHER STUDIES

Those who pass B.Voc. Animation and Multimedia Degree are eligible for admission to higher studies.

PROGRAMME STRUCTURE

The B.Voc. Animation and Multimedia shall include:

- General Education Components
- Skill Components
- Project
- Internship
- Soft Skills and Personality Development Programmes

CREDIT CALCULATION

The following formula is used for conversion of time into credit hours.

- One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, workshops/labs and tutorials;
- For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops;

COURSE STRUCTURE

NSQF Level	Skill Component Credits	General Component Credits	Normal Duration	Exit Points / Awards
Year 3	36	24	Six Semesters	B. Voc.
Year 2	36	24	Four Semesters	Advanced Diploma
Year 1	36	24	Two Semesters	Diploma

As per the UGC guidelines, there are multiple exit points for a candidate admitted in this course. If he/she is completing all the six credits successfully, he/she will get B. Voc. Degree in Animation and Multimedia. If he/she is completing the first four semesters successfully, he/she will get an Advanced Diploma in Animation and Multimedia. If he/she is completing the first two semesters successfully, he/she will get a Diploma in Animation and Multimedia.

B.VOC. IN ANIMATION & MULTIMEDIA DETAILED SYLLABUS

Year 1 - First Semester

	Subject	Credits
1.	**Language 1(English)**	3
2.	**Language 2 (Kannada/Hindi)**	3
3.	**Value Education**	3
4.	**Computer Fundamentals**	3

Unit 1

Introduction - Computer Hardware: Computer system as information processing system; Types of computer system, hardware options, CPU, input devices, output devices, storage devices, communication devices, configuration of hardware devices and their applications.

Personal Computer: PC and its main components, hardware configuration, CPU and clock speed, RAM and secondary storage devices, other peripherals used with PC; Factors influencing PC performance; PC as a virtual office.

Unit 2

Word processing and Presentaion - Introduction and working with MS-Word 2010 in Ms-Office; Features, Parts of MS Word application window, Creating, Saving and closing a document - Opening and editing a document - Moving and copying text, Text and paragraph formatting, applying Bullets and Numbering, Find and Replace, Insertion of Objects, Date and Time, Headers, Footers and Page Breaks Graphics, Mail Merge, Meaning purpose and advantages, creating, merged letters, mailing labels, envelops and catalogs, Working with Tables, Presentation with Microsoft PowerPoint, Features, advantages and application of Templates, slideshow, saving, opening and closing a Presentation, Inserting, editing and deleting slides, Types of slides, Formatting, Insertion of Objects and Charts in slides- Custom Animation and Transition.

Unit 3

Spread Sheet-working with MS EXCEL 2010 : Features of MS Excel - worksheet, workbook, cell, cellpointer, cell address etc., Parts of Ms Excel window -Saving, opening and Closing workbook - Insertion and deletion of worksheet – Entering and Editing data in worksheet - cell range - Formatting - Auto Fill -Formulas and its advantages - References: Relative, absolute and mixed - Functions: Meaning and Advantages of functions, different types of functions available in Excel - Templates - Charts - Graphs -Macros: Meaning and Advantages of macros creation, editing and deletion of macros, Data Sorting, Filtering, validation, Consolidation, Grouping, Pivot Table and Pivot Chart Reports.

Unit 4

Modern communication system (Concepts only):

Communications, FAX, Voice mail, and information services - E Mail, group communication, Teleconferencing, Video conferencing, File exchange, Bandwidth, common network components, Hosts and servers, workstations, protocol converters, Modems, terminal controllers, routers and gateways, Network Topologies, Network types LAN, MAN, WAN and their architecture, Dial up access, High bandwidth personnel connections, Internet, WWW.

5. **Foundation Arts** 3

Unit 1

Elements and principles of art, History of Indian Art, A brief knowledge about the pre-historic scene of India. Western Art - cave paintings of ALTAMIRA and LAZCAUX. Egyptian Art – Renaissance to the modern era- Renaissance art, Modern art.

Unit 2

Nature & Architecture Study Nature, Building, Historical place – light and shade. Distribution & Understanding the images, Perspective & dimensional studies, Basic understanding of pictorial space, form & planes. Drawing based work.

Unit 3

Geometrical Drawings, Drawing from objects, Square, Cubes, cones, Cylindrical, Circle objects and other geometrical shapes, sketches and study. Observed and studied in various rendering media and Techniques Conditions.

Unit 4

Figurative & Non – Figurative study drawing from human figure, mainly based on genera form and gesture Animal Figure–Gesture, movement, form & Rhythm. Study based composition from outdoor subjects – Village life, City life. Pencil Shading, water coloring, Pattern making.

6. **Computer Graphics** 3

Unit 1

Introduction of Computer Graphics, Vector shapes, Bitmap & Vector difference, different color modes, Introduction to Corel draw, Drawing lines, Drawing calligraphic, Copying, converting, and removing outlines, Spraying objects along with line, Drawing shapes, Drawing rectangles and squares, Drawing ellipses, circles, arcs, Drawing polygons and stars, Drawing spirals, transformations, and effects , Positioning objects, Aligning and distributing objects.

Unit 2

Creating cartoon character, Using curve objects, Drawing Closed Curves, Drawing with the Artistic Media tool, 3-Point Curve tool, Special Effect of Corel draw, Blending tool, Contouring the Object, Distorting Objects, Envelope tool, Extruding of the Object, Drop Shadow, Applying Transparency Effect, Trim, Welding objects, Intersecting objects.

Unit 3

Introduction to Adobe Photoshop, Learning about pixels & resolution, Zoom Tool Interface, Resize Image, Resizing Canvas, File types, document sizes, customize document, Crop Tool, Magnetic Tools, Trimming Image, Background Layer, Creating A New Layer, Re-arranging Layers, Preference setting, Linking Layer Movement,

Locking Layer Movement, Layer Transparency, Elliptical Marquee options, Adjustment Layers, Typing styles, Gradient Editor, Gradient Layer.

Unit 4

Creating GIF animation image, Layer mask, Script- Image processor Drop Shadow, Inner Shadow, Inner Glow, Outer Glow, Bevel and Emboss, Satin, Color Overlay, Gradient Overlay, Pattern Overlay, Stroke, RGB Levels, Hue & Saturation, Blur, Sharpen, Dodge, Burn, Healing Brush, patch tool, Blending Options, radial & shape blur, Brightness/Contrast Creating new pattern, , saving for web, creating Magazine cover, greeting card, invitations, logos, brochures, advertisements.

7. **Stop motion and cut out animation** 3

Unit 1

Critical Thinking (storyboarding concept through visual and written exploration of ideas, allows them to solve problems, make connections, practice interdisciplinary learning, think deeper about their learning)

Unit 2

Collaborative learning (students and teachers work collaboratively to create the animation)

Assessment strategies (as a tool to check for students understanding and create a metacognitive path for students)

Unit 3

Making learning visible (students tell the story of their learning through the animation process)

Unit 4

Arts integration (Integrate drawing and 3-d arts into classroom content as well as digital media arts)

8. **Computer Fundamentals Lab** 3

Computer Fundamentals Exercises:

1. Page Setup, Save, Open, Close files, Fonts size, Borders & Shading, Alignment, Superscript, Subscript, etc.

2. Changing Indents with paragraph, Select all, Cut Copy, paste.
3. Columns, Inserting Symbols, Date , Time, Applying Bullets and Numbering, Page Break and Page Numbers, Word Art .
4. Inserting picture, Drawing objects and Numbering and Spell Check, Line Spacing, Drop Cap.
5. Creating Table, Merge Cells, Text Direction, and Paragraph Space before and after.
6. Typing the text inside the table and border, inserting the clip art pictures, etc.
7. Tab Settings & Inserting tab, Stops at the required positions and typing content.
8. Create a Macro to insert a picture as a logo of a company. Assign this macro only to toolbars.
9. Storing the Identity card format in macro called idmac. Assign it to toolbar and shortcut key.
10. To Learn Mail Merge
11. To use Drawing Tools and their effects etc in word.
12. Inserting Footnote, Creating and applying styles, Change Case Find and Replace and Autocorrect.
13. Excel sheet Creating
14. Creating Company Presentation in PowerPoint

9. **Computer Graphics Lab** 3

1. Creating Vector Shapes
2. Creating Vector cartoon character.
3. Change the image size, adjust luminosity, contrast and color, edit and change specific parts of the image.
4. Change to B&W image, use a small selection of the most important tools, crop images store your images.
5. Change the image size with minimum loss of image clarity, adjust luminosity and color with minimal tonal damage.
6. Recovering from major under or over exposure errors, easy ways to edit and change specific parts of the image errors (the magic stuff), better B & W conversions.

7. Logo designing and Photo restoration
8. Shadow detail with channel masks sharpening images- alternative methods to store organize & backup images.
9. Creating magazine cover designs
10. Creating gif animation in Photoshop.
11. Creating greeting card designs
12. Creating paper advertisement
13. Resolution adjusting for B&W image making, More sophisticated ways to sharpen images;, To store, organize & backup the image library.
14. Creating GIF Animation images

10. **Stop motion lab** 3

1. Identify the 12 principles of animation
2. Calculate and apply appropriate frame rates
3. Manipulate animation production equipment
4. Create accurate and aesthically appealing stop motion animation
5. Describe characteristics of well-designed and executed animation
6. Relate some knowledge of the history of animation
7. Assess and critique past and current animation trends
8. Demonstrate progress in basic sculpting, puppet making and animation skills
9. Critically analyze your creative work and the work of others

Year 1 - Second Semester

1. **Language 1(English)** 3
2. **Language 2 (Kannada/Hindi)** 3
3. **Environmental Science** 3
4. **History of Animation** 3

Unit 1

Early Animation, The past – Cave painting, Flip book, Egyptian murals, the magic lantern, The present – Stop motion, CGI animation, the future animated humans, Victorian parlor toys, Zoetrope (190 AD: 1834) Thaumatrope (1824), Phenakistoscope (1831), Praxinoscope (1877).

Unit 2

animation industry in different country, Chinese animation, Iranian Animation, Japanese animation, British animation, French animation.

Unit 3

First color cartoon, First animated feature film, early Walt Disney, History of mickey mouse, silly Symphonies, origin of Warner Bros, MGM cartoon studios, sound animation.

Unit 4

The rise of Computer Animation, the fall of traditional animation, from big screen to small screen, start of television era, modern animation in USA, eighties trends, golden age of animation.

5. **2D Character & Environment Sketching** 3

Unit 1

Research and inspiration of character sketching, Head study, drawing from life, Color basics, Perspectives.

Unit 2

Background designs, Matte paintings, Shapes, Forms, Shadows and lights, Human and cartoon figures.

Unit 3

Fun fiction, Coloring, City landscapes, Pattern creation.

Unit 4

Applying core skills, Gesture drawings, Contour, Walk cycle, Design and development.

6. **3D Modeling** 3

Unit 1

Definition of Modeling, Creation of 3D objects. Exploring the 3D Max Interface, Controlling & Configuring the Viewports, Customizing the Max Interface & Setting Preferences, Working with Files, Importing & Exporting, Selecting Objects & Setting Object Properties, Duplicating Objects, Creating & Editing Standard Primitive & extended Primitives objects, Transforming objects, Pivoting, aligning etc.

Unit 2

Understanding 2D Splines & shape, Extrude & Bevel 2D object to 3D, Understanding Loft & terrain, Modeling simple objects with splines, Understanding morph, Modeling with Polygons, using the graphite, working with deforming surfaces & using the mesh modifiers, modeling with patches & NURBS, 3D Modeling from 2D Objects, The Lathe Modifier, The Extrude Modifier, The Sweep Modifier.

Unit 3

Understanding Compound Object Types, ShapeMerge Object, Creating Connect Objects, Modeling with Boolean Objects, Creating a Scatter Object, Creating a Loft Object, Using the Get Shape and Get Path buttons, The Deformation window interface, Modeling some interior objects, Modeling a garden, Creating AEC Extended objects, Creating Mountains, Exterior Modeling using railing and wall, creating doors, windows and stairs, Creating street for gaming.

Unit 4

Modeling in Maya - Maya interface, tools, buttons, navigate between different artwork displays through key commands and shortcuts, creating basic 3D models, using Transform tools to move, rotate, and scale, grouping objects, parent objects and pivot them, selecting components and rotating, face and edge deleting, extrude, poke, or cut to add details to the objects, Boolean, duplicate, flip, split polygons

by creating new vertices and faces and draw new polygons freehand, creating gradients and bevels to smoothen edges, modeling basic shapes and figures using primitives.

7. **Comic art and design** 3

Unit 1

contains a short introduction to the basics of comics and visual storytelling, starting with technical aspects, forms of narration, and artistic practice. This part of the course offers practical and theoretical issues. Students analyse and reflect on results reached and put them into relation to the course's literature/reading obligations. Comic-strips and visual material are produced experimenting with tools, styles, and construction of sequences. This part of the course develops practical competences of visual narrating, layout of individual images and picture-sequences, digitalisation, production and distribution, marketing. Results are presented in seminars.

Unit 2

looks at international comics-cultures, focusing on the traditions, styles and contexts within mainly Western Europe, USA, and Japan and South Korea. It introduces the main and coming forms of publishing and distribution that are important for the different comics-cultures.

Unit 3

is dedicated to one individual project that has to be developed for publication in a previously determined medium. E.g. screen or print. The topic and medium are chosen by the student in dialogue with her/his supervisor. The project-work is done independently, with limited supervision. It can be used for further analysis and development in the final paper.

Unit 4

runs parallel to the entire course and consists of lectures, group-discussions, and written/drawn exercises. Theory is integrated in the practical elements and the students continuously describe their reflections and analyses in oral or/and written form. The whole course

completes with a written comics-analysis or the practical development of a comic that takes cultural issues of audiences into consideration. A comics-project in the latter meaning has to include or be supplemented by written reasoning for the choice of styles, layouts, characters, lettering, etc.

8. **3D Modeling Lab** 3

3D Modeling Exercises:

1. Creating House, Chairs, tables
2. Architectural modeling design
3. Creating Mountains – Interior & Exterior Modeling,
4. Modeling a garden – Modeling a Landscape.
5. Modeling airoplane and helicopter
6. Modeling the Body – Modeling a Female Character
7. Modeling car – Modeling a High Polygonal.
8. Modeling a pot using Boolean
9. Making snake using loft
10. Developing interior placing furniture
11. Making Table Lamp.

9. **Animation Production Lab** 3

Lab Exercises:

1. Use of lines and shapes.
2. Colours, shades and textures.
3. Colour mixing theory.
4. Human character designing.
5. Cartoon sketching-male, female and children.
6. Props for the animation.
7. City/village landscapes with perspective.

Application of perpectives in buildings.

10. **Comic art and design Lab** 3

1. cultural backgrounds of comics in different cultures
2. storytelling traditions and stereotypes in different cultures
3. comics dramaturgies
4. visual storytelling in contemporary media landscapes.
5. relevant fields of comics-research
6. production of a comic, from idea to published product
7. forms of production- and publication

Year 2 - Third Semester

1.	**Language 1(English)**	3
2.	**Health, Safety & Environment**	3
3.	**Fundamentals of Indian Constitution**	3
4.	**Soft Skill**	3
5.	**Production Techniques**	3

Unit 1

Importance of design and art direction in films. Voice terack. Casting. Rehearsal. Preparation. Recording. Animation. Story reels. Animatics. Exposure sheets. Titles.

Unit 2

Introduction to linear and nonlinear editing. Analog versus Digital - the difference, Transitions-Fades, Cuts, Dissolves, Wipes, Keying & Layering, formats- Avi, MPG-2, Mov, Wmv, VCDs and DVDs, Internet formats, VHS.

Unit 3

Live Video capture from capture card, tuner card, satellite & local channel capture to edit, Capturing and gathering media Build and organize your story, – titles, importing, Rough cut, Trim your story, Stop Motion, Motion Effects Text, Titles, Multiclip Filtering and Keying, Organizing Clips In The Browser, THE Creation of Sequences and BINS, The Icon View and Columns View, Marking Controls.

Unit 4

Elements of edit, The Timeline Buttons and Controls, The Timeline Overview, Editing Clips Into The Canvas & Timeline, Transferring Clips in the Timeline, applying keyframes, Trimming Using the Selection Tool, Closing and Finding Gaps, Adjusting Audio Over Time, The Audio Mixer & using the voice over tool, Delete Between the In/out Points.

6. **2D Animation** 3

Unit 1

Introduction to 2D animation, animation uses, animation industry, 2D animation production process, story board components, drawings for animation. Live model study, Drawings with shapes.

Unit 2

Animatics, Interface, Drawing Tool bar, View Tool bar, Color Tool bar, Option Tool bar, Properties Panel, Modeling Objects and shaping, Timeline status, Layers Play head, Time Line header, Creating Layer, Folders & Properties, Layer Mask, Symbols, Graphic, Move Clip, Button, Using Library.

Unit 3

Under lining data type, Raster and vector,. 2D graphics creation features. Typography animation.

Unit 4

Animation, Tweening Animations, Motion Tweenn, Shape Tween, Filters Drop Shadow, Blur, Glow , Bevel, Gradient Glow & bevel, Sound, Importing Sound, Placing Sound, Button, Editing, Start and End Points of Sound, Publish setting, swf-html-gif-jpeg-png- Quick time.

7. **Introduction to 3D Texturing** 3

Unit 1

Working with default maps, Understanding Material Properties, Opacity and transparency, Shininess and specular highlights, Working with the Material Editor, Using the sample slots, Naming materials, Getting new materials, Assigning materials to objects, Picking materials from a scene, Selecting objects by material, Previewing materials and rendering maps.

Unit 2

Understanding Material Map Types, 2D maps, 3D maps, Reflection and refraction maps, Diffuse Color mapping, Specular Level mapping, Glossiness mapping, Opacity mapping, Bump mapping,

UVW Map modifier, Using the Unwrap UVW modifier.

Unit 3

Working with Shaders & Hair, Using Shading Types, Blinn shader, Phong shader, Anisotropic, Multi-Layer shader, Oren-Nayar-Blinn shader, Metal shader, Strauss shader, Translucent shader, Multi-Layer Materials, Blend, Double Sided, Using Compound Materials, Raytrace Materials.

Unit 4

Multi/Sub-ObjectTop/Bottom, Ink 'n' Paint Material, Using material IDs, Working with Hair, Growing hair, Setting hair properties, Adding hair to a Man's head, Using hair presets, Using Hair Dynamics, Running a simulation, Creating golden objects, creating net texture.

8. **Production Techniques Lab** 3

Lab Exercises :

1. Interface of video editing program.
2. Slideshows with transitions and video effects.
3. Working with resolution and presets.
4. Using footages and images.
5. Making a double acting video.
6. Chroma key, Blue screen and green screen videos.
7. News Program editing for television.
8. Debate program editing.
9. Animated titles.
10. Rendering and exporting to film file formats.

9. **2D Animation Lab** 3

Lab Exercises :

1. Create a new blank movie file in Flash MX
2. Tools and steps involved in first simple animation using motion twining – basic shapes – Shape Twining – shape tweening in Flash MX.
3. Importing video files into Flash using Adobe Media Encoder and tracing the video file.
4. Creating the E-card – Animation E-card – set the stage for E-card – use a new kind of symbol called a Movie Clip.
5. Creating mask animation and path animation
6. Creating sunset scenery in flash
7. Flash Lesson – Adding Simple Audio – add a looping audio background
8. Key frames animation
9. Background animation
10. Creating a complete 2D animation with characters and dialogue.

10. **Minor Projects** 1

Year 2 - Fourth Semester

1.	**Language 1(English)**	3
2.	**Behavior Skill**	3
3.	**Human Rights and Value Education**	3
4.	**Fundamentals of Business**	3
5.	**Web Technology :**	3

Unit 1

Basic principles involved in developing a web site. Planning process. Five Golden rules of web designing. Design Concept. Home Page Layout. Designing navigation bar.

Unit 2

Web Standards. Why create a web site. Audience requirement. Introduction to web technologies. Careers and job roles. How the websites work. Web servers. Client and server scripting languages. Browsers and compatibility.

Unit 3

Types of web sites. Domains and hosting. Static and dynamic sites. Government, personal and commercial sites. Introduction to blogs. Importance of blogs. Search engines.

Unit 4

Web standards and W3 recommendations, web Content management system. Word press, Joomla, Drupal etc. Website themes and modifications. Publishing sites and promoting websites.

6.	**3D Lighting & Camera**	3

Unit 1

Working with Cameras, Creating a camera object, Creating a camera view, Controlling a camera, Aligning cameras, Setting Camera Parameters, Lens settings and field of view.

Unit 2

Camera type and display options, Using the Motion Blur effect, Using the Depth of Field effect, Camera path, target path, Camera

path animation.

Unit 3

Working with Lights, Basic Lighting Techniques, Natural and artificial light, Shadows, Light Types, Default lighting, Ambient light, Omni light, Spotlight, Direct light, Skylight, Creating and Positioning Light Objects, Transforming lights.

Unit 4

Using the Sunlight and Daylight Systems, Using the Compass helper, Understanding Azimuth and Altitude, Specifying date and time, Specifying location, Volume light parameters.

7. **Multimedia Techniques** 3

Unit 1

Match moving & camera tracking - Procedural FX workflow- Concepts of set extension & CG integration. Layer-based, node-based & advanced compositing.

Unit 2

Typography Design-Lighting and look development. compositing video with CGI. Null Objects. Particle-Based Crowd Replications. Photoshop for 3D.

Unit 3

The colour pipeline: from acquisition to delivery. Colour space and the use of LUTs. Premultiplication. Luminance keying. Post processing the matte. Understanding the concept of multipass CGI compositing.

Unit 4

Blue/green screen keying as procedural matting for VFX work. De-graining techniques. Tracker Marker removal on blue or green screens. Dustbusting. Simulation. Particle dynamics. Matching light.

8. **Web Technology Lab** 3

1. Basic structure of HTML file including various head and body tags

2. Simple web page creation with images and text
3. Hyperlinks –HTML link, image links, pdf, email and download links
4. Incorporating video and Flash files into web pages
5. Displaying tabular data in web pages using tables
6. Web page using forms and Frameset tags.
7. Web page layouts – tables and div tags
8. Creating a complete website (minimum 3 pages)
9. Styling with CSS

9. **3D Texturing & Lighting Lab** 3

1. Creating interior Textures for house
2. Creating reflecting objects
3. Creating Glass materials
4. Creating Multi colored object
5. Lighting controls - Intensity, Distribution, Color and Movement
6. Glow effects in 3D
7. Creating realistic golden trophy
8. Creating face textures using UV Map
9. Lights – Sources of Light and Realistic Look.
10. Types of Lights: Ambient Light – Directional, Point
11. Spot Lights: Area light, Volume Light, Color, Intensity and Gobos
12. Light Decay Rate: Light Linking, Spotlight properties, Spotlight Effects.
13. Light decay Regions and Barn Doors – D map Resolution, Filter Size, and Bias – Ray traced Shadows.
14. Light Effects –Light Fog, Environment Fog, Simple Fog, Physical Fog, and Volume Fog – Glow and Halo

10. **Minor Projects** 1

Year 3 - Fifth Semester

1. **Gender Equity** 3
2. **Legal & ethical aspects of Business** 3
3. **Interactive Animation** 3

Unit 1

Difference between Flash animation and interactive animation, asset management in library, Learn to export and deploy Flash content on the Web, describe the steps of web site planning and implementation, Describe the difference between user-defined and timeline-defined actions, Apply simple action scripting to execute navigational components in a Flash movie, publish and post a Flash movie online.

Unit 2

Organizing a complex object into layers, Duplicating Movie Clips, animating a complex Movie Clip, Controlling objects with buttons, Understanding frame labels, Using buttons to navigate labeled frames, Nesting code within Movie Clips, Adding drag interactivity to the object, use Buttons and Action Script to enable basic user interaction.

Unit 3

Using transparency in a video & Embedding video in web pages and other applications, Creating an advanced animation with video, Copying the video to create a reflection, Reflecting the video, Enhancing a video reflection with a mask, Building an MP3 Player, Loading sounds from external files, Controlling sound playback with Play and Pause buttons, Changing tracks, Wiring the progress bar & Building the progress bar slider, Making Flash movies accessible.

Unit 4

Understanding Dynamic text fields, applying HTML with Action Script, Animating the scrolling text with the buttons, Easing the text using the buttons, Understanding Flash Mobile, Exploring Device Central, Creating and testing Flash Lite applications.

4. **Post Production** 3

Unit 1

Animation production process. Script to screen, process of an animation. Pre-production, production and post-production, Live action in film making.

Unit 2

Traditional post production techniques. Adding visual effects. Adding CGI, transfer of color motion picture film to video or DPX. Color grading with telecine.

Unit 3

Introduction to digital Inter mediate. Meaning. Color grading. History of DI. Telecine tools.

Unit 4

Digital cinema packages. Color suite. Music, pitch correction, equalization.

5. **Advanced Character Design** 3

Unit 1

Introduce different 'styles of characters used for animation and gaming. Create own character, Detailed Study on Character Design, Clay Modeling methodology.

Unit 2

Basics of Armature. 3D Model of a proposed Character, experiment special features and mannerisms to character, Identify the texture for developed characters, Deals with some procedural Textures.

Unit 3

Learning Blender 3D UVW Maps And Unwrapping A Mesh, lighting to character, Compositing and Enhancement Phase. Learn basic of "Perspective", Environment Modeling, develop an atmosphere.

Unit 4

3D UVW Maps And Unwrapping A Mesh More experiments with texturing and shading of realistic back grounds for animation. Practice rendering, compositing.

6. **3D Rigging & Animation** 3

Unit 1

Introduction to Object Animation, The Rendering Menu, Understanding the Max Renderers, Creating Atmospheric Effects, Adding effects to a scene, Batch Rendering options, Video Post toolbar, Adding an image input event, Adding scene events, Adding image filter events, Adding an image output event.

Unit 2

Assigning controllers in the Track View, Transform controllers, Position track controllers, Rotation and Scale track controllers, Learning the Track View Interface, Track View menus and toolbars, Track View menus and toolbars.

Unit 3

Working with Space warps & Reactor, Creating a Space Warp, Binding a Space Warp to an object. Space Warp Types, Forces, Deflectors, Geometric/Deformable Space Warps, Modifier-Based Space Warps, Using reactor, wind, Using the Preview window, Creating animation keys, Morpher modifier, Working with the constraints.

Unit 4

Working with Biped & Bones, Creating a Biped, Customizing a biped, Modifying a biped, Bending links, Working with Postures and Poses, Animating a Biped, Using Footstep Mode, Building a Bones System, Assigning an IK Solver, Setting bone parameters, IK Limb solver, Understanding the Skinning Process, Binding to a skeleton.

7. **Visual Effects** 3

Unit 1

Introduction to vfx - Photographic principles - Introduction to the Interface. Basic Animation. Basic Rendering. Using cameras in editing and applying VFX, demonstrate basic media management techniques.

Unit 2

Rear Projection-Stop Motion Animation-Matte Paintings. Anchor point-Key frames- Motion Sketch, explosions, water, Fire.

Unit 3

Titling styles, Lights and Cameras, Expressions, Painting, applying animation presets, blending modes, 3d layers, mattes, rendering techniques, exporting composition to other file formats.

Unit 4

Motion tracking - 2D and 3d camera tracking- rotomation - wire removal techniques- color corrections.

8. **3D Animation Lab** 3
    1. Creating human character and hand moment
    2. creating rain fall
    3. Creating Fan Animation
    4. Creating Airplane & Helicopter Animation
    5. Creating facial expression animation
    6. Creating walk cycle
    7. Creating Character jumping & running animation
    8. Creating Exterior scenery animation
    9. Creating wind animation
    10. Creating 3D text animation
    11. Creating displace animation
    12. Creating bomb blasting scene
9. **Video compositing Lab**
    - Understand the difference between a visual effect and a special effect
    - Determine when to choose whether to create a visual effect or a special effect and determine when the two techniques can work together.
    - Pull mattes using various image processing techniques including chroma-keying
    - Understand RGB and RGBA

- Describe and use the compositing process and identify major applications used in industry
- Develop a visual effects pipeline for integration in the filmmaking process
- Demonstrate the use of Layer based compositing techniques.
- Understand the difference between a visual effect and a special effect
- Track motion data using various techniques including 2D pixel tracking, planar tracking, and camera tracking
- Develop a visual effects pipeline for integration in the filmmaking process
- Understand basic image processing techniques.

10. Project 2

	Year 3 - Sixth Semester	
1.	**General Project Management**	3
2.	**Inventory Management**	3
3.	**Entrepreneurship**	3
4.	**Advanced 3D Graphics**	3

Unit 1

Introduction to ZBrush, Introduction to Digital sculpting, workspace, hotkeys, Custom buttons / palettes, Sculpting with images.

Unit 2

Modeling vs sculpting Base meshes Dynamesh, ZSpheres, ZSketch, Insert brushe, s Kitbashing, Custom brushes, Dynamesh sketch, Insert brushes, Kitbashing, Custom brushes, Dynamesh sketch.

Unit 3

Refine and polish, Polishing brushes, Topology and cleanup, Projection and maps, Detailing and FX, Nanomesh Fibermesh, Model preparation.

Unit 4

Subtools Polygroups UVs Textures/polypaint Materials, Standard Materials Matcaps, Scene' preparation, Lighiting Lightcaps.

5.	**Dynamics & Effects**	3

Unit 1

Working with Particles, Creating Particles and Particle Flow, Understanding the Various Particle Systems, Using the Spray and Snow Particle Systems.

Unit 2

Using the Super Spray Particle System, Super Spray Basic Parameters rollout, Particle Generation rollout, Particle Type rollout, Using the Blizzard Particle System.

Unit 3

Using the PArray Particle System, Using the Time Controls,

Setting frame rate, Auto Key mode, Set Key mode.

Unit 4

Using the Motion Panel, Animating Objects, Animating cameras, Animating lights, Animating materials.

6. **Dynamics Lab** 3

    1. Creating Fire effect
    2. Creating Cracker effect
    3. Creating glow effect
    4. Creating ray effects
    5. Creating 3D Text effects

7. **Script writing lab** 3

    - Discuss the basic elements of story, Archplot, Multiplot, Miniplot, Nonplot, Antiplot structure.
    - Discuss Theme, Meaning and Emotion and Character. Discuss historical approaches to structure, power and conflict, reversals of plot and expectation, the inciting incident, progressive complications, turning points, set ups and pay offs, crisis, climax and resolution.
    - Principles of Exposition, Backstory, Flashbacks, Screenwriting Problems, Narrative and Dialogue.

8. **Story boarding lab** 3

    - produce a series of cohesive storyboards from a script
    - recognize and define common storyboard terminology
    - apply basic drawing techniques to create legible storyboards
    - create and output a simple animatic from scratch
      identify and state common preproduction workflow.

9. **Minor Projects (Animation Final Project)** 3

10. **Minor Project** 2

Total Credits of all 6 Semesters	**174**

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St Aloysius College (Autonomous)

Mangaluru

Re-accredited by NAAC "A" Grade

COURSE STRUCTURE AND SYLLABUS

B.Voc

Food Processing and Engineering

DEEN DAYAL UPADHYAY CENTRE FOR KNOWLEDGE ACQUISITION AND UPGRADATION OF SKILLED HUMAN ABILITIES AND LIVELIHOOD (KAUSHAL)

(UGC approved B.Voc. Degree conducting institutions with UGC assistance)

(2017 –18)

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(ಸ್ವಾಯತ್ತ)
ಮಂಗಳೂರು- 575 003

ST ALOYSIUS COLLEGE
(Autonomous)
P.B.No.720
MANGALURU- 575 003, INDIA
Phone:+91-0824 2449700,2449701
Fax: 0824-2449705
Email: principal_sac@yahoo.com
Website: www.staloysius.edu.in

Re-accredited by NAAC with 'A' Grade - CGPA 3.62
Ranked 44 in College Category by NIRF, MHRD, Government of India
Recognised by UGC as "College with Potential for Excellence"
College with 'STAR STATUS' conferred by DBT, Government of India

No: SAC 40/Syllabus 2018-19 Date: 04-12-2017

NOTIFICATION

Sub: Syllabus of **B.Voc. in FOOD PROCESSING AND ENGINEERING** Course under Credit Based Semester System.

Ref: 1. Academic Council decision dated 28-10-2017
2. Office Notification dated 04-12-2017

Pursuant to the Notification cited under reference (2) above, the Syllabus of **B.Voc. in FOOD PROCESSING AND ENGINEERING** Course under Credit Based Semester System is hereby notified for implementation with effect from the academic year **2018-19.**

PRINCIPAL **REGISTRAR**

To:
1. The Chairman/Dean/HOD.
2. The Registrar
3. Library

Structure and Scheme
B.Voc (Bachelor of Vocation) (Food Processing and Engineering)

Bachelor of Vocation (B.Voc.) is launched under the scheme of University Grants Commission for skill development based on higher education leading to Bachelor of Vocation (B.Voc.) Degree has multiple exits as Diploma/Advanced Diploma under the National Skill Qualification framework. The B.Voc. programme incorporates specific job roles and their National Occupational Standards along broad based general education.

B Voc in FOOD PROCESSING & ENGINEERING

1. Food Processing & Engineering

ICRA Management Consulting Services (IMaCS) conducted the district wise skill gap study for the State of Karnataka. Based on its research, sectors are identified which will be the development and employment growth engines in the districts in the next five years and will have skill training requirements. It forecasted the numbers for 20 high growth sectors identified by NSDC . Based on its forecasts, it has been estimated that between 2012 and 2022, an incremental demand (cumulative for ten years) for 8.47 million people will be generated in Karnataka. Maximum demand will be generated from sectors such as tourism, travel and agriculture and allied (mainly allied such as horticulture, fishery, animal husbandry, poultry and sericulture); building, construction and real estate; IT & ITES, transportation, logistics, warehousing and packaging; healthcare and education services. The supply side numbers have also been forecasted. It has been estimated that between 2012 and 2022, about 8.16 million persons will join the workforce in Karnataka. Of these, about 43 per cent will be minimally skilled, 40 per cent will be semi-skilled, 17 per cent will be skilled and the remaining about one per cent will be highly skilled

As per NSDC district wise skill gap study in Karnataka 2011 Agriculture and Allied sectors are the biggest employment sources in the state

	Specialisation	Skill Gaps Identified
1.	Food Technology	Handling of Food Process Equipments
2.	Food and Nutrition	Analytical Instrumentation
3.	Nutritional Biochemistry	Organoleptic studies

1. B.Voc. Programme has been designed as per National Skill Qualification Framework emphasizing on skill based education.
2. **4.1.3. Alignment with National Occupational Standard of the Sector Skills Council and National Skill Qualification Framework:**

S.No.	Name of the Sector / Programme	Semester	Job role(s) Covered	NSQF Level	Remarks
1	B.Voc in Food Processing & Engineering	1	Assistant System Manager	4	
		2	Food Safety Manager	5	
		4	Packaging and Labelling Associate Food Process Engineer	6	
		6	Instrumental Analyst Food Production Manager	7	

1. **LEVELS OF AWARD:**

AWARD	DURATION	Core Level corresponding NSQF Level
Certificate Course	6 Months	4
DIPLOMA	1 YEAR (TWO SEMESTERS)	5
ADVANCED DIPLOMA	2 YEAR (FOUR SEMESTERS)	6
B.VOC. DEGREE	3 YEAR (SIX SEMESTERS)	7

Credits for each of the year

NSQF LEVEL	SKILL COMPONENT CREDITS	GENERAL EDUCATION CREDITS*	NORMAL CALENDAR DURATION	EXIT POINT /AWARDS
Year 1	36	24	Two Semesters	Diploma in Food Processing
Year 2	36	24	Two Semesters	Advanced Diploma in Food Processing
Year 3	36	24	Two Semesters	Degree in Food Processing
Total	**108**	**72**		

The formula used for conversion of time into credit hours is as follows:

a) One Credit would mean equivalent of 15 periods of 60 minutes each, for theory, workshops/labs and tutorials;

b) For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops;

c) For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures/workshops.

2. **ELIGIBILTY FOR ADMISSION IN B.VOC**. A candidate will be eligible to join 1st semester of B.Voc. Food Processing & Engineering course, if he/she has passed 10+2 examination (Any stream/ Arts/Science/Commerce) or 10+2 vocational stream related to Food processing of recognized Board/university, or any other examination recognized as equivalent thereto without reappear.

3. The course of study of B.Voc. shall be divided in to six semesters and end semester examination will be held at the end of every semester in the months of October (for semester I, III & V) and April (for semester II, IV & VI) or as fixed by registrar of evaluation.

4. Semester examination will be open to regular candidates who have been on the rolls of a college affiliated to this University and meet the attendance and other requirements.

5. **B Voc in FOOD PROCESSING & ENGINEERING**

	SEMESTER -1	Credits
1	Communication Skills - 1	4
2	Kannada/ Hindi/French/Malayalam /Konkani -1	4
3	Basic computer skills - 1	4
4	Basics of Food Processing- BV -134.1	3
5	Fundamentals of Food and Nutrition- BV -135.1	3
6	Basics of Food Safety and Regulatory Act- BV -136.1	3
7	Practical Paper pertaining to BV -137.1P	3
8	Practical Paper pertaining to - BV -138.1P	3
9	Practical Paper pertaining to - BV -139.1P	3
10	Industrial visit -BV 140.1	-
SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 1 Supervisory development program Enhanced supervisory productivity Effective handling of challenges and stress Ownership and Accountability		

Accepting responsibility and taking ownership at the workplace	

	SEMESTER -2	Credits
1	Communication Skills - 2	4
2	Kannada/ Hindi/French/Malayalam /Konkani -2	4
3	Basic computer skills - 2	4
4	Introduction to Cereals, Legumes and Oil Processing- BV -134.2	3
5	Fundamentals of Food Chemistry and Microbiology - BV -135.2	3
6	Introduction to Fruit and Vegetable Processing- BV -136.2	3
7	Practical Paper pertaining to BV -137.2P	3
8	Practical Paper pertaining to BV -138.2P	3
9	Practical Paper pertaining to BV -139.2P	3
10	Industrial Visit - BV 140.2	

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 2

Learning how to take accountability while performing complex tasks

Going beyond the blame game to achieve collaboration

Business communication

Infusing the art of effective communication

	SEMESTER -3	Credits
1	Soft skills	4
2	Health safety and Environment	4
3	Fundamentals of Indian constitution	4
4	Introduction to Bakery & Confectionary Processing- BV -134.3	3
5	Food Engineering and Instrumentation- BV -135.3	3
6	Introduction to Dairy Technology- BV -136.3	3
7	Practical paper pertaining to BV -137.3P	3
8	Practical paper pertaining to BV -138.3P	3
9	Practical paper pertaining to BV -139.3P	3
10	Industrial Visit- BV 140.3	-

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 3

Building effective relationships through the power of communication.

Written business communication for success.

Time management

Gaining insights into multitasking to manage time

	SEMESTER -4	Credits
1	Behavioural skills	4
2	Human Rights and Value Education	4
3	Fundamentals of Business Law	4
4	Introduction to Meat, Fish and Poultry Processing- BV -134.4	3
5	Basics of Food Packaging - BV -135.4	3
6	Food Additives and Preservatives - BV -136.4	3
7	Practical Paper pertaining to BV- 137.4P	3
8	Practical Paper pertaining to BV -138.4P	3
9	Practical Paper pertaining to BV -139.4P	3
10	Industrial Visit - BV 140.4	-

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 4

Withstanding pressure to enhance performance

Increasing the threshold level of pressure

Sales leadership program

Know your customer behaviour to maximize sales

	SEMESTER -5	Credits
1	Gender Equity and Value Education	4
2	Legal and ethical aspects of Business	4
3	Entrepreneurship	4
4	Food Drying and Concentration Techniques- BV -134.5	3
5	Spices and Plantation Crop Technology- BV -135.5	3
6	Introduction to Fermentation Technology- BV -136.5	3
7	Practical paper pertaining - BV- 137.5P	3
8	Practical paper pertaining to BV -138.5P	3
9	Practical paper pertaining to BV -139.5P	3
10	Industrial Visit - BV 136.6	

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 5

Business acumen

Gaining knowledge about the business and industry

Learning the impact of different factors of economy on business

How to do competitor profiling

	SEMESTER -6	Credits
1	General Project Management	4
2	Inventory Management	4
3	Principles of Marketing	4
4	Food industry Waste Management- BV -134.6	3
5	Practical paper pertaining to BV -135.6P	3
6	Industrial Project- B.VFP-611	12

Structure and Syllabus of B.Voc in Food processing and Engineering

Scheme and Syllabus

Bachelor of Vocation

B.Voc First Year: Food Processing and Engineering (1st Semester)

CODE	SUBJECTS	L	T	P	TOTAL CREDITS *	External Marks	Internal Marks	Practical Marks	TOTAL MARKS
BV 131.1	Communication Skills - 1	**4**			**4**	**70**	**30**		**100**
BV 132.1	Kannada/ Hindi/ French/Malayalam/Konkani -1	**4**			**4**	**70**	**30**		**100**
BV 133.1	Basic computer skills - 1	**4**			**4**	**70**	**30**		**100**
BV 134.1	Basics of Food Processing	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 135.1	Fundamentals of Food and Nutrition	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 136.1	Basics of Food Safety and Regulatory Act	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 137.1P	Practical Paper pertaining to - BV 134.1			**4**	**2**	**40**	**10**	**50**	**50**
BV 138.1P	Practical Paper pertaining to - BV 135.1			**4**	**2**	**40**	**10**	**50**	**50**
BV 139.1P	Practical Paper pertaining to - BV 136.1			**4**	**2**	**40**	**10**	**50**	**50**
BV 140.1	Industrial Visit				**3**				**50**
	Total				**30**				**800**

15hrs L=1credit; 30hrs of practical =1credit

B.Voc First Year: Food Processing and Engineering (2nd Semester)

CODE	SUBJECTS	L	T	P	TOTAL CREDITS*	External Marks	Internal Marks	Practical Marks	TOTAL MARKS
BV 131.2	Communication Skills - 2	**4**			**4**	**70**	**30**		**100**
BV 132.2	Kannada / Hindi / French/Malayalam/Konkani - 2	**4**			**4**	**70**	**30**		**100**
BV 133.2	Basic computer skills - 2	**4**			**4**	**70**	**30**		**100**
BV 134.2	Introduction to Cereals, Legumes and Oil Processing	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 135.2	Fundamentals Of Food Chemistry And Microbiology	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 136.2	Introduction to Fruit and Vegetable Processing	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 137.2P	Practical Paper pertaining to - BV 134.2			**4**	**2**	**40**	**10**	**50**	**50**
BV 138.2P	Practical Paper pertaining to - BV 135.2			**4**	**2**	**40**	**10**	**50**	**50**
	Practical Paper pertaining to - BV 136.2			**4**	**2**	**40**	**10**	**50**	**50**
BV 140.2	Industrial Visit				**3**				**50**
	Total				**30**				**800**

15hrs L=1credit; 30hrs **BV 139.2P** of practical =1credit

B. Voc Second Year: Food Processing and Engineering (3rd Semester)

CODE	SUBJECTS	L	T	P	TOTAL CREDITS*	External Marks	Internal Marks	Practical Marks	TOTAL MARKS
BV 131.3	Soft skills	**4**			**4**	**70**	**30**		**100**
BV 132.3	Health safety and Environment	**4**			**4**	**70**	**30**		**100**
BV 133.3	Fundamentals of Indian constitution	**4**			**4**	**70**	**30**		**100**
BV 134.3	Introduction to Bakery & Confectionery Processing	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 135.3	Food Engineering and Instrumentation	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 136.3	Introduction to Dairy Technology	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 137.3P	Practical Paper pertaining to BV 134.3			**4**	**2**	**40**	**10**	**50**	**50**
BV 138.3P	Practical Paper pertaining to - BV 135.3			**4**	**2**	**40**	**10**	**50**	**50**
BV 139.3P	Practical Paper pertaining to - BV 136.3			**4**	**2**	**40**	**10**	**50**	**50**
BV 140.3	Industrial Visit				**3**				**50**
	Total				**30**				**800**

15hrs L=1credit; 30hrs of practical =1credit

B. Voc Second year: Food Processing and Engineering (4th Semester)

CODE	SUBJECTS	L	T	P	TOTAL CREDITS *	External Marks	Internal Marks	Practical Marks	TOTAL MARKS
BV 131.4	Behavioral skills	**4**			**4**	**70**	**30**		**100**
BV 132.4	Human Rights and Value Education	**4**			**4**	**70**	**30**		**100**
BV 133.4	Fundamentals of Business Law	**4**			**4**	**70**	**30**		**100**
BV 134.4	Introduction to Meat, Fish and Poultry Processing	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 135.4	Basics of Food Packaging	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 136.4	Food Additives and Preservatives	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 137.4P	Practical Paper pertaining to - BV 134.4			**4**	**2**	**40**	**10**	**50**	**50**
BV 138.4P	Practical Paper pertaining to - BV 135.4			**4**	**2**	**40**	**10**	**50**	**50**
BV 139.4P	Practical Paper pertaining to - BV 136.4			**4**	**2**	**40**	**10**	**50**	**50**
BV 140.4	Industrial Visit				**3**				**50**
	Total				**30**				**800**

15hrs L=1credit; 30hrs of practical =1credit

B. Voc Third year: Food Processing and Engineering (5th Semester)

CODE	SUBJECTS	L	T	P	TOTAL CREDITS *	External Marks	Internal Marks	Practical Marks	TOTAL MARKS
BV 131.5	Gender Equity and Value Education	**4**			**4**	**70**	**30**		**100**
BV 132.5	Legal and ethical aspects of Business	**4**			**4**	**70**	**30**		**100**
BV 133.5	Entrepreneurship	**4**			**4**	**70**	**30**		**100**
BV 134.5	Food Drying and Concentration Techniques	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 135.5	Spices and Plantation Crop Technology	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 136.5	Introduction to Fermentation Technology	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 137.5P	Practical Paper pertaining to - BV 134.5			**4**	**2**	**40**	**10**	**50**	**50**
BV 138.5P	Practical Paper pertaining to - BV 135.5			**4**	**2**	**40**	**10**	**50**	**50**
BV 139.5P	Practical Paper pertaining to - BV 136.5			**4**	**2**	**40**	**10**	**50**	**50**
BV 140.5	Industrial Visit				**3**				**50**
	Total				**30**				**800**

15hrs L=1credit; 30hrs of practical =1credit

B. Voc Third year: Food Processing and Engineering (6th Semester)

CODE	SUBJECTS	L	T	P	TOTAL CREDITS *	External Marks	Internal Marks	Practical Marks	TOTAL MARKS
BV 131.6	General Project Management	**4**			**4**	**70**	**30**		**100**
BV 132.6	Inventory Management	**4**			**4**	**70**	**30**		**100**
BV 133.6	Principles of Marketing	**4**			**4**	**70**	**30**		**100**
BV 134.6	Food Industry Waste Management	**3**	**0**	**0**	**3**	**70**	**30**		**100**
BV 135.6P	Practical Paper pertaining to BV 134.6			**4**	**2**	**40**	**10**	**50**	**50**
BV 136.6	Industrial Project				**12**				**350**
	Total				**30**				**800**

15hrs L=1credit; 30hrs of practical =1credit

Syllabus of B.Voc in Food processing and Engineering

Structure and Scheme

B.Voc (Bachelor of Vocation) (Food Processing and Engineering)

B.VOC. FOOD PROCESSING AND ENGINEERING- FIRST YEAR

(1ST SEMESTER)

BV-134.1 BASICS OF FOOD PROCESSING

Max. Marks: 70 Total lectures: 45 hrs.

1. Introduction to Food Processing: Definition, Objectives, scope of food processing industries, Introduction to Different processes employed in food processing viz. Milling, Cooking, Boiling, Steaming, Braising, Stewing, Roasting, Frying, Grilling, Baking, Fermentation, Pickling, Refining.

2. **Food Preservation** : Heat: Evaporation, boiling, paraboiling, steam under pressure, pasteurization, blanching, canning). Low Temperature: (Thawing, refrigeration, cold storage, de-hydro freezing): Drying (Methods of drying – dehydration by Air drying, sun drying and freeze drying) Radiations: (Ultraviolet and ionizing irradiations). Their effect on on microorganisms, use of aspects of canning and bottling, processing operations

3. **Food Preservation** : Preservation by fermentation – Curing and Pickling; Smoking Chemical preservatives- (Objectives, principles, types of preservatives, Different types of chemical preservatives, Safety in use and certification levels, Preservation by high osmotic pressure(Pickling, salting, curing – principles). Effect of various food processing operations on the nutrients of foods.

Preservation of meat and poultry products: Electrical stimulation, chilling and freezing of fresh meat. Cold shortening and thaw rigor, Chilling and freezing processing of poultry meat.

6. **Methods in Food Processing** - Microwave processing, Extrusion cooking, Ohmic Heating, Reverse Osmosis, Electro dialysis, Ultra-filtration, High Pressure Processing, Super critical fluid extraction .

7. **Advances in fortification**: synthetic nutrients, techniques of food fortification and stability of nutrients in relation to processing.

REFERENCES :

1. Jood, Sudesh, 2002, Food Preservation, Agrotech Publisher Academy, Udaipur.
2. Potter, N.N., 2002, Food Science, CBS Publishers, ND.
3. Sethi, Mohini, 2001, Food Science, CBS Publishers, ND.

4. Srilakshmi, B., 2001, Food Science, New Age International Pvt. Ltd., ND.
5. Mahendru, S.N., 2000, Food Additives, Tata McGraw Hills, ND.
6. Manay, N.S., 2001, Foods: Facts & Principles, Wiley Eastern Ltd., ND.
7. Fellows, P., 2005, Food Processing Technology : Principles & Practices, CRC Press, Woodhead Publishing Ltd., England.

PRACTICALS

BV-134.1-PRACTICAL PAPER I (BV-137.1P-114: Basics of Food Processing)

1. To blanch a seasonal fruit or vegetable & assess quality of blanching process.
2. To study the effect of browning on raw fruits & vegetables.
3. To study effect of heat and acidity on milk proteins.
4. To study the effectiveness of pasteurization.
5. To study Pasteurization of milk using microwave technique.
6. To study different methods of food processing i.e. by heat, low temperature & drying of given food sample.
7. To check the shelf life of a given food at ambient temperature and under refrigeration.
8. Basic of GLP, Glassware cleaning, Ph meter, preparation of reagent ,Normality and Molality, Labeling techniques.
9. Phosphate test for the effect of pasteurization
10. Introduction to safety of Laboratory Equipments, Sterilization of glasswares in the food microbiology laboratory.

BV-135.1 FUNDAMENTALS OF FOOD & NUTRITION

Max. Marks: 70 Total lectures: 45 hrs.

1. **Introduction to Food:** Definition, classification and constituents of food :Carbohydrates, Fats , Proteins ,Fat soluble vitamins- (A,D,E and K) Water soluble vitamins – (Thiamin, Riboflavin, Niacin, Pyridoxine, Folate, Vitamin B12 and Vitamin C) Minerals – (Calcium, Iron, Zinc, Iodine and Flourine).(neena)

2. Nutritional Concept in Food Design: Nutritive values of cereals, pulses, oil seeds, fruits vegetables, fish, meat and eggs)

3. **Functions**: Of food, Effect of deficiency & overconsumption of dietary sources on health, Basic food groups, Recommended Dietary Allowance (RDA), Food guide pyramid, Dietary fibers, Functions of water in body. . Balanced Diet: Definition, food groups used in planning balanced diets.

4. **Nutrition**: Basic terms used in nutrition, relationship between food, health and nutrition, bioavailability of nutrients. Basal Metabolic Rate (BMR). Protein quality, Dietary allowances and standards for different age groups: adult man/woman, pre-school children, adolescent children, pregnant woman.geriatric nutrition, nutrition for athletes

5. HUMAN NUTRITION -Concept and definition of terms-Nutrition, Malnutrition and Health; Scope of Nutrition. Growth & development from infancy to adulthood.

REFERENCES:

1. N. Shakuntala Manay & M. Shadaksharaswamy Food Facts and Principles by, New Age International (P) Ltd. Publishers.
2. N. Potter & J. Hotchkiss, Food Science CBS Publisher and Distributors.
3. Manoranjan Kalia and Sagita Sood, Food Preservation and Processing by Kalyani Publishers.
4. Shubhangini Joshi, Nutrition and Dietetics Tata Mcgraw Hill Co. Ltd.
5. M. Swaminathan, Vol-I Food and Nutrition , Bangalore Printing and PublishingCo.
6. Gopalan C, Rama Sastri BV, Balasubramanian SC .1989. Nutritive Value of Indian Foods. National Institute of Nutrition, ICMR, Hyderabad.
7. Wardlaw and Insel MG, Insel PM. 2004. Perspectives in Nutrition. Sixth Edition, McGraw Hill.
8. Srilakshmi B 2012. Nutrition Science. 4th Revised Edition, New Age Interntional Publishers.
9. Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Puri S .Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd.
10. ICMR.2010. Recommended Dietary Allowances for Indians. Published by National Institute of Nutrition, Hyderabad
11. Antia, F.P. and Abraham, P. 2011: Clinical Dietetics and Nutrition, Fourth Edition, Oxford University Press.
12. Joshi, V.D. 2005: Handbook of Nutrition and Dietetics, Vora Medical Publications, Mumbai.

13. Masih, S. 2011. Essentials of Food and Nutrition, Lotus Publishers.
14. Sharma, R. 2011: Diet Management, Fourth Edition, Elsevier, A Division of Reed Elsevier India Private Limited.

PRACTICALS

BV-135.1-PRACTICAL PAPER II (BV-138.1P -115: Fundamentals of Food and Nutrition) Max.

1. To study nutritional information in different packed foods available in the market.
2. Qualitative and quantitative determination of carbohydrates in food.
3. Qualitative and quantitative determination of proteins in food.
4. Qualitative and quantitative determination of different vitamins in different food products.
5. To plan diet chart for different age groups with special reference to different age groups.
6. To prepare scrap file showing excess and deficiency of different food components.

BV-136.1– BASICS OF FOOD SAFETY AND REGULATORY ACT

Max. Marks: 70 Total lectures: 45 hrs.

1. **General principle of food hygiene**,: Hygiene in relation to food preparation, personal hygiene and food handling habits. sanitizers, role of sanitation, general sanitary consideration and sanitary evaluation of food plants.

2. **Sanitary practices of food:** Cleaning of plant, Establishing and maintaining sanitary practices in food plants. Place of sanitation in food plants. Sanitary aspects of building and equipment.

3. **Introduction to concepts of food quality: F**ood safety and quality assurance. Control of QC & QA. HACCP, Food adulteration, nature of adulterants, methods of evaluation of food adulterants and toxic constituents. Microbial quality control: determination of microorganisms in foods by cultural, microscopic, physical and chemical methods.

4. **Food Safety** – Role of voluntary agencies & legal aspects of consumer protection. National & International food laws –FSSA, BIS, AGMARK, FDA, Export (quality & inspection act, Consumer protection act), Labeling requirements of foods. Food adulteration ; Definition, object of act, central committee for food standards; public analysis, food inspector, duties of Food inspectors, Report of Public analyst, sealing, fastening and dispatch of samples, powers of court.

REFERENCES:

1. Nielsen, S.S, 2004, Introduction to chemical Analysis of foods, CBS Publishers, New Delhi.
2. Ranganna. S., 2001, Handbook of Analysis & Quality control for Fruit & Vegetable Products, Tata McGraw Hill, New Delhi.
3. Pomeranz.Y, Meloan.C.E, 1996, Food Analysis – Theory & Practice, CBS Publiushers, New Delhi.
4. Jacobs.M.B., 1999, Chemical Analysis of Food & Food Products, CBS Publiishers, New Delhi.
5. Jay.J.M, 1996, Modern Food Microbiology, CBS Publishers, New Delhi.
6. Debnath, 2005, Tools & Techniques of Biotechnology, Pointer Publishers, Jaipur.
7. Ingraham, John.L.2004, Introduction to Microbiology, 3 Ed., Thomson brocks/Cole Inc.
8. Tortora G.J et al, 2008, Microbiology: an introduction, Pearson Education
9. Nester, E.W, 2009, Microbiology, McGraw-Hill Higher Education
10. Dubey, R.C., Maheshwari, D.K., 2008, Textbook of Microbiology, S.Chand Publications,ND
11. Adams, M.R., Moss, M.O., 2007, Food Microbiology, New Age International Pvt. Ltd., ND.
12. Pelczar, Reid and Chan, 2008, Microbiology, McGraw hill Ed, ND

13. Ananthanarayan, Panikar, CKJ.,2006, Textbook of Microbiology, Oriental Longman Pvt. Ltd., Hyderabad.
14. Frazier, William, C. 2008, Food Microbiology, Tata McGraw Hill Ed., ND.
15. S.Roday 1998, food Hygiene and sanitation Tata McGraw Hill Ed., ND.
16. Bean Malicse 2012 Principles of food sanitation,safety and hygiene patima University

PRACTICALS

BV-136.1-PRACTICAL PAPER III (BV-139.1P-114: Basics of Food Safety and Regulatory

Act)

1. Introduction and study of microbiological instruments.

2. Cleaning of glass wares, preparation of media, cotton plugging and Sterilization.

3. Different staining techniques for identification of microbes: simple staining, negative staining, gram staining, acid fast staining.

4. Personal hygiene- microbes from hands, tooth-Gums and other body parts.

5. Isolation of microorganisms from food samples.

6. To analyze the quality of water.

7. Determine the Critical Control Points for production line of Milk, Fruits & Vegetables and Meat industry as per HACCP system.
8. To prepare a chart of specifications for different Food products as specified by BIS.
9. Sterility and Swap test.
10. Acrylamide test

BV-140.1-INDUSTRIAL VISIT

First Year: Food Processing and Engineering (2nd Semester)

BV-134.2-INTRODUCTION TO CEREALS, LEGUME AND OIL PROCESSING

Max. Marks: 70 Total lectures: 45 hrs.

1. Paddy Processing:

Paddy Varieties - Their Composition and Quality characteristics. Curing of Paddy. Parboiling Processes, Cold Water soaking and Hot water soaking processes, Paddy Dryer - LSU Dryer. By Products of Paddy Processing - Paddy husk and its uses as boiler fuel, husk ash, activated carbon, furfural and other by products. Production of Flattened Rice and Puffed Rice from Paddy. Rice Milling**:** Paddy Dehusking Processes. Rice Mill Flow Chart. Modern Rice Mills, Paddy, Bran and Brokens separators. Utilization of by products: rice bran, rice bran oil, flour mixes and dough and other readymade powders (idli, dosa and gulab jamun).

2.Milling of Pulses: Major Pulses grown in the country and their application, Status of Pulse milling industry in India, need for modernization, Traditional milling process - merits and demerits. Drying of legumes - Sun drying, Traditional Processing steps. Modern milling process - Process flow chart - Mechanical hot air drying and conditioning - merits and demerits, Dehusking in Pulse Pearler, Water conditioning, splitting of pulses in Pulse splitter, Merits and demerits. Mini dhal mill.

3.Milling and Processing of Maize: Dry milling of maize: Storage and drying, Pre-cleaning, cleaning equipment, Degermination and Dehusking, Roller milling, Sifting, Purifying, Aspiration, Pneumatics in a maize mill. Products of milling - Flour, Semolina, Brewers' grits etc and their applications. Wet milling of Maize and corn: Modern methods of processing, Cleaning, Steeping, Degermination, Bran and Fibre separation, Gluten and Starch Separation, Equipment needed for Degermination, Debraning and starch separation. Starch conversion into other value added products. Extraction and refining of Corn oil in brief.

4.Grain Storage and Handling: Bag Storage - Advantages and Disadvantages - Bag Storage
structure design. Parameters of good storage structure, Cover Plinth Storage Structures, CAP storage (Ceiling and Plinth Storage), Plans for Bag storage, lay outs, Dunnage, Materials for Dunnage, Pallets, Protection against Rodents, Fungi, Pests and Mites. Fumigation Processes for bag storage piles. Bulk Storage in silos and large Bins, Relative merits and demerits of Silo storage to Bag Storage.

Reference Books

1. Chakraverty, A.: Post Harvest Technology of Cereals, Pulses and Oilseeds. Oxford and IBH
Publishing Co, Calcutta (1995)

2. Samuel Matz: The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall
(1992)
3. N.L.Kent and A.D.Evans: Technology of Cereals (4th Edition) Elsevier Science (Pergaman), Oxford, UK, (1994)
4. George E Inglett: Maize-Recent Progress in Chemistry and Technology Academic Press, London (1982)
5. Ruth H. Matthews: Pulses – Chemistry, Technology and Nutrition Mercel DekkerInc. USA (1989)
6. Y. Pomeranz: Modern Cereal Science and Technology VCH Publishing Inc. New York (1987)
7. Cryde M. Christensen: Storage of Cereal Grains and their Products American Association of
Cereal Chemists inc., St. Paul, USA 1982

PRACTICALS

BV-137.2P -PRACTICAL PAPER I (BV-134.2 Introduction to Cereals and Legume Processing)

1. Milling of Wheat flour.
2. Determination of Gluten.
3. Preparation of chapaties, bread, biscuits and cakes.
4. Paraboiling of Rice.
5. Study of malting of Barley.
6. Identification and description of common pulses.
7. Preparation of fried snacks and baked goods
8. Preparation of germinated foods.
9. Visit to food industry-Visit to bakery
10. Germination study
11. Smoky cake
12. Proximate analysis of given sample

BV-135.2-FUNDAMENTAS OF FOOD CHEMISTRY AND MICROBIOLOGY

Max. Marks: 70 Total lectures: 45 hrs.

1.**Moisture in Foods**: Structure, Properties, Types of water in food, water activity and their specific function, Water activity and stability, Lipids: Classification, Structures, Physical and chemical properties, rancidity and its types, Hydrogenation, Refining of oils, Margarine and importance in diet Carbohydrates: Definition, Classification, Functions, Properties of simple & complex carbohydrates, food chemistry-definition and importance.

2.Proteins: Introduction, Sources of protein, Classification and structures, Nutritive, Physicochemical properties, Nutritive and supplementary value of food proteins, Denaturation and its implications, Gel formation and its theories. Effect of processing on food proteins. Pigments: Introduction and significance of natural pigments in food - Chlorophylls, Carotenoids, Haemoglobin and Myoglobin, Anthocyanins, Flavonoids, Betalains Tannins. Enzymes in foods, and food industry

3. Minerals: Main elements and trace elements in different food, Functions, sources, deficiency diseases and RDA. FOOD ADDITIVES: Definitions, uses and functions of: Acids, Bases, Buffer system, Chelating / sequestering agents, Low calorie and non-nutritive sweeteners, Antioxidants.

4. Microbiology: Introduction, historical developments of general and food microbiology; prokaryotes and eukaryotes; classification of microorganisms-a brief account; sources of microorganisms in foods; microbial growth, growth curve; factors affecting growth-intrinsic and extrinsic factors controlling growth of microorganisms. public health: food poisoning, types of food poisoning, Food Toxicology : Naturally occurring toxicants in foods: Aflatoxins: Introduction, types of Aflatoxins, Goitrogens, Cyanogens.

REFERENCES

1. Food Chemistry by L H Meyor (CBS Publisher, Delhi)
2. Food Facts and Principal by N. Shakuntala Manay & M. Shadaksharaswamy (New Age International (P) Ltd. Publishers, New Delhi)
3. Food Chemistry by O.R. Fennema, 2nd edn. (Marcel Dekkar Inc.)
4. Food Chemistry by H D Belitz and W. Groech (Springer Publ.)
5. Food Additives by S.N. Mahindru
6. Food Processing and Preservation by B.Siavsankar (Prentice Hall India)
7. Pelezar, M.I and Reid, R.D. (1993) Microbiology McGraw Hill Book Company, NewYork, 5th Edition.
8. Frazier, W.C. (1988) Food Microbiology, McGraw Hill Inc. 4th Edition.
9. Doyle, P. Bonehat, L.R. and Mantville, T.J-(1997): Food Microbiology, Fundamentals and Frontiers, ASM Press, Washington DC.
10. Textbook of Microbiology (6th edition) by Ananthnarayan & C K J Paniker
11. Basic Food Microbiology by George J. Banwart
12. Food Microbiology by M R Adams and M O Mos
13 Industrial microbiology L.E.Casida
14 A textbook of Biotechnology by R.C.Dubey
15 Neelima Garg. Laboratory Manual of Food Microbiology. 2010. I.K.International

PRACTICALS

BV-138.2P: -PRACTICAL PAPER II (BV-135.2 Fundamentals of Food Chemistry and Microbiology)

1.Basic activities in the food microbiology laboratory (Preparing dilution blanks and media, bacterial transfers, isolating single colonies, preparing slides, simple stain, Gram stain, enumeration of food-borne microorganisms).

2.Preparation of nutrient media and types of different of culture methods.

3.Staining of bacteria

4.Testing pectin strength in fruit & vegetable extracts.

5.Isolation of starch, Changes on heating at starches / gelatinization properties of starches.

6.Effect of acid & alkali on color of fruits & veg.

7.Effect of sugar on boiling point of water.

8,Microbial examination of bread moulds.

9.Microbial quality of street foods.

10. Microbial spoilage of milk.

11. Acid value of Fat /oil.

BV-136.2: INTRODUCTION TO FRUIT AND VEGETABLE PROCESSING and FOOD BEVERAGES

Max. Marks: 70 Total lectures: 45 hrs.

1. **Chemical composition**: Post harvest changes, Preparing fruit and vegetable for processing. Pectin: Raw materials; processes and uses of pectin; products based on pectin manufacture and quality control. Post-harvest handling of fresh fruits and vegetables for Processing , Storage of Horticultural Crops: Containers- Tin, glass and other packaging materials used in fruits and vegetables preservations,

2. **Factors**: Natural, Ventilated, Controlled Atmosphere Storage, Low temperature storage (General methods of freezing of fruits & vegetables).Fruit and vegetable plant layout and processing line. Fruit and vegetable product quality standards and quality control measures.

3. **Canning of fruits and vegetables**: basic requirements, process, machinery, operation and effect. Drying /Dehydration of fruits and vegetables: types, Process, machinery, operation, Problems related to storage of dehydrated products

4**. Formulation and preparation of fruit juices**, Jams, jelly, pickles, tomato products (sauce), potato chips: principle, processing techniques.

Beverage: Non-carbonated Beverages: Introduction, dilutable beverages- ingredients, manufacturing operation, filling and packaging. Ready to drink non-carbonated products. Coffee bean preparation-processing-brewing-decaffeination-instant coffee-Tea-types-black, green ,juices based beverages. Carbonated beverages: Ingredients, carbon dioxide production, Alcoholic beverages: Introduction. Wine- wine variety, Fermentation and other operations.

REFERNCES:

1. Srivastava, R.P. and Kumar, S., 1998, Fruit and Vegetable preservation: Principles and Practices, 2nd Ed, International Book Distributing Co, Lucknow.
2. Salunkhe, D. K. and Kadam, S.S., 1995, Handbook of vegetable Science and Technology, Production, Composition, Storage and Processing, Marcel Dekker, New York.
3. Dauthy, M.E., 1997, Fruit and Vegetable processing, International book Distributing Co. Lucknow, India.
4. Siddappa, L.G., and Tondon, G. L., 1986, Preservation of Fruit and Vegetables, Indian

Council of Agricultural Research, New Delhi.

PRACTICALS

BV-139.2P -PRACTICAL PAPER III (BV-136.2: Introduction to Fruit and Vegetable Processing and Food Beverages)

1. Preparation of jams and jellies from different fruits.
2. Demonstrate various concepts, principles and procedures involved in processing of food beverage manufacturing beverages
3. To prepare different types of pickles (sweet & sour).
4. Estimation of Ascorbic Acid content spectrophotometrically.
5. Determination of Brix (sugar content) of total soluble sugars by refractometer : Acid ratio of fruits and vegetable products
6. Drying by different methods of fruits and vegetables.
7. Preparation of tomato ketch-up, sauce & chutney.
8. Preparation of potato chips, finger chips.
9. Determination of starch content of apples/potatoes.
10. Industrial visit to fruit & vegetable processing unit.

BV-140.2-INDUSTRIAL VISIT

Suggested Readings

Arsdel W.B., Copley, M.J. and Morgen, A.I. 1973. Food Dehydration, 2nd Edn. (2 vol. Set). AVI, Westport.
Bender, A.E. 1978. Food Processing and Nutrition. Academic Press, London.
Fellows, P. and Ellis H. 1990. Food Processing Technology: Principles and Practice,New York.
Jelen, P. 1985. Introduction to Food Processing. Prentice Hall, Reston Virginia, USA.
Lewis, M.J. 1990. Phys i c al Properties of Food and Food Processing Systems.Woodhead, UK.
Wildey, R.C. Ed. 1994. Minimally Processed Refrigerated Fruits and Vegetables.Chapman and Hall, London.

Second Year: Food Processing and Engineering (3rd Semester)

BV 134.3- INTRODUCTION TO BAKERY, AND CONFECTIONERY PROCESSING

Max. Marks: 70 Total lectures: 45 hrs.

1. **Introduction to baking**: Bakery ingredients and their functions; Testing of flour; Manufacture of cake and biscuits; Analysis of bakery products; Cake Icing techniques, manufacture of wafer, cookies and crackers, Malting of cereals- uses of malt, Malt extract and oats technology.(neena)

2. **Manufacture :** Of bread, sweet yeast dough products, , pies, pastries, doughnuts, chocolates and candies; Chocolate Confectionery: Cocoa beans, chocolate liquor, cocoa butter, cocoa bean processing and chocolate manufacturing plant operations. Wheat flour, quality characteristics and its uses in bakery products: bread, biscuits & cakes, pasta goods and processed cereal foods for infants. Manufacturing of cakes-Causes of variation in cake quality, shortened cakes, Unsharpened cakes (sponge cakes);

3. **Extrusion :** Objectives and importance ; Components and functions of an extruder; Classification of extruder; Advantages and disadvantages of different types of extrusion; Maintenance, safety and hygiene of bakery plants.

4. **Commercial Baking Technology & Status**: Introduction: Ingredients used in baking, The Equipment of baking, Reactions of baking, Manufacturing of bread- Kind of breads, Manufacturing of Biscuits and cookies, Of bakery and confectionary industries in India. Machines & equipment for batch and continuous processing of bakery products.

REFERENCES:

1. Extrusion of Food, Vol 2; Harper JM; 1981, CRC Press.
2. Bakery Technology & Engineering; Matz SA; 1960; AVI Pub.
3. Up to-date Bread Making; Fance WJ & Wrogg BH; 1968, Maclasen & Sons Ltd.
4. Modern Cereal Chemistry; Kent-Jones DW & Amos AJ; 1967, Food Trade Press Ltd.

PRACTICALS

BV 137.3P-PRACTICAL PAPER I (BV 134.3: Introduction to Bakery and Confectionery Processing)

1. Determination of total ash content of wheat flour.
2. Determination of acid insoluble ash in wheat flour.
3. Determination of dry gluten in wheat flour.
4. Demonstration of stages of sugar cookery.
5. Preparation of different types of cakes.
6. Preparation of different types of cookies.
7. Preparation of chocolate.
8. Making of bread
9. Industrial visit

BV 135.3- FOOD ENGINEERING AND INSTRUMENTATION

Max. Marks: 70 Total lectures: 45 hrs

1. Physical Properties and frictional properties of Foods: Methods of estimation of - Shape, size, volume, density, porosity, surface area, moisture content, equilibrium moisture content, water activity. Sorption Isotherm and its determination. Friction, Static and kinetic friction, and angle of repose. Mechanical properties

2. Rheological Properties of Foods: Rheological Classification and models, Viscosity – effect of temperature on viscosity, measurement of viscosity – capillary tube viscometer – plate and cone viscometer –coaxial cylinder viscometer. Texture measuring instruments, Hardness and brittleness of food materials. Extrusion**,** Objectives and importance; Components and functions of an extruder;(Adarsha)

3. Thermal Properties of Foods: Definitions - specific heat, enthalpy, conductivity and diffusivity, surface heat transfer coefficient. Measurement of thermal properties like specific heat, enthalpy, conductivity and diffusivity;

4. Units, Dimensions and Conversions, SI System. Properties of steam and moist air, Steam tables and Psychrometric chart (for Drying), Unit operations in Food Processing.

5. **Food samples and sampling techniques:**, storage and preservation of samples, expression of results, Sensory analysis of foods, Electronic evaluation of sensor y attributes- Electronic nose, electronic tongue, Colour measurement in foods, texture analysis in foods.

EFERENCES:

1. Rao, M.A. Rizvi, S.S.H., and Datta, A.K. Engineering Properties of Foods. Taylor and Francis, USA, 2005.
2. Serpil Sahin, and Sumnu. Physical properties of Foods. Springer Science + Business Media LLC, USA. 2006.
3. M.J.Lewis: Physical Properties of Foods and Food Processing Systems Woodhead Publishing Cambridge, UK (1990)

PRACTICALS

BV 138.3P -PRACTICAL PAPER II (BV 135.3: Food Engineering and Instrumentation)

1. Study of dehydration characteristics of different food materials.

2. Determination of particle size of given flour sample using Sieve analysis.

3. Homogenization of milk and measurement of size of fat globules before and after homogenization.

4.Coefficient of viscosity of water, milk, juices etc. by flow through a capillary tube.

5.Surface tension of water by Jaeger's method.

6.Mechanical equivalent of heat by calendar and Borne's apparatus.

7.Study of different types of Mixers.

8.To study different components of evaporator.

9.Determination of viscosity of different food products.

10.Food Plant Design and preparation of layout and working and handling of the food instrument

BV 136.3- INTRODUCTION TO DAIRY TECHNOLOGY

Max. Marks: 70 Total lectures: 45 hrs.

1. **Definition of milk:** Chemical composition of milk Principle and methods of milk processing (Filtration, Clarification, Pasteurization, Homogenization, Sterilization(neena) Types of processed milk: pasteurized, toned, flavored & fermented milk, infant milk, milk powder Preparation methods and principles of Paneer, cheddar Cheese, Curd, Yoghurt.()

2.Processing of market milk- Practices for reception, chilling, clarification, and storage of raw milk. Storage and processing of fluid milk: pasteurization, sterilization, homogenization:Effect of homogenization on physicochemical properties of milk. UHT Processing, aseptic packaging Membrane processing of milk.

3. Frozen milk products: composition, process of manufacture, defects (their causes and prevention). Technology of indigenous milk products: *dahi*, butter, ghee. Utilization of milk industry by-products: Importance/Need and food applications of dairy products.

4. Newer concepts in dairy products: cream powder, sterilized cream, butter spread, butter powder, cheese spread, whey protein concentrates, Lactose powder. Probiotics and their applications.

REFERENCES:

1. Sukumar, De (1994). Outlines of Dairy Technology. Oxford University Press.
2. SmithG. (2003). Dairy processing improving quality. Wood head Publishers.
3. Andrews, A.T. (1994).Biochemistry of Milk Products. Wood head Publishers.
4. Technology of Dairy Products by Early, R.
5. Aneja P, Mathur BN,Chandan RC & Banerjee A K.2002. Technology of Indian Milk Products.

Dairy India Pub.

PRACTICALS

BV 139.3P -PRACTICAL PAPER III (BV 136.3: Introduction to Dairy Technology)

1. To check the heat stability of milk by COB and Alcohol tests.
2. Quantitative estimation of acidity of milk by Titration method.
3. Determination of specific gravity, SNF % and TS% of milk.
4. Estimate the milk fat by Gerber method.
5. To determine the Casein content of the milk.
6. To check the sterility of milk by Turbidity test.
7. Bacteriological estimation of milk by sterilized milk , SPC method.
8. To estimate the purity of ghee by Baudouin test.
9. Preparation of Ghee by different methods
10. Preparation of dahi, cream and buttermilk
11. To prepare ice cream and testing of its quality .
12. Estimiation of free fatty acids in ghee sample
13. Estimation of milk PH
14. Phosphate test for pasteurization milk.
15. Adulteration test milk.
16. Milk based beverages

BV 140.3-INDUSTRIAL VISIT

Second Year: Food Processing and Engineering (4th Semester)

BV 134.4- INTRODUCTION TO MEAT, FISH AND POULTRY PROCESSING

Max. Marks: 70 Total lectures: 45 hrs.

1. Status and scope of meat industry in India: Structure and physico-chemical properties of muscle meat: meat pigments, composition and nutritive value, conversion of muscle into meat. Global commercial fisheries resources, production trends

2. **Meat-nutritional quality**: Meat and poultry, structure of muscles-factor affecting quality of fresh meat. Postmortem changes – rigor mortis. Meat products – Ham and Beckon, sausage, standards for meat products, Components of carcass viz. muscles, postmortem glycolysis, rigor mortis and contraction of muscles.

3. **Fish preservation** - low temperature, chilling and freezing, Thermal processing, dehydration- curing and smoking, preservation using antibiotics, preservation by irradiation. Types of fish. post mortem changes in fish,handling, storage and transportation of fish. Marine products segment includes sundried, artificially dehydrated, radiation preserved, processed, preserved and canned fish.

4.**Egg processing**: Structure and composition of egg, nutritive value of egg. collection, grading cleaning washing, processing of egg, types of egg products. storage and transportation.

REFERENCES:

1. Modern Dairy Products, Lampert LH; 1970, Chemical Publishing Company.
2. Developments in Dairy Chemistry – Vol 1 & 2; Fox PF; Applied Science Pub Ltd.
3. Outlines of Dairy Chemistry, De S; Oxford.
4. Richardson and Mead. 1999. Poultry meat science.
5. Pearson and Tauber. 1989. Muscle and meat biochemistry.
6. Pearson and Dutson. 1994. Quality attributes and their measurement in meat poultry
7. Egg Science and Technology by Stadelman WJ, and Cotterill OJ, 2002, CBS Publishers, New Delhi.
8. The Meat We Eat by Romans. JR and Costllo WJ, Carlson WC, Greaser ML and Jones KW, 2004, Interstate Publishers, USA

PRACTICALS

BV 137.4P-PRACTICAL PAPER I (BV 134.4: Introduction to Meat, Fish and Poultry Processing)

1. To conduct survey of different meat processing industries.
2. To Process chicken and test quality.
3. Determination of Egg components.
4. Preparation of egg products, boiled, fried, omelet.
5. To determine quality of egg by brine floatation technique.
6. Determination of egg density.
7. Assessment of quality of meat and fish.
8. Chemical analysis trimethyl amine, BBM
9. Teach something about Hallall chicken.
10. Preparation of different products
11. Fish and meat pickling products, like fermentation products.
12. Microbial quality analysis.
13. Utilization of by products from waste by chicken, poultry, meat, pork.
14. Tenderization of meat by Pepin .
15. Rigar mortis

BV 135.4- BASICS OF FOOD PACKAGING

Max. Marks: 70 Total lectures: 45 hrs

1.Introduction to Food Packaging: Protection of Food products - major role of food packaging - Functions of packaging, Effect of environmental factors like Light, Oxygen, Moisture, Temperature and mechanical forces and biological factors on food quality and shelf life, Need for protective packaging. Estimating the Shelf life requirement of food products for packaging - accelerated storage studies etc.

2.Metal Cans and Glass Bottles as Packaging: Merits and demerits, Metallic can types employed, Tin cans and Aluminum cans, relative merits and demerits, specialty of Open top sanitary cans (OTS), Lacquers and their use, Three piece cans and Two piece cans, Aerosol Cans, Relative merits and demerits. Basics of Canning operations, Can closures.

3.Flexible Films Packaging: Relative merits and demerits. Formation of Films and pouches, Plastics used and their**.** Specific applications, advantages and disadvantages – Polyethylene (LDPE and HDPE), Cellulose, Polypropylene (PP), Polyesters, Poyvinylidene Chloride (PVDC - Diofan, Ixan and Saran), Polyvinyl chloride, Copolymers their applications. Different types of paper, paperboard, plastics, cellulose films,

4.Filling and Sealing Operations for various types of packages. Can double seam - can seam formation and defects- terminology, Metal caps for bottles and jars – Crown corks, lug caps, Twist off lid and ROPP caps, Description and applications. Closing and sealing of Rigid plastic containers. Filling and sealing of Flexible plastic containers, Seal types - Bead seals, Lap Seals and Fin seals.

5.Packaged foods:

This includes spices, snacks and savouries, ready-to-eat (RTE) and ready-to-cook (RTC) meals, beverages, chocolate and non-chocolate based confectionery, biscuits and bakery items.

REFERENCES:

1. Gordon L. Robertson: Food Packaging- Principles and Practice Marcel Dekker Inc, USA (1993)
2. Donald Downing: Complete Course in Canning (3 Volumes) CTI Publications inc, USA (1996)
3. Mathlouthi M. (Editor): Food Packaging and Preservation Elsevier Applied Science Publications Essex, UK (1986)
4. J. R.D.David, R. H Graves and V.R.Carlson: Aseptic Processing and Packaging of Foods: CRC Press, New York
5. Sachrow & Griffin, "Food packaging"
6. Heiss R., "Principles of food packaging"
7. Paine E.A, "Fundamentals of packaging".
8. Day P.T., "Packaging of food beverages"
9. Food Packaging: Principles and Practice. Gordon L. Robertson. Marcel Dekker. 1993
10 Food Packaging Materials – M. Mahadevish R.V. Gowramma.

PRACTICALS

BV 138.4P -PRACTICAL PAPER II (BV 135.4: Basics of Food Packaging)

PRACTICAL PAPER XII (B.VFPE-315)

M.M: 45

1. Shelf life studies of packaging foods.
2. To determine grease resistance of packaging materials.
3. Gas/Vacuum packaging of foods and shelf life studies
4. To find out the porosity of tin plate.
5. Determination of Water Vapor Transmission rate of Packaging Material.
6. To find out the uniformity and amount of wax on wax paper.
7. Edible packaging of Food Samples.
8. Puncture resistance of corrugated boxes.
9. To find out the tin coating weight.
10. To see the chemical resistance of packaging material.
11. Visit to various industries, dealing with food packaging materials like / paper, board and metal cans.
12. Bursting strength
13. Testing of paper boards, swap test for packaging

BV 135.4-FOOD ADDITIVES AND PRESERVATIVES

Max. Marks: 70 Total lectures: 45 hrs

1. Introduction: Food additives definition – Determination of the limit for addition – NOEL – Toxicity data

Method of determining toxicity – LD50, carcinogenicity, teratogenicity – PFA, FDA, FPO,regulations – GRAS additives.Types, chemical properties, levels of additions in individual products, toxicity data of Acidulants – Preservatives – Emulsifiers and gums - Antioxidants

2. Types, chemical properties, levels of additions in individual products, toxicity data of Dough conditioners - flour improvers – Humectants –Enzymes, Starches

3.Types, chemical properties, levels of additions in individual products, toxicity data of Colourants – Natural and artificial, Flavourants, Flavour enhancers, Fat substitutes and replacers

4.Types, chemical properties, levels of additions in individual products, toxicity data Sweeteners – Natural and synthetic, Chelating agents, antibrowning agents, Nutritional additives

REFERENCES:

1. Food additives by Brannen A.L., Davidson P.M., Salminen S. and Thorngate J.H. Second Edition, Revised and Expanded. Marcel dekker Inc. USA, 2002.

1. Handbook of Food additives by Thomas Furia,
Manual of methods of analysis of analysis of foods food addititve lab manual, govt of india.
Latest addition of books

PRACTICALS

BV 139.4P -PRACTICAL PAPER III (BV 136.4: Food Additives and Preservatives)

1. Analysis of food additives

2.Quantative methods for the identification of benzoic acid in food samples.

3. Estitmation of benzoic acid in the presence of saccharin ready to serve beverages.

4. Determination of nitrate and nitrite in foods

5. Isolation, identification and estimation of synthetic food colours.

6. Oil soluble colors

7. Test for sulphur dioxide in food samples.

8. Isolation of pigments by food samples, beet root, turmeric

BV 140.4-INDUSTRIAL VISIT

Third Year: Food Processing and Engineering (5th Semester)

BV 134.5- FOOD DRYING AND CONCENTRATION TECHNIQUES

Max. Marks: 70 Total lectures: 45 hrs

1. Drying definition: Moisture removal and its need, Dehydration of food, Evaporation of water below its boiling point, Utilities of drying, Theoretical aspects of drying, Thermal properties related to drying of foods. Moisture content measurement, representation and determination, Equilibrium moisture content (EMC), its determination, methods, models and importance, Moisture sorption curves, Hysteresis phenomenon.

2. Drying process and methods, Drying rate periods – constant and falling rate periods and their calculation, Heat and mass transfer coefficient calculations, Capillary and diffusion theory, Thin layer and deep bed drying, Dryer performance indices – overall thermal efficiency, specific energy consumption, coefficient of performance.

3. Classification and selection, Quality criteria for dryer selection.
Basic construction and application of the following dryers – Grain dryers, Tray dryers, Vacuum dryers, Spray dryers, Fluidized bed dryers, Freeze dryers, Flash Dryers, Super-heated steam drying, Solar energy based dryers, Osmotic Dehydration, Drum dryer.
Basic design steps and calculations – Tray dryer, Vacuum dryer, Freeze dryer, Fluidized bed dryer.

4.Physical, Chemical and Microbiological characteristics of dehydrated foods: Re-hydration ratio, size and density, shelf-life, water activity, Microbial stability of selected foods.
Novel drying techniques, Hybrid dryers, Energy and environment conservation.

REFERENCES:

1. Unit operations of chemical engineering by McCabe and Smith. McGraw-Hill
2. Chemical engineering handbook by Perry RH. McGraw-Hill
3. Dairy plant engineering and management by Tufail Ahmad, Kitab Mahal Publications
4. Engineering for dairy and food product by Farrall AW. John Wiley and Sons
5. Milk Pasteurization by Hall CW. The AVI Publication
6. Introduction to Chemical Engineering By Salil K Ghosal, Shyamal K Sanyal, Siddhartha Datta, Tata Mcgraw Hil

PRACTICALS

BV 137.5P- RACTICAL PAPER I (BV 134.5: Food Drying and Concentration Techniques)

1. Hot air oven drying methods.
2. Study on conventional and Non-conventional drying process.
3. Sun drying
4. Evaporators
5. Concentration of heating
6. Pada making
7. Milk made by condensation method.
8. Visit industries-milk

BV 135.5- SPICES AND PLANTATION CROP TECHNOLOGY

Max. Marks: 70 Total lectures: 45 hrs

1. Importance of spices: Spices – production and importance – pepper, cardamom, chilli, turmeric, ginger, clove, nutmeg and other minor spices – stage of harvesting and harvesting methods – threshing, shelling, decortication of spices - methods – merits and demerits. Cleaning, grading and packaging of spices Processing of spices – drying - traditional and mechanical drying – cleaning, grading and grinding – construction and operation of different mills – cryogenic grinding, packaging and storage of spices.

2. Processing of spices: Processing of major and minor spices – pepper, cardamom, chilli, turmeric, ginger, clove, nutmeg, – quality analysis of spices- processes involved in the manufacture of oleoresins and essential oils.

3. Processing of coconut, oilpalm, arecanut and cashew: Processing of plantation importance – processing of coconut, oilpalm, arecanut, cashew– harvesting and stages of harvest – drying, cleaning and grading – production of value added products – packaging and storage of produces.crops – production and

4. Processing of coffee, tea, cocoa and vanilla: Processing of coffee, tea, cocoa and vanilla – methods, process and equipment – value added products – packaging and storage

REFERENCES:

1. Pruthi, J.S. 2001. Minor Spices and Condiments: Crop management and post harvest technology,ICAR Publications, New Delhi, India pp. 1-781.
2. Pruthi, J.S. 1998. Major Spices and Condiments: Crop management and post harvest technology, Reprint: ICAR Publications, New Delhi, India pp. 1-514. K. V. Peter, 2004, Handbook of herbs and spices, Woodhead Publishing Ltd , Cambridge England
3. The complete Book on Coconut & Coconut Produts (Cultivation & Processing). By NIIR Board, Asia Pacific Business Press Inc., New Delhi – 110 007.
4. Hand Book on Spices. By NIIR Board, Asia Pacific Business Press Inc.,New Delhi – 110 007.

PRACTICALS

BV 138.5P -PRACTICAL PAPER II (BV 135.5: Spices and Plantation Crop Technology)

1. Extraction of essential oil in spices.(Clove oil)
2. Detection of adulteration in spices.
3. Analysis of cocoa beans
4. Analysis of chocolate
5. Extraction of virgin coconut oil.
6. Estimation of caffeine in coffee.

BV 136.5- INTRODUCTION TO FERMENTATION TECHNOLOGY and NUTRACEUTICALS

Max. Marks: 70 Total lectures: 45 hrs.

1. Introduction to fermentation: Types of fermentations, fermentation kinetics, fermenter design, Types of fermenter, fermentation kinetics.

2. Process description and control for preparing fermented products. Traditional Indian products like *idli, dosa, dhokla*. soya based products like soya sauce, natto.

3. Downstream processing in fermentation: objectives and problems with downstream processing; various equipment for product recovery.

4. Micro-filters and ultrafiltration systems for separation of cells and fermentation medium and for concentration of medium containing product; extraction of product with solvent, evaporation, crystallization, centrifugation and drying.

Nutraceuticals **:** Introduction: Phytonutrients and antinutrients, sources, definition to functional foods, nutraceuticals pre-and probiotic interactions. Free radical scavengers; Mechanism and biological role of antioxidant molecules.

REFERENCES:

1. Vogel,H.C. andTodaro,C.L.(2005). Fermentation and Biochemical Engineering Handbook: Principles, Process

Designand Equipment, 2nd Edition, Standard Publishers.

2. El-Mansi,E.M.T.(2007). Fermentation Microbiology and Biotechnology 2nd Edition, CRC/Taylor & Francis.

3. Joshi, V.K. and Ashok Pandey, (1999), Biotechnology: Food Fermentation, Microbiology, Biochemistry and Technology, Vol. I & vol. II Educational Publisher.

4. Peppler, H.J. and D. Perlman, (2004), Microbial Technology: Fermentation Technology, 2nd Edition,

Vol. II Academic Press / Elsevier.

5. Stanbury, P.F., A. Whitaker and S.J. Hall, (1997), Principles of Fermentation Technology, 2nd Edition Aditya Books(P) Ltd.

6. Philip R Ashurst. 1998. Chemistry & Technology of soft drinks & fruit juices published by Blackwell Publishers.

7. Mitchel AJ. 1997. Formulation and production of carbonated soft drinks published by Blackwell Publishers

8. Maurice Shachman. 2000. The soft drinks companion-A technical handbook for the beverage industry published by CRC Press.
9. Shakuntala Manay. N and M. Shadakshara Swamy. 2000. FOODS: Facts and Principles Published by New Age International(p) ltd.publishers
10. Hui et al., Hand book of food and beverage fermentation
11. Boulton , Brewing yeast and fermentation.

PRACTICALS

BV 139.5P -PRACTICAL PAPER III

(BV 136.5: Introduction to Fermentation Technology

1. List the quality control steps in beverage preparation
2. To prepare different soft drinks
3. To test quality of beverages.
4. To prepare ready-to-serve (RTS) fruit beverages.
5. Preparation of natural sauerkraut fermentation
6. Preparation of yoghurt and analysis
7. Wine production+ Beer production
8. Visit to Bharath mall
9. Fermented traditional foods.

V - BV 140.5: INDUSTRIAL VISIT

Third Year: Food Processing and Engineering (6th Semester)

BV 134.6: - WASTE MANAGEMENT IN FOOD INDUSTRY

Max. Marks: 70 Total lectures: 45 hrs

1.Food industry By-products and Waste: Introduction, status in India, definition, origin and type of waste and byproducts, their identification, classification, composition and characterization, need for treatment and utilization, impact on environment, food waste as source of biogenic raw material and energetic utilization.

2. Introduction to Food Waste Treatment, basic unit operations, techniques & equipment for treatment, primary treatments like screening, sedimentation, skimming, floatation coagulation & flocculation, flow equalization, filtration, adsorption, chemical oxidation, membrane separation, ion exchange. Anaerobic & aerobic digestion of organic wastes, activated sludge process, biomass generation & its utilization.

3. Food Wastes and By-products Related to Specific Processing Industries like fruit and vegetables (apple, orange, mango, potato etc.), dairy industry, oil and oil seeds industry, sugar industry, grains and milling industry, fermentation (alcohol and beer), livestock and poultry, fish, meat.

4. **Introduction to Food Packaging Waste** handling and treatment, Farm wastes. Incineration of solid food waste and its disposal. **Future Trends**, introduction to legal and statutory requirements for food waste handling, treatment and disposal.

References

1. Waste Management for the Food Industries, by Ioannis S. Arvanitoyannis, First edition 2008, Elsevier Inc, USA.
2. Food and Agricultural Wastewater Utilization and Treatment, Sean X. Liu, First edition 2007, Blackwell Publishing, Iowa 50014, USA.
3. Managing Food Industry Waste, ROBERT R. ZALL, First edition, 2004, Blackwell Publishing Professional, Iowa, USA.
4. The Treatment and Handling of Waste by Bradshaw AD Chapman & Hali.
5. Alternative Strategies for the Treatment of Food Processing Waste by Rockey J.
6. Food Processing Waste Management by Green J.H. AVI Publications.
7. Post harvest Technology of Fruits and Vegetables by L.R. Verma. Indus Pub.

PRACTICALS

BV 135.6P-PRACTICAL PAPER I (BV 134.6: Waste Management in Food Industry)

1. Utilization of by products from different food waste.
2. Lycopene extraction from tomato peel.
3. Isolation of starch in potato peel
4. Extraction of pectin from citrus peel
5. Utilization of waste for preparation of different products like vinegar, starch, pectin.
6. Biogas production.
7. Solid waste management, liquid waste management. Eg- vermiculture
8. Waste management in diary industries
9. Mango bar preparation
10. Urva market visit

BV 136.6- INDUSTRIAL PROJECT

St Aloysius College (Autonomous)

Mangaluru

Re-accredited by NAAC "A" Grade

Bachelor of Vocational Studies

In

PHARMACEUTICAL CHEMISTRY

CREDIT BASED SEMESTER SYSTEM

(2018 –19 ONWARDS)

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(ಸ್ವಾಯತ್ತ)

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ST ALOYSIUS COLLEGE
(Autonomous)
P.B.No.720
MANGALURU- 575 003, INDIA
Phone:+91-0824 2449700,2449701
Fax: 0824-2449705
Email: principal_sac@yahoo.com
Website: www.staloysius.edu.in

Re-accredited by NAAC with 'A' Grade - CGPA 3.62
Ranked 44 in College Category by NIRF, MHRD, Government of India
Recognised by UGC as "College with Potential for Excellence"
College with 'STAR STATUS' conferred by DBT, Government of India

No: SAC 40/Syllabus 2018-19 Date: 04–12–2017

NOTIFICATION

Sub: Syllabus of **B.Voc. inPharmaceutical Chemistry**
Course under Credit Based Semester System.

Ref: 1. Academic Council decision dated 28-10-2017
2. Office Notification dated 04–12–2017

Pursuant to the Notification cited under reference (2) above, the Syllabus of **B.Voc. inPharmaceutical Chemistry** Course under Credit Based Semester System is hereby notified for implementation with effect from the academic year **2018-19**.

PRINCIPAL **REGISTRAR**

To:

1. The Chairman/Dean/HOD.
2. The Registrar
3. Library

Structure and Scheme
B.Voc (Bachelor of Vocation) (Pharmaceutical Chemistry)

Preface

The Ministry of Human Resources, Government of India has launched DeenDayalUpadhyayaKaushalKendras across the country. This is a scheme on skills development based higher education as part of college/university education, leading to setting up of Bachelor of Vocation courses (B.Voc.) to serve multiple needs, including (i) career oriented education and skills to students interested in directly entering the workforce,
(ii) contracted training and education programmes for local employers, (iii) high-touch remedial education for secondary school graduates not ready to enroll in traditional colleges, giving them a path to transfer to three or four year institutions; and (iv) general interest courses to the community for personal development and interest. Bachelor of Vocation will have with multiple exits such as Diploma and Advanced Diploma under the NSQF (National Skills Qualifications Framework). The Bachelor of Vocation model, by and large, will be accessible to a large number of individuals of the community, offer low cost and high quality education locally, that encompasses both vocational skills development well as traditional coursework, thereby providing opportunities to the learners as to move directly to the employment sector or move into the higher education sector. It offers a flexible and open education system which also caters to community-based life-long learning needs.

About the programme

The program is designed to educate and create skilled manpower that can serve the society through the knowledge gained during the course of time. The student enrolling in the course will be benefitted in several ways. The candidate will work in the college as well as with the industries during the time of his study. If a candidate successfully completes first year of study he would be awarded a diploma and he will be capable enough to serve as a laboratory assistant in any industry or academic institution. A candidate completing two successful years in Bachelor of Vocation program will be awarded with advanced diploma. An advanced diploma qualified student in Pharmaceutical Chemistry will be fit for working ADL, QC and Production department of any pharmaceutical industries. The candidate completing all three years of the course successfully will be awarded with Bachelor of Vocation in Pharmaceutical Chemistry and is fit for getting absorbed in any division of Pharmaceutical Industries.

Sl. No.	Name of the Sector/ Programme	Sem	Job role(s) Covered	NSQF Level
1.	B.Voc in Pharmaceutical Chemistry	1	Assistant Operation Manager	4
		2	Production Operator	5
		4	Medical Sales Representative Quality Assurance Chemist	6
		6	Quality Control Chemist Production Chemist	7

1. **LEVELS OF AWARD:**		
AWARD	**DURATION**	**Core Level corresponding NSQF Level**
Certificate Course	6 Months	4
DIPLOMA	1 YEAR (TWO SEMESTERS)	5
ADVANCEDDIPLOMA	2 YEAR (FOUR SEMESTERS)	6
B.VOC. DEGREE	3 YEAR (SIX SEMESTERS)	7

CREDITS FOR EACH OF THE YEAR				
NSQF LEVEL	**SKILL COMPONENT CREDITS**	**GENERAL EDUCATION CREDITS***	**NORMAL CALENDAR DURATION**	**EXIT POINT/ AWARDS**
Year 1	36	24	Two Semesters	Diploma in Pharmaceutical Chemistry
Year 2	36	24	Two Semesters	Advanced Diploma in Pharmaceutical Chemistry
Year 3	36	24	Two Semesters	Degree in Pharmaceutical Chemistry
Total	**108**	**72**		

1. The formula used for conversion of time into credit hours is as follows:

a) One Credit would mean equivalent of 15 periods of 60 minutes each, for Theory, workshops/labs and tutorials;

b) For internship/field work, the credit weightage for equivalent hours shall be 50% of that for lectures/workshops;

c) For self-learning, based on e-content or otherwise, the credit weightage For equivalent hours of study should be 50% or less of that for lectures/ Workshops.

2. **ELIGIBILTY FOR ADMISSION IN B.VOC**. A candidate will be eligible to join 1st semester of B.Voc. Pharmaceutical Chemistry course, if he/she has passed 10+2 examination (Any stream/ Arts/Science/Commerce) or 10+2 vocational stream related to Pharmaceutical Chemistry of recognized Board/university, or any other examination recognized as equivalent thereto without reappear.

3. The course of study of B.Voc. shall be divided in to six semesters and end semester examination will be held at the end of every semester in the months of October (for semester I, III & V) and April (for semester II, IV & VI) or as fixed by registrar of evaluation.

4. Semester examination will be open to regular candidates who have been on the rolls of a college affiliated to this University and meet the attendance and other requirements

B.VOC IN PHARMACEUTICAL CHEMISTRY

Sl No.	SEMESTER - 1	CREDITS
1	Communication Skills – 1	4
2	Kannada/ Hindi/French/Malayalam /Konkani -1	4
3	Basic computer skills – 1	4
4	Basic Pharmaceutical Calculations- BV 124.1	3
5	Pharmaceutics (Basic Principles) I- BV 125.1	3
6	Basic Organic Chemistry– BV 126.1	3
7	Practical-Organic Chemistry-I BV-127.1P	3
8	Practical –Inorganic Chemistry -BV-128.1P	3
9	Practical Organic Chemistry-II -BV-129.1P	3

SKILL OUTCOME IN GENERAL EDUCATION –

SEMESTER 1 Supervisory development program

Enhanced supervisory productivity

Effective handling of challenges and stress

Ownership and Accountability Accepting responsibility and taking ownership at the workplace

Sl No.	SEMESTER - 2	CREDITS
1	Communication Skills – 2	4
2	Kannada/ Hindi/French/Malayalam /Konkani -2	4
3	Basic computer skills – 2	4
4	Pharmaceutical Inorganic Chemistry- BV 124.2	3
5	Fundamental Biochemistry - BV 125.2	3
6	Indian Drugs Regulatory and GMP- BV 126.2	3
7	Practical-Inorganic Chemistry-I BV-127.2P	3
8	Practical-Analytical Chemistry- BV-128.2P	3
9	Practical- Inorganic Chemistry-II BV-129.2P	3

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 2

Learning how to take accountability while performing complex tasks going beyond the blame game to achieve collaboration

Business communication

Infusing the art of effective communication

Sl No.	SEMESTER - 3	CREDITS
1	Soft skills	4
2	Health safety and Environment	4
3	Fundamentals of Indian constitution	4
4	Basic Physical Chemistry- BV 124.3	3
5	Cell Biology - BV 125.3	3
6	Analytical Chemistry - BV 126.3	3
7	Practical Physical Chemistry BV-127.3P	3
8	Practical –Analytical chemistry BV-128.3P	3
9	Practical -Cell biology BV-129.3P	3

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 3

Building effective relationships through the power of communication.

Written business communication for success.

Time management

Gaining insights into multitasking to manage time

Sl No.	SEMESTER - 4	CREDITS
1	Behavioral skills	4
2	Human Rights and Value Education	4
3	Fundamentals of Business Law	4
4	Medicinal Chemistry I - BV 124.4	3
5	Basic Microbiology- BV 125.4	3
6	Advanced Analytical Chemistry I- BV 126.4	3
7	Practical-Medical Chemistry BV-127.4P	3
8	Practical-Analytical Chemistry BV-128.4P	3
9	Practical-Basic microbiology BV-129.4P	3

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 4

Withstanding pressure to enhance performance

Increasing the threshold level of pressure

Sales leadership program

Know your customer behaviour to maximize sale

Sl No.	SEMESTER - 5	CREDITS
1	Gender Equity and Value Education	4
2	Legal and Ethical aspects of Business	4
3	Entrepreneurship	4
4	Medicinal Chemistry II- BV 124.5	4
5	Applied Biochemistry- BV 124.6	3
6	Pharmacognosy and Phytochemistry BV 124.7	3
7	Practical-Phytochemistry BV-127.5P	3
8	Practical-Applied Biochemistry BV-126.5P	3
9	Practical-Pharmacognosy and Phytochemistry BV-128.5P	3

SKILL OUTCOME IN GENERAL EDUCATION – SEMESTER 5

Business acumen

Gaining knowledge about the business and industry

Learning the impact of different factors of economy on business

How to do competitor profiling

Sl No.	SEMESTER - 6	CREDITS
1	General Project Management	4
2	Inventory Management	4
3	Principles of Marketing	4
4	Pharmacology-BV 123.6	3
5	Pharmaceutical technology-BV 124.6	3
6	Pharmacology and toxicology-BV 125.6	
7	Practical-Pharmaceutical technology-BV 126.6P	
8	Practical-Pharmacology and Toxicology-BV 127.6P	12
9	Practical-Drug Analysis-BV 128.6P	

SKILL OUTCOME IN GENERAL EDUCATION –
SEMESTER 6 Presentation skills

To help participant imbibe the skills for presenting effectively and delivering influential presentations

Customer Service

Understanding the dynamics of customer service and foster the culture of customer focus in the organization

1. PharmaceuticalChemistry

*	Inadequate knowledge of chemical compounds and laboratory testing processes
*	Inadequate practical orientation and exposure to machines
*	High degree of handholding required
*	Inadequate self motivation to enhance andupdateskillsInadequate ability/knowledge to work in Clean Room ,Air Handling units, Current Goof
*	Manufacturing Practices (cGMP) standards
*	Inadequate knowledge of compliance to processes
*	Inadequate technical knowledge of Good Laboratory Practices(GLP)
*	Inadequate knowledge of relevant USFDA rules
*	Convincing skills and objection handling
*	Relationship management
*	Basic knowledgeof logistics,commercialaspects,legal aspect

B.Voc First Year: Pharmaceutical Chemistry (I Semester)

Code	Subjects	L	T	P	Total Credits*	External Marks	Internal Marks	Practical Marks	Total Marks
BV 121.1	Communication Skills – 1	4			4	70	30		100
BV 130.1	Kannada// Hindi/	4			4	70	30		100
BV 122.1	French/Malayalam/ Konkani-1								
BV 123.1	Basic computer skills – 1	4			4	70	30		100
BV 124.1	Basic Pharmaceutical Calculations	3	0	0	3	70	30		100
BV 125.1	Pharmaceutics (Basic Principles)	3	0	0	3	70	30		100
BV 126.1	Basic Organic Chemistry	3	0	0	3	70	30		100
BV 127.1P	Practical-Organicchemistry-I			4	2	40	10	50	50
BV 128.1P	Practical – Inorganicchemistry			4	2	40	10	50	50
BV 129.1P	Practical–Organic chemistry-II			4	2	40	10	50	50
	Total				30				750

B.Voc First Year: Pharmaceutical Chemistry (II Semester)

Code	Subjects	L	T	P	Total Credits*	External Marks	Internal Marks	Practical Marks	Total Marks
BV 121.2	Communication Skills – 2	4			4	70	30		100
BV 130.2	Kannada// Hindi/	4			4	70	30		100
BV 122.2	French/Malayalam/Konkani-2								
BV 123.2	Basic computer skills – 2	4			4	70	30		100
BV 124.2	Pharmaceutical Inorganic Chemistry	3	0	0	3	70	30		100
BV 125.2	Fundamental Biochemistry	3	0	0	3	70	30		100
BV 126.2	Indian Drugs Regulatory and GMP	3	0	0	3	70	30		100
BV 127.2P	Practical - Inorganic Chemistry-I			4	2	40	10	50	50
BV 128.2P	Practical - Analytical Chemistry			4	2	40	10	50	50
BV 129.2P	Practical - Inorganic Chemistry-II			4	2	40	10	50	50
	Total				30				750

B.Voc Second Year: Pharmaceutical Chemistry (III Semester)

Code	Subjects	L	T	P	Total Credits*	External Marks	Internal Marks	Practical Marks	Total Marks
BV 121.3	Soft Skills	4			4	70	30		100
BV 122.3	Health Safety And Environment	4			4	70	30		100
BV 123.3	Fundamentals of Indian Constitution	4			4	70	30		100
BV 124.3	Basic Physical Chemistry	3	0	0	3	70	30		100
BV 125.3	Cell Biology	3	0	0	3	70	30		100
BV 126.3	Analytical Chemistry	3	0	0	3	70	30		100
BV 127.3P	Practical- Physical Chemistry			4	2	40	10	50	50
BV 128.3P	Practical – Analytical chemistry			4	2	40	10	50	50
BV 129.3P	Practical–Cell Biology			4	2	40	10	50	50
	Total				30				750

B.Voc Second Year: Pharmaceutical Chemistry (IV Semester)

Code	Subjects	L	T	P	Total Credits*	External Marks	Internal Marks	Practical Marks	Total Marks
BV 121.4	Behavioral Skills	4			4	70	30		100
BV 122.4	Human Rights and Value Education	4			4	70	30		100
BV 123.4	Fundamentals of Business Law	4			4	70	30		100
BV 124.4	Medicinal Chemistry - I	3	0	0	3	70	30		100
BV 125.4	Basic Microbiology	3	0	0	3	70	30		100
BV 126.4	Advanced Analytical Chemistry - I	3	0	0	3	70	30		100
BV 127.4P	Practical- Medicinal Chemistry			4	2	40	10	50	50
BV 128.4P	Practical – Analytical chemistry			4	2	40	10	50	50
BV 129.4P	Practical– Basic Microbiology			4	2	40	10	50	50
	Total				30				750

B.Voc Third Year: Pharmaceutical Chemistry (V Semester)

Code	Subjects	L	T	P	Total Credits*	External Marks	Internal Marks	Practical Marks	Total Marks
BV 121.5	Gender Equity and Value Education	4			4	70	30		100
BV 122.5	Legal and Ethical Aspects of Business	4			4	70	30		100
BV 123.5	Entrepreneurship	4			4	70	30		100
BV 124.5	Medicinal Chemistry - II	3	0	0	3	70	30		100
BV 125.5	Applied Biochemistry	3	0	0	3	70	30		100
BV 126.5	Pharmacognosy and Phytochemistry	3	0	0	3	70	30		100
BV 127.5P	Practical- Phytochemistry			4	2	40	10	50	50
BV 128.5P	Practical – Applied Biochemistry			4	2	40	10	50	50
BV 129.5P	Practical– Pharmacognosy and Phytochemistry			4	2	40	10	50	50
	Total				30				750

B.Voc Third Year: Pharmaceutical Chemistry (VI Semester)

Code	Subjects	L	T	P	Total Credits*	External Marks	Internal Marks	Practical Marks	Total Marks
BV 121.6	General Project Management	4			4	70	30		100
BV 122.6	Inventory Management	4			4	70	30		100
BV 123.6	Principles of Marketing	4			4	70	30		100
BV 124.6	Pharmacology	3	0	0	3	70	30		100
BV 125.6	Pharmaceutical Technology	3	0	0	3	70	30		100
BV 126.6	Pharmacology and Toxicology	3	0	0	3	70	30		100
BV 127.6P	Practical-Pharmaceutical Technology			4	2	40	10	50	50
BV 128.6P	Practical – Pharmacology and Toxicology			4	2	40	10	50	50
BV 129.6P	Practical– Drug Analysis			4	2	40	10	50	50
	Total				30				750

15 hrs L=1credit; 30hrs of practical =1credit

SEMESTER-I

BV 124.1-BASIC PHARMACEUTICAL CALCULATIONS

RATIONALE: Lots of calculations are required in pharmaceutical chemistry professionwhich involves basic mathematics and knowledge of simple physics and chemistry principles. The course is intended to teach the student how such calculations are done. The subject will be fundamental for many of the subjects the student will encounter in future.

COURSE OBJECTIVES:

To make student learn the basic calculations, a pharmaceutical chemistry professional is expected to do in his/her professional life.

LEARNING OUT COMES:

The student should be able to:

1) Carry out routine calculations involved in pharmaceutical chemistry.

2) Draw and understand different graphs

PREREQUISITES: Basic knowledge of arithmetics, Physics and Chemistry can take this course well.

SYLLABUS

UNIT-I 10 Hours

a) Rational nos.

Proportional set of nos., Ratios, Fractions, Decimals, Percentage.

b) Other nos.

Exponents and Logarithms, Variables, Constants and Parameters, Graphical Presentation of data-Different types of graphs (Line graph, Bar graph, Pie chart, Histogram etc.) Slope and Intercept.

UNIT-II 10 Hours

a) Systems and units

Mass and weights, Metric units, Conversions between systems, Temperature conversions and others.

b) Ratios, proportions and percentage, Percent calculations, Concentration systems, Parts per million, Calculation of amount of ingredients required to make up percentage

solutions, Conversion from one to another strength.

UNIT-III 10 Hours

a) Dilutions

Simple dilutions, Serial dilutions, concentrated solutions, strengths, multiple dilutions, mixing concentrations

b) Parenteral solutions and isotonicity, Rate of flow of IV (invitro) solutions, Isotonicity, Alcohol calculations.

c) Density

Determination of density, specific gravity, Determination of displacement value, Displacement volumes-solid-solid, liq-liq.

UNIT-IV10 Hours

a) Molecular weight, Moles, millimoles, milliequivalents. Molar concentrations.

b) Accuracy and measurements

Rounding no's. Significant figures, Correcting nos, Accuracy in arithmetic calculations, Accuracy in weighing, measuring for assays, Limits and uniformity of content. Standard deviation, mean and mode

Reference books:

1. A. J. Winfield. A. Rees, I. Smith, Pharmaceutical Practice, 4th edition, Elsevier publication.

2. Christopher A. L. and D.B. Pharmaceutical compounding and Dispensing, Pharmaceutical press, May 2010.

3. D.P., G. Dosage Calculations, Delmar Publishers, 9th edition.

4. Don A. B. and T. W. G. Pharmacy Calculations, CBS Publisher, 3rd Edition 2007.

5. Cooper and Gunn's. Dispensing for Pharmaceutical students, S. J. Carter, 12th edition. CBS Publisher, 1987.

6. Judith A. R, Ian S, et al. Introduction to Pharmaceutical Calculations, Pharmaceutical Press, 4th Edition, 2015.

BV 125.1-PHARMACEUTICS (BASIC PRINCIPLES)

RATIONALE: The subject is meant for exposing the student to different dosage forms,Routes of drug administration and their merits and demerits. Also the student will be provided knowledge of fundamental physical properties of compounds useful in manufacturing of drug formulations. The in-depth understanding of some of the important basic processes used in Industry will also be taught.

COURSE OBJECTIVES:

1. To make student understand the different dosage forms and routes of administration.
2. To understand the important physical properties of compounds and its impact in preparation and stability of drug formulation
3. To understand the common processes used in manufacturing of drug formulations.

LEARNING OUT COMES:

The student should be able to:

1. Narrate various dosage forms, routes of administration, their merits and demerits
2. Describe importance of environmental factors on drug manufacturing.
3. Explain some unit processes used in industry.
4. Describe the importance of certain physical properties of drugs, excipients and their utilization in drug manufacturing.

PREREQUISITES: The student knowledgeable of basic physics and chemistry can take this course well.

SYLLABUS

UNIT-I10 Hours

Introduction

Introduction to Different dosage forms, Routes of administration and their comparisons, Environment control in Pharmaceutical industry and its importance, Importance of air, water, Humidity, Temperature in drug manufacturing giving some examples.

UNIT-II10 Hours

a) Introduction to various processes in Pharmaceutical manufacturing units

Principles of heat transfer: Modes of Heat transfer- Conduction, Convection, Radiation, Induction Sources of heat—Steam and Electricity

Factors affecting Rate of evaporation, Differentiations between Evaporation, Distillation, Rectification, Precipitation, Crystallization.

Brief introduction: - Solvent distillation and its application. Different types of heat of Reactions—Heats of reactions, formations, Heat of melting, vaporization and sublimation, heat of hydration and salvation.

b) Introduction to dispensed products

Classification of dispensed products: Brief description and applications of each product. Difference between extemporaneous preparations and Non extemporaneous preparations.Classification as per physical state—Solids, Liquids, Semisolids, Inhalations. Classification as per route of administration, Classification as Sterile and non-sterile preparations, Classification as Galenicals and non Galenicals Packaging of dispensed products: - Containers and closures. Labeling of dispensed products.

UNIT-III -10 Hours

a) States of matter

Different states of matter-Solid, liquid, Gas, Crystalline and Amorphous, Hygroscopic, Efflorescent, Deliquescent, Modified states of matter-Glassy state, Glass transition temperature, Liquid crystals, Liquid-solid compacts, Solid dispersions.

b) Polymorphism

What is Polymorphism, Pseudo polymorphism, Solvates and Hydrates, Metastable forms. Examples of polymorphic drugs and effect on physicochemical properties

c) Principles of fluid flow

Reynolds's no. and its importance. Types of flow-Laminar flow, Intermediate flow, Turbulent flow. Importance of types of flow in Pharmaceutical processing.

UNIT-IV 10 Hours

Solubility and solubilisation: Definitions and expressions Physical properties of different solvents and solutes and their effects on solubility, Major pharmaceutical solvents –brief discussions.

Liquid-liquid systems-Solubility and Miscibility, Partitioning between immiscible solventsand partition co-efficient, Effect of pH on solubility—Dissociation constant. Solubilisation techniques –Brief discussion.

Complexation: Classification of complexes and its applications. Concept of Filtration

andfiltration techniques.

Reference books:

1. C.V.S, S. Pharmaceutical engineering, Principles and Practice, VallabhPrakashan, 1st Edition, 2009.
2. K., S. Pharmaceutical Engineering New age International publishers, 1st edition, 2012.
3. P., M. Elementary chemical engineering, Tata McGraw hill, 2nd edition.
4. Physical pharmaceutics, E.Shotton, Indian edition, oxford press, 1974.
5. Physico chemical principles of pharmacy, 6th edition, Alexander T. Florence and David Attwood, Pharmaceutical press, 2011.

BV126.1- BASIC ORGANIC CHEMISTRY

RATIONALE: Majority of the drugs used are organic in nature and thereforeunderstanding the basics of organic chemistry, naming these complex chemical structures, understanding the chemical and physical properties of the common groups of compounds and also doing synthesis of these compounds becomes very important in understanding drug properties.

COURSE OBJECTIVES:

1. To learn fundamentals of chemical bonds, stereochemistry.
2. To learn basic chemical functional groups of compounds with respect to their physical and chemical properties.
3. To learn the simple organic chemical reactions.
4. To identify organic compounds by testing their physical and chemical properties.

LEARNING OUTCOMES: The student should be able to:

1. Define and explain different types of chemical bonds.
2. Name the organic compounds according to IUPAC nomenclature system.
3. Narrate physical and chemical properties of different compounds representing different functional group.
4. Write chemical reactions depicting synthesis and chemical properties of these Organic compounds.
5. Synthesis some organic compounds.
6. Identify unknown organic compounds by conducting different physical and chemical tests.

UNIT-I 10 Hours

Chemical bonding, covalent bonding, VBT, VSEPR and MOT

Chemical bonding – (self study-definition, types-ionic, covalent, coordinate and hydrogen bonding-inter and intra molecular hydrogen bonding.)

Covalent bonding-(self study: definition, atomic orbital overlap concept of covalency, formation of H_2 , F_2 O_2, HF. VBT-Postulates (Pauling approach.)

VSEPR Theory-Postulates, geometry of molecules-BeF_2,BF_3,CH_4 ,PF_5,SF_6,NH_3,H_2O,SF_4,CIF_3, XeF_2,XeF_4.IF_4, Geometry of ions-carbonate,nitrate.

MOT-LCAO, explanation for formation of bonding and antibonding molecular orbitals. Conditions using LCAO approach. Energy level diagram for molecular orbitals ,mixing of orbitals ,filling up of electrons in molecular orbitals ,molecular orbital configuration, bond order and magnetic properties of species like He_2,B_2,C_2,N_2,O_2.

UNIT-II **10 Hours**

Structure and Nomenclature:

STRUCTURE AND BONDING IN ORGANIC MOLECULES. - 10 hours

(SELF STUDY: Introduction to organic chemistry, aim and scope of organic chemistry, importance of organic compounds, catenation, and classification of organic compounds, representations and conventions of writing formula. IUPAC nomenclature of aliphatic organic compounds-simple and bifunctional).

Inductive ,mesomeric ,electromeric and hyperconjugative effect-explanation and examples.Notations-curved arrows ,drawing electron movements,half –headed(in tautomerism) and double headed arrows. Types Of bond breaking-homolytic and heterolytic,Types of reagents-electrophiles and Nucleophiles. Types of reactions-addition, substitution, elimination and rearrangement .

UNIT-III 10 Hours

Preparation and Reactions of: Alkanes, Alkenes, Alkynes; Cycloalkanes, Dienes,Benzene, Polynuclear aromatic compounds, Reactive intermediates –

Carbocations, Carbanions, Carbenes, Nitrenes and Free radicals

UNIT-IV-10 Hours

Stereochemistry of Organic compounds-

Optical isomerism, plane of symmetry, molecular c hirality,sterogeniccentre,chiral and achiral molecules,enantiomers,properties of enantionmers,optical activity in example-lactic acid and tartaric acid.Diasteromers,threo and erythrodiasteromers,mesocompounds,resolution of enantioomers(mechanical, biochemical and chemical) inversion,andracemization.Relative and absolute configuration,sequencerules,D and L , R and S systems of nomenclature. Geometric isomerism (cis-trans) .E and Z system of nomenclature, geometric isomerism in oximes and acyclic compounds.Conformational isomerism-conformational analysis of ethane and 1, 2-dichloroethane.Conformations of cyclohexane (Newman projection).

Reference Books:

1. Morrison & Boyd, Organic Chemistry, Prentice-Hall, 6th, 2001.
2. March J, Advanced Organic Chemistry, MacGraw-Hill, 3rd, 1985.
3. Solomon &Fryhle, Organic Chemistry, Wiley, 8th, 2004.
4. Shriner &Morill, The systemic Identification of Organic Compounds, Wiley, 8th, 2004.
5. Furniss, Vogel's Textbook of Practical Organic Chemistry, Pearson education, 5th, 2004.
6. Eliel E, Stereochemistry of Carbon Compounds, McGraw-Hill, 7th, 1962.
7. Eliel E, Elements of Stereochemistry, wily, 3rd, 1969.
8. Cahn &Dermer, Introduction to Chemical Nomenclature, Butterworths, 3rd, 1979.
9. Warren S, Organic synthesis-The disconnection approach, Wiley, 4th, 1982.
10. Wheland G Advanced Organic Chemistry, Wiley, 3rd, 1960.
11. Kagan H, Organic Stereochemistry, Wiley, 4th, 1965.
12. House H, Modern Synthetic Reactions, Wiley, 2nd, 1972.

PRACTICALS

BV127.1P- ORGANIC CHEMISTRY-I

RATIONALE: To provide the basic knowledge of very important concepts and to provide overview of the applications of the concepts in applied field to the students.

PREREQUISITES: Basic knowledge of mathematics, physics and chemistry of H.S.C level

Experiments:

1. Introduction to laboratory and safety hazards.
2. Introduction to organic compound identification test.
3. Introduction to reagent test.
4. Analysis of the given unknown organic compound.

BV128.1P-INORGANIC CHEMISTRY

RATIONALE: To provide the basic knowledge of very important concepts and to provide overview of the applications of the concepts in applied field to the students.

PREREQUISITES: Basic knowledge of arithmetic, physics and chemistry of H.S.C level.

Experiments:

1. Introduction to laboratory Glass wares and handling.
2. Calibration of volumetric apparatus.
3. Preparation of standard solutions.
4. Preparation and standardization of sodium hydroxide.
5. Preparation and standardization of Hydrochloric acid.
6. To determine Normality, Molarity, %w/v, and gm/litre of any solution.
7. Any other related experiments.

BV129.1P-ORGANIC CHEMISTRY-II

RATIONALE: To provide the basic knowledge of very important concepts and to provide basic skills in synthesis of organic compounds and determination of physical parameters.

PREREQUISITES: Basic knowledge of arithmetic, physics and chemistry of H.S.C level.

1. To synthesize phthalimide from phthalic anhydride.
2. Synthesis of Benzohydrol from Benzophenone
3. Synthesis of Acetyl Salicylic acid (Aspirin)
4. Synthesis of Acetaminophen (Paracetamol)
5. To synthesize acetanilide from aniline.
6. To synthesize p – bromo acetanilide from acetanilide.
7. To synthesize p-nitroacetanilide from acetamilide
8. To synthesize Benzoic acid from benzamide or phenyl benzoate.
9. To synthesize Beta -D-Glucopenta acetate from Beta-D-Glucose.
10. To synthesize m-dinitrobenzene from nitrobenzene.
11. Any other related experiments

SCHEME OF EXAMINATION:

1.	Synopsis	-10Marks
2.	Major Experiments	-20Marks
3.	Viva voce	-10Marks
4.	Record	-10Marks
	Total	**50 Marks**

Reference Books:

1. Manuals provided with the licensed version of the software.
2. Vogel's text book of quantitative chemical analysis, 6th Edition, 2007.
3. Vogel's text book of practical organic chemistry, 5th Edition, 2012.
4. Charles Dickson, Experiments in Pharmaceutical Chemistry, 2nd Edition, 2014, CRC Press, Taylor & Francis group.
5. Mohd. MumtazAlam et al, Practical Pharmaceutical Analytical Chemistry, 2011, Elsevier Publication.

SEMESTER -II

BV124.2- PHARMACEUTICAL INORGANIC CHEMISTRY

RATIONALE: Study of Pharmaceutical Chemistry requires a basic knowledge ofinorganic chemistry to understand various inorganic salts, chemicals etc in the formulation of drugs and their role in digestion/metabolism.

COURSE OBJECTIVES:

1. To learn fundamentals of inorganic chemistry.
2. To learn the different inorganic compounds which are important in pharmaceutical industry?
3. To understand limit test for different anions/cations.

LEARNING OUTCOMES: The student should be able to understand

1. Preparation of simple inorganic compounds which are having medicinal applications.
2. Storage conditions of these inorganic compounds.
3. The importance of limit test to evaluate the impurities in Pharmacopoeial substances.

UNIT-I 10 Hours

Impurities in pharmacopoeial substances: Sources and effects, importance of limit test,general principles, procedures for limit tests for chloride, sulphate, iron, arsenic, lead and heavy metals. Special procedures for limit tests.

General methods of preparation, assays, strorage conditions and medicinal uses of inorganic compounds belonging to the following classes.

UNIT-II **10 Hours**

Gastrointestinal agents:

Acidifiers: dilute HCl

Antacids: Aluminium hydroxide gel, Calcium carbonate, Sodium bicarbonate,magnesium trisilicate, Magnesium carbonate (light and heavy), Magnesium hydroxide mixture.

Protective and adsorbents: Kaolin and Talc

Cathartics: Magnesium sulphate, Sodium orthophosphate, Sodium sulphate.

UNIT-III **10 Hours**

Topical agents and Dermatological preparations:

Protective: Talc, Zinc oxide, Zinc stearate, titanium dioxide.

Antimicrobials: Potassium permanganate, chlorinated lime, iodine preparations, Boricacid, Borax.

Dental Products: Dentifrices, anticaries agents, desensitizing agents, calciumcarbonate, sodium fluoride, stannous fluoride, zinc chloride, zinc eugenol cements.

UNIT-IV **10 Hours**

Miscellaneous agents:

Expectorants: Ammonium Chloride (Formal method), Potassium iodide.
Haematinics: Ferrous gluconate, ferrous fumarate, Iron dextran injection, ironand ammonium citrate. Poisons and antidotes**:** Sodium thiosulphate, Charcoalactivated Pharmaceutical Aids: Bentonite, Sodium metabisulphite, BariumSulphate

Reference Books:

1. K. G. Bothara, Inorganic Pharmaceutical Chemistry, Pragathi Books, 2008.
2. Bentely and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press, 1960
3. J.D.Lee, Concise Inorganic Chemistry, 5th edition, Wiley India Ltd, 2008.
4. C.A.Discher, Modern Inorganic Pharmaceutical Chemistry, John Wiley & Sons, 1964.
5. J.H.Block, E.B.Roche, T.O.Soine and C.O.Wilson, Inorganic Medicinal and Pharmaceutical Chemistry, Lea &Febiger, 1974.
6. Walton, Principles and methods of Chemical Analysis, Prentice Hall, 1984.

BV 125.2- FUNDAMENTAL BIOCHEMISTRY

RATIONALE: Understanding the chemistry of life is fundamentally for studying the effect of drugs on human body. The course will enable student to learn the basic chemical reactions occurring in the human body. Also the various factors which can regulate this chemical processes will be taught.

COURSE OBJECTIVES:

1. To learn the structure and function of various biochemical enzymes
2. To learn the basic metabolic processes occurring within the human body and Factors regulating the same.

LEARNING OUTCOMES: The student should be able to:

1. Describe the structure and functions of various biochemical enzymes.
2. Describe the various biochemical pathways occurring within the human body.
3. Describe the basic principles of enzymology.
4. Classify the different enzyme

UNIT-I **10 Hours**

Biological macromolecules and carbohydrates:

Introduction to carbohydrates, Nomenclature, definition and classification of carbohydrates, Monosaccharides, Classification, structural aspect and biological significance, Disaccharides, Oligosaccharides, Polysaccharides.

UNIT-II10 Hours

Lipids

Structure andfunctiondiversity of lipids, Definition andclassification,Fattyacids, Triacylglycerol,glycerophospholipids,Sphingolipids,steroids andotherbiologically important lipids (Terpenes, steroids, cholesterol etc).

UNIT-III (10 Hours)

Proteins:

Structure and function, General structure of Amino acids, Classification of Amino acids, and Peptide bond link amino acids in proteins, Composition of amino acid in protein and determining sequence of amino acid residue, Structure of protein, Types of protein structure, Primary structure, Secondary structure, Tertiary structure, Quaternary structure, Various other biologically important protein.

UNIT-IV **10 Hours**

Enzymes and co-enzymes:

Structure and function of enzyme, Classification of enzyme, Enzyme kinetics and its mechanism of action Enzyme inhibition, Types of enzyme inhibition, Reversible enzyme inhibition, Irreversible enzyme inhibition, Regulation of enzyme activity, Enzymes and Iso-enzymes in clinical diagnosis, Coenzyme classification, Role of vitamin as coenzyme, Biological significance, Metal as coenzyme and its biological significance.

REFERENCE BOOKS

1. Dr. U. Satyanarayana, Biochemistry, 2nd edition, Books and allied (P) Ltd., 2004.
2. A. White, Philip Handler, E.L. Smith, R.L. Hill, I.R. Lehman, Principles of Biochemistry, 6th edition, Tata McGraw Hill Publishing Company Ltd., 2004.
3. D. L. Nelson, M. M. Cox, Lehninger Principles of Biochemistry, 4th edition, W. H. Freeman & Company, 2005.
4. P.C. Champe, R.A. Harvey, Biochemistry, 2nd edition, Lippincott – Raven publishers, 1994.
5. R. K. Murray, D.K. Granner, P.A. Mayes, V.W. Rodwell, Harper's Illustrated Biochemistry, 26th edition, McGraw Hill Publishers, 2003.
6. W. H. Elliott, D. C. Elliott, Biochemistry & Molecular Biology, 1st edition, Oxford University Press, 1997.
7. G. L. Zubay, W. W. Parson, D.E. Vance, Principles of Biochemistry, 1st edition, WCB publishers, 1995.
8. E.E. Conn and P.K. Stumpf, G. Bruening, R. H. Doi, Outlines of Biochemistry, 5th edition, John Wiley & Sons, New York, 1999.
9. D. B. Marks, Board Review Series, Biochemistry, 2nd edition, Harwal Publishing, 1994.
10. R. H.Garrett, C. M. Grisham, Principles of Biochemistry with a Human Focus, 1st edition, Harcourt College Publishers, 2002.
11. M. Cohn, K.S. Roth, Biochemistry and Disease, 1st edition, William and Wilkins Co., Baltimore, 1996.
12. H. R. Horton, L.A. Moran, R. S. Ochs, J. D. Rawn, K. G. Scrimgeour, Principles o f Biochemistry, 2nd edition, Prentice-Hall International Inc., 1996.
13. S. Ramakrishnan, K.G. Prasanan, R. Rajan, Textbook of Medical Biochemistry, 3rd Edition, Orient Longman, Madras, 2001.

BV126.2-INDIAN DRUGS REGULATORY AND GMP

RATIONALE: Study of this paper aims at giving an overview of Indian Drug Regulatory guidelines and Good manufacturing Practices in Pharmaceutical Industry.

COURSE OBJECTIVES:

1. To learn the requirements of Indian Drug Industry and prevalent standards.
2. To learn methods of GMP used in preparation of drugs.

LEARNING OUTCOMES: The student should be able to:

1. Have a basic knowledge of Indian Drug Regulations.
2. Understand the prevalent GMP methods used in Pharma Industry.

UNIT -I 10Hours

Pharmaceutical legislations in India: Origin, development, scope, objectives and natureof pharmaceutical legislation in India. History and ethics of profession of pharmacy. A study of regulatory aspects that affect drug product design, manufacture and distribution in India with special emphasis on following some Acts/Laws (recent amendments):

The Drugs and Cosmetics act, 1940.

The Narcotics Drugs and Psychotropic Substances Act, Drugs (price control) Order in Force, Medicinal and Toilet Preparations (Excise Duties) Act 1955, Copy the Environmental Protection Act, Consumer Protection Act, The Drugs and Magic Remedies (Objectionable Advertisements) Act1955, Monopolistic & Restrictive Trade Practices Act, etc

UNIT-II 10 Hours Globalization of drug Industries: Export-Import Policy of Drugs in India, US andEurope. WHO certification Trademarks and Copyrights.

Pharmaceutical Regulatory Process in India: Hierarchy and working flow of FDA in India, roles of DCGA and CDSCO in drug control, Drug Control Authority and its documentation in the State.

Legal Environment: Need for Government regulations, financial regulations, SEBI, BIFR, FEMA etc, Contract Act and sale of Goods Act.

UNIT-III10Hours

Good Manufacturing Practices: GMP of Pharmaceutical manufacturing,Evolution and principles of GMP, SOP's, Schedule - M, WHO, EU & FDA guidelines in brief including cGMP Organization and personal responsibilities, training and hygiene. Pharmaceutical plant location, design, construction & layout, Maintenance of sterile area.

UNIT-IV10 Hours

Quality control and Quality assurance: Definition & general principles. In process quality control and finished products quality control for the following products in the pharmaceutical Industry: Tablets, Capsules, Ophthalmic and parenteral products.

Documentation in pharmaceutical Industry: Master formula records, Batch formula records, common technical documentation (CTD) & electronic common technical documentation (ECTD).

References:

1. The Pharmaceutical Regulatory Process, Taylor & Francis, 2nd ed., 2008 – Ira R. Berry, Robert P. Martin
2. FDA Regulatory Affairs: A Guide for Prescription Drugs, Medical Devices and Biologics, 2nd ed., 2008, – Douglas J. Pisano and David S. Mantus.
3. Original laws published by Govt. of India, Pamposh Publications, 1970.
4. Indian Pharmaceutical guide, Vol 8, Pamphosh Publications, 1970.
5. Guidelines for Developing National Drug Policies; WHO Publications, 1998.
6. A textbook of Forensic Pharmacy, B. M. Mithal, 8th Edition, Current Distributors, 1988.
7. How to practice GMP's, 6th edition, 2010, P. P. Sharma, Vandana Publications Pvt.Ltd, and Delhi.
8. Good Manufacturing Practices for Pharmaceuticals, 5th edition, Vol 52, Sidney H. Willing and James R. Stoker, Edited by James Swarbrick, Marcel Dekker series.

PRACTICALS

BV127.2P- INORGANIC CHEMISTRY-I

RATIONALE: To provide the basic knowledge of very important concepts and to providebasic skills in analysis of inorganic salts.

PREREQUISITES: Basic knowledge of arithmetic, physics and chemistry of H.S.C level.

1. Detection of acid and basic radicals of a given inorganic salt (1-5)
2. Analysis of a given mixture of inorganic salts (6-10).

BV129.2P- INORGANIC CHEMISTRY-II

RATIONALE: To provide the basic knowledge o f very important concepts and toprovide overview of the applications of the concepts in applied field to the students.

PREREQUISITES: Basic knowledge of arithmetic, physics and chemistry of H.S.C level.

1. Limit test for chlorides, sulfates, heavy metals, Iron and Arsenic.
2. Modification in limit test for chloride and sulfates in Potassium permanganate, Sodium bicarbonate, Sodium benzoate, Sodium salicylate.
3. Preparation of inorganic pharmaceuticals such as, Potash alum, Magnesium sulphate and Boric acid.
4. Test for purity
   a. swelling power in Bentonite
   b. Presence of Iodates in KI
   c. Dextrose and Sucrose in Calcium gluconate
5. Any other related experiments.

BV128.2P–ANALYTICAL CHEMISTRY

RATIONALE: To provide the basic knowledge of synthesis and identification of important drugs.

PREREQUISITES: Basic knowledge o f arithmetic, physics and chemistry of H.S.C level.

1. Determination of Iodine value of given oil.
2. Estimation of Nitrite ions in water sample
3. Assay of Aspirin.
4. Assay of Ibuprofen
5. Assay of Hydrogen peroxide.
6. Assay of Ammonium chloride.
7. Assay of Zinc oxide.
8. Assay of Sodium bicarbonate.
9. Determination of Saponification value of given Oil.
10. Assay of Paracetamol.
11. Any other related experiments.

SCHEME OF EXAMINATION:

1.	Synopsis	-10Marks
2.	Major Experiments	-20Marks
3.	Viva voce	-10Marks
4.	Record	-10Marks
	Total	**50 Marks**

References:

1. Charles Dickson, Experiments in Pharmaceutical Chemistry, 2nd Edition, 2014, CRC Press, Taylor & Francis group.
2. Mohd. MumtazAlam et al, Practical Pharmaceutical Analytical Chemistry, 2011, Elsevier Publication.
3. J. B. Yadav, Advanced Practical Physical Chemistry, 16th Edition, 2006, Goel Publishing House.
4. Manuals provided with the licensed version of the software.
5. Vogel's text book of quantitative chemical analysis, 6th Edition, 2007.
6. Vogel's text book of practical organic chemistry, 5th Edition, 2012.

SEMESTER- III

BV 124.3-BASIC PHYSICAL CHEMISTRY

RATIONALE: Physical properties of drugs and chemicals have immense effect ondrug manufacturing, efficacy and stability. Strong knowledge of these subjects becomes mandatory for any professional.

COURSE OBJECTIVES:

1. To learn the important physical properties of drugs and chemicals, that can significantly affect the drug manufacturing.
2. To quantify these physical properties and methods to alter the same so as to avail desired levels.

LEARNING OUTCOMES: The student should be able to:

1. Define and explain the various physical properties.
2. Measure the physical properties and demonstrate the methods to alter the same by different ways.
3. Narrate and explain the laws, theories pertaining to these properties.
4. Carry out simple calculations involved with these properties.

UNIT-I **10 Hours**

Gaseous state: **4 Hours**

Self study: (Molecular velocities: root mean square velocity, average velocity and most probable velocities-definition and calculation relation between RMS, average and most probable velocities.)

Critical phenomenon: PV isotherms of real gases, Andrew's isotherms of carbon dioxide-continuity of states. Isotherms of Vander Waal's equation, relation between critical constants and Vanderwaals's constants-derivation of the expressions for Tc, Pc and Vc based on Vanderwal's constants.

Solid state: **4 Hours**

Elementary account of unit cell and Bravais lattice. Laws of crystallography: Law of constantncy of interfacial angles-definition and explanation taking hexagonal crystal system as an example. Law of rationality indices.Miller indices, calculation of Millar indices foe different planes in a cubic crystal system.Law f symmetry-definition. Types of elements of symmetry –a) axis of symmetry b) plane of symmetry c) centre of symmetry-definition and explanation taking cubic crystal system as an example. X-ray diffraction by crystals. Derivation of Bragg's equation.

(Self study: Stoichiometric defects-Frenkel and Schottkydefects, Their effect on density)

ADSORPTION: **2 Hours**

Basics of adsorption, Freundlich and Gibbs adsorption isotherms, Langmuir theory of adsorption.

UNIT-II **10Hours**

Liquid state: **4 Hours**

(Self study: differences between solids, liquids and gases.)

Structure of liquids-qualitative description.Properties of liquids-Viscosity-definitions Unit, principle and method determination.Surface tension-definition, SI unit, principle and method of determination.Parachor-expression, definition in deciding the structures of organic compounds (vogel's method only).

Dilute solutions and colligative properties- **3 Hours**

Ideal and non-ideal solutions-Raoult's law, thermodynamic properties (ΔG, ΔH and ΔS) of ideal solutions.Colligative properties (definition) and an elementary account of the 4 colligative properties.

Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.

BINARY MIXTURES: 3 Hours

Ideal liquid mixtures-Raoult's law, vapour pressure vs composition (mole fraction) curves. Azeotropes-HCl-H_2O and ethanol-water system. Partially miscible liquids: Phenol water, TEA-water and nicotine –water systems.

UNIT-III 10Hours

Thermodynamics:

Self study-(system, surroundings, types of system, process, types of process, enthalpy, internal energy, I^{st} law of thermodynamics)

Variation of heat of reaction with temperature.Derivation of Kirchoff's equation.

Second law of thermodynamics (definition), efficiency (definition), Carnot's theorem, Expression for efficiency of carnot's engine. Thermodynamic scale of temperature (definition), concept of entropy, entropy as a state function, statement of zeroth and third law of thermodynamics (definition)

Entropy change in reversible process, Irreversible process, for a ideal gas under different conditions (derivations) $\Delta S=Cv\ lnT_2/T_1+Rln\ V_2/V_1$ and $\Delta S=CplnT_2/T_1+RlnP_1/P_2$.Derivation of ΔS during phase change and on mixing of ideal gases. Gibbs free energy, Helmholtz free energy: significance, variation of G with T and P. Problems bases on above topics.

UNIT- IV10Hours

Chemical kinetics 4 Hours

(Self study: Rate of a reaction-definition, rate equations of simple chemical reactions-two examples.

Effect of concentration on the rate of a chemical reaction.Order of a reaction-zero order, first order second order pseudo order-definition two examples for each.Half life definition and general mathematical expression)

Rate constants for II and n^{th} order reactions.Derivation with equal and unequal concentrations for second order reaction.Termination of the order of a reaction-differential, integration, half life period and isolation methods.Problems on determination of order of the reaction and half life.

Catalysis- **2 Hours**

(Self study: General characteristics of catalytic reactions, homogeneous and heterogeneous reactions)

Acid-base catalysis general and specific-(qualitative treatment only) Enzyme catalysis-examples, Characteristics of enzyme catalysis, mechanism of enzyme catalysis (qualitative treatment only)

Photochemistry- **4 Hours**

Differences between thermal and photochemical reactions: laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Primary and secondary reactions, quantum yield .Photosensitized reactions with examples. Photo-physical process-Jablonski diagram depicting various process occurring in the excited state-fluorescence and phosphorescence-definition, Explanation of fluorescence .Definition, explanation of phosphorescence with examples.Chemiluminescence.

Reference Books:

1. G. Raj Advanced Physical Chemistry, 20th Edition, Goel Publishing House, Meerut, 1996-97.
2. Dr. J.N. Gurtu, Dr. HemantSnehi, Advanced Physical Chemistry, 7th Revised and Enlarged Edition, PragatiPrakashan, Meerut, 2000.
3. P.L. Soni, O.P. Dharmarha, U.N. Dash, Textbook of Physical Chemistry, 22nd Edition, Sultan Chand and Sons, New Delhi, 2001.
4. B.S. Bahl, G.D. Tuli, ArunBahl, Essentials of Physical Chemistry, Reprinted 24th Edition, S. Chand and Company Ltd., New Delhi, 2004.
5. B. Viswanathan, P.S. Raghawan, Practical Physical Chemistry, 1st Edition, Viva Books Pvt. Ltd., 2005.
6. I. Das, A. Sharma, N. R. Agrawal, an Introduction to Physical Chemistry, Revised 2nd Edition, New Age International Publishers, New Delhi, 2005.
7. W. J. Moore, Physical Chemistry, 5th Edition, Orient Longman Pvt. Ltd., New Delhi, 2004.
8. Prof. S.K. Dutta, Principles of Physical Chemistry and Biophysical Chemistry, 1st Edition, Books and Allied (P) Ltd., Kolkata, 2007.
9. L.M. Atherden, Bentley and Driver's Textbook of PharmaceuticalChemistry, 8th Edition, Oxford University Press, Bombay, 1994.
10. S. Glasstone , Textbook of Physical Chemistry, 2nd Edition, Rajiv Beri for Macmillan India Limited, New Delhi, 1995.
11. J. B. Yadav Advanced Practical Physical Chemistry, 33rd Edition, Krishna PrakashanMedia (P) Ltd., 2013.
12. C.R. Metz, Schaum's Solved Problems Series, 2000 solved problems in Physical Chemistry, 2nd Edition, McGraw Hill Publishing Company, USA, 1989

BV125.3-CELL BIOLOGY

RATIONALE: Understanding the biology of cell is fundamentally required for studying the effect of drugs on human body. The course will enable student to learn the basic cell biology system. Also the structure of DNA/RNA, its modification & transcription will be taught.

COURSE OBJECTIVES: 1) to learn the structure and function of DNA/RNA. 2. To learn the basic cell biology processes occurring within the human body and factors regulating the same.

LEARNING OUTCOMES: The student should be able to:

1. Describe the structure and functions of cell, cell size, cell wall etc.
2. Narrate the structure of prokaryotic and eukaryotic cell.
3. Describe the basic principles of cell systems & cell divisions.
4. Classify the different enzymes.

UNIT-I

Cell theory **10 Hours**

Cell size and diversity, Structure of prokaryotic and eukaryotic cell.

Plasma membrane, cell wall, mitochondria, chloroplast, nucleus, Endosomes, Peroxisomes, Ribosome their organization and function, transport of nutrients ions and drug substances across membranes, ion channels, Endocytosis, Pinocytosis, diffusion and active transport systems, cellular energy transduction, Role of mitochondria and Chloroplast systems.

UNIT-II

Cell cycle and Cell division **10 Hours**

Meiosis, Mitosis, molecular events in growth and cell death, cell receptors: role in signal transduction and cellular response, cytoskeleton: microtubules and their role in cell structural organization; intracellular trafficking and cell motility.

UNIT-III

DNA / RNA structure **10 Hours**

Organization of genetic material, Replication, (Transcription, RNA polymerase, transcription factors, regulatory element, mechanism of transcription regulation, Gene splicing, Post transcriptional RNA modifications, 5‟cap formation, Transcription formation, 3‟endo polyadenylation, Splicing, mRNA its stability and Transportation, Translation, prokaryotic and eukaryotic translation machinery, initiation; elongation, regulation; post translational modification of protein.

UNIT-IV **10 Hours**

Cell damage, apoptosis, mutation, DNA damage and repair, methods of detection of cell and DNA damage. Biology of cancer- characteristic of cancer cell, types, stages- Angiogenesis, Metastasis, Carcinogens- chemical and physical, treatment- Chemotherapy, Radiotherapy.

Reference books

1. Molecular Biology by J.M. Walker & E.B. Gingold, 3rd edition, royal society of chemistry, 1993.
2. Molecular Cell Biology by L. Lodish, 6th Edition, WH Freeman & Co 2007.
3. Molecular Cell Biology by David Freifelder, Jones and Bartlett Publishers, Inc, 1998.
4. Molecular & Cell Biology by Sheelar& Bianchi, Wiley India Pvt Ltd, 3rdEdition.
5. Cell & Molecular Biology by De Robertis&RobertisJr, Lippincott Williams &Wilkins,8th Edition, 2010.
6. Cell Biology by Satyesh Chandra Raoy, Kalyan, New central book Agency-Kolkata, 2008.
7. The cell, a molecular approach- Geoffrey M.Cooper, Robert E.Hausmam-Sinauer Associates, Inc.
8. Text book of cell and Molecular Biology-Ajoy Paul.
9. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology- P.S.Sharma
10. Cell and Molecular Biology-P.K.Gupta.

BV 126.3-ANALYTICAL CHEMISTRY

RATIONALE: Measuring Drug purity is a primary requirement to ensure the quality of drugs. Quantifying the purity of compound can be done by different techniques. Some of the most commonly used techniques will be taught in this subject. This will make the student capable to work in a quality control department of the pharmaceutical industry

COURSE OBJECTIVES:

1. To make student learn the basic principles of various assay techniques commonly used in quality control department of any pharmaceutical industry.
2. To provide the hands-on experience by actually conducting these assays in the lab.

LEARNING OUTCOMES: The student should be able to:

1. Correctly sample the drug for testing
2. Carry out calculations involved in basic statistics.
3. Narrate the principles of methods and instruments used in assay of various drugs and chemicals.
4. Conduct assays of some drugs using these methods and instruments.

UNIT-I

Errors and statistics **10 Hours**

Types of error, Confidence interval, Comparison of results and means of two samples, Paired T-test, Q-test, Correlation and linear regression, comparison of more than two means, Significant figures, Rules for retaining significant digits.

Sampling

Basis of sampling, sampling procedure and selection of sample, factors affecting sampling: sampling and physical state, Crushing, Grinding and hazards in sampling.

Methods of analysis

Qualitative-sample size and techniques-micro, semi micro and micro sample size, Type of tests-wet, dry, spot. (Terms, definition and examples).

UNIT-II **10Hours**

Introduction to titrimetric analysis:

Significance of quantitative analysis in quality control, Different techniques of analysis, Preliminaries and definitions, Fundamentals of volumetric analysis, methods of expressing concentration, Primary and Secondary standards.

Acid Base titrations:

Principles of acid base titrations, Theory of acid base titrations, Neutralization curve, acid Base indicators, Theory of acid base indicators, Selection of indicators.

Precipitations titration:

Principles of different methods of precipitation titration, Mohr's method, Volhard's method, Fajans method with examples, indicators used, Estimation of sodium chloride by using this method.

UNIT-III 10 Hours

Redox titrations: Principles of redox titrations, concepts of oxidation and reduction. Redoxreactions, equivalent weights of oxidizing and reducing agents, theory of redox titrations, Iodimetry and Iodometry with examples, Bromometry with example, titration with titanous chloride as a reducing agent, Cerimetry.

Nonaqueous titrations:

Principle and theory of non aqueous titrations, classification of solvents used in non aqueous titrations ,Indicators used in the estimation of sodium Benzoate and Ephedrine hydrochloride by using non aqueous methods.

Complexometric titrations:

Principles of complexometric titrations, chelating agents, different types of complexometric titrations, methods of detecting endpoints in complexometic titrations, indicators used, estimation of Calcium Gluconate.

UNIT-IV 10Hours Flame Photometry, AAS, Thermal analysis, TGA and DTA

Flame Photometry – General Principles and Instrumentation of Flame Photometry (2 Types of burners, Slit, Monochromaters, reader). Applications –Qualitative and quantitative. AAS – principle, Instrumentation and applications, Thermoanalytical methods-Principle and 2 spectral applications of TGA and DTA.

Reference books:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mandham, R.C. Denney, J.D. Bernes, M.J.K. Thomas, 5th Edition, ELBS, UK, 1996.
2. G.D. Christian, Analytical Chemistry, 5th Edition, John Wiley & Sons, New York, 1994.
3. D.A. Skoog, D.M. West, F.J. Holler, Analytical Chemistry: An Introduction, 6th Edition, Saunders College Publishing, New York, 1994.
4. J.A. Dean, Analytical Chemistry Handbook, 1st Edition, McGraw Hill Inc., New York, 1995.
5. Dr. A.V.Kasture, Dr. K.R. Mahadik, Dr. S.G. Wadodkar, Dr. H.N. More, A Textbook of Pharmaceutical Analysis, Volume – I, 8th Edition, NiraliPrakashan, Pune, 2002.
6. R.A. Day and A.L. Underwood, Quantitative Analysis, 6th Edition, Prentice-Hall of India Pvt. Ltd., New Delhi, 2008.
7. F.W. Fifield, D. Kealey, Principle and Practice of Analytical Chemistry, 5th Edition, Blackwell Science Ltd., 2000.
8. Anjaneyulu, K. Chandrasekhar, ValliManickam, A Textbook of Analytical Chemistry, 1st Edition, Pharma Book Syndicate, Hyderabad, 2006.
9. The Indian Pharmacopoeia 2007, Volume-I, II & III, Conteoller of Publication, 2007.
10. S.M. Khopkar, Basic Concepts of Analytical Chemistry, 2nd Edition, New Age International Publishers, New Delhi, 1998.
11. A.H. Backett, J.B. Stenlake, Practical Pharmaceutical Chemistry, 4th Edition, CBS Publishers, Delhi, 1997.
12. I.M. Pande, Systemic Analytical Chemistry, 1st Edition, Central Book Depot, Allahabad, 1965.
13. R. Kellner, J.M. Mermet, M. Otto, H.M. Widmer, Analytical Chemistry, 1st Edition, Wiley-VCH, 1998.
14. T. Higuchi, Pharmaceutical Analysis, 1st Edition, CBS Publishers, New Delhi, 1997.

PRACTICALS

BV127.3P- PHYSICAL CHEMISTRY

Experiments:

1) To determine the viscosity and specific gravity of the given liquids.
2) To determine the Surface tension of the given liquids.
3) To study the effect of temperature on viscosity and surface tension of the given liquids.
4) Determination of composition of unknown mixture using Refractive index.
5) To check the validation of Freundlich and Langmuir adsorption isotherm using charcoal and acetic acid
6) Acid hydrolysis of Ester.
7) Catalytic strength Of Acids.
8) Catalytic decomposition of H_2O_2
9) Effect of acid strength on Ester hydrolysis.
10) Percentage of NaCl
11) Any other related experiments.

BV128.3P- ANALYTICAL CHEMISTRY

Experiments:

1) To estimate nitrogen content by kjeldahl‟s method
2) Estimation of Barium as Barium sulphate.
3) Estimation of chloride as sodium chloride by Gravimetry.
4) Estimation of Nickel as nickel Dimethylglyoximate.
5) Estimation of Iron as Ferric oxide.
6) Estimation of copper as Cuprous Thiocyanate.
7) Estimation of sodium ion by Flame Photometry.
8) Estimation of Potassium ion by Flame photometry.
9) Determination of Iron by spectrophotometry
10) To prepare Tetraammine cupric sulphate
11) Any other related experiments.

BV129.3P-CELL BIOLOGY

Experiments:

1) Basic study on Microscope.
2) Study of mitosis in onion root tip.
3) Inhibition of Mitosis by mitotic inhibitors.
4) Extraction of DNA from Bovine Spleen/ Liver quantification.
5) Investigation of the melting temperature of DNA
6) Extraction of RNA from coconut endosperm, purification of RNA.
7) Study of plasmolysis in cells of Rheo leaves.
8) Human chromosome Karyotyping.
9) Lymphocyte isolation and determination of cell viability (trypan blue dye exclusion method.)
10) Uptake of Glucose by Yeast cells.
11) Eye pigment isolation of Drosophila melanogaster.
12) Any other related experiments.

SCHEME OF EXAMINATION:

1.	Synopsis	-10Marks
2.	Major Experiments	-20Marks
3.	Viva voce	-10Marks
4.	Record	-10Marks
	Total	**50 Marks**

REFERENCE BOOKS:

1. Practical Pharmaceutical Analytical Chemistry by Alum, Elsevier health sciences-India; 1st edition, 2010.
2. Practical analytical chemistry; Being a complete course in chemical analysis by Henry Trimple., forgotten books, 2012.
3. Essential cell biology: A practical approach volume 1, cell structure 1st edition, Oxford University Press; 1st edition, 2013.
4. Practical skills in biology by Jones, Allan, Reed, Rob; Pearson education.
5. Cell biology a laboratory handbook by Julio E.Celis; Academic press.
6. Cell and Molecular biology of plants by Dr.C.P.Singh; Pearl books publishers.

SEMESTER -IV

BV 124.4-MEDICINAL CHEMISTRY - I

RATIONALE: Basic chemistry learnt till previous semester is now getting extended to medicinal chemistry where the student learns the chemistry of complex drug molecules and how a chemical structure and alter the body functions.

COURSE OBJECTIVES To learn the structure, Structure activity relationship, physicochemical properties and drug design and docking of drug.

LEARNING OUTCOMES The student should be able to: 1. Draw correct chemical structure of drugs. 2. Give scientific name of drugs. 3. Narrate physicochemical properties and Structure activity relationship. 4. To know about drug design and molecular modeling.

UNIT-I **10 Hours**

Drug design:

Analogues and prodrug concept, Concept of lead, rational approach to drug design, Overview of drug design and development, tailoring of drug, general principles of Drug action and drug receptor interaction.

UNIT-II **10 Hours**

Physiochemical properties of drug molecules influencing biological activity:

Physical properties, Meyer-Overton and Meyer-Hemmi theory,Fergusion theory, Vanderwaal's constant, steric factors, Factors governing ability of drugs to reach active site, Stereochemistry and drug action, Bioisosterism.

UNIT-III **10 Hours**

Molecular modeling and drug design: De novo Drug Design, Molecular modeling(MM),Computer Aided Drug Design (CADD),Methods of Lead Discovery, Identification and Optimization of Lead, Docking study introduction

UNIT-IV **10 Hours**

QSAR Lipophilic, electronic and stearic parameters, Hansch Linear Free Energy Relationship (LFER) model of QSAR, Free Wilson Mathematical Model of QSAR, a few important marketed products and their side effects.

Reference books:

1. Wilson and Giswold's Textbook of Organic, Medicinal and Pharmaceutical Chemistry. N. Delagado and W. A. R. Remers, Eds, J. Lipponcott Co. Philadephia.
2. Principles of Medicinal Chemistry by W. C. Foye, Lea & Fibiger, Philadelphia.
3. Burger's Medicinal Chemistry, H. E. Wolff, Ed. John Wiley & Sons, New York Oxford University Press, Oxford.
4. Singh and Kapoor ―A Text Book of Pharmaceutical and Medicinal Chemistry‖ Vallabh Prakashan, New Delhi.
5. Strategies for Organic Drug Synthesis & Design by Daniel Lednicer, 22nd Edition, John Wiley & sons, USA.
6. Organic Chemistry by L. Finar, Vol. I & II, ELBS/ Longman, London.
7. Kar, A., Medicinal Chemistry, New Age International Publishers, New Delhi, 2007.
8. Taylor, J. B and Triggle, D. J., Comprehensive Medicinal Chemistry II, Vol. 1-8, Quantitative Drug Design, Elsevier Ltd., 2007.

BV125.4-BASIC MICROBIOLOGY

RATIONALE: Microbiology is an exciting discipline with far-reaching impacts in human health and disease. This course will focus on the study of bacteria, viruses, and fungi and their interrelationship with human disease development. There will be emphasis on microbial structure, growth, metabolism, genetics and microbial diversity.

COURSE OBJECTIVES

1. This course will cover topics in the history of microbial morphology and physiology, bacterial metabolism, genetics, and the classification of microorganisms.
2. This course will increase awareness and appreciation for microscopic organisms in our environment and their relationships to humans in health and disease.
3. This course will also provide with tools for a better understanding of microbial pathogenesis, means of control and treatment.

LEARNING OUTCOMES:

The student should be able to:

1. Understand how microorganisms survive where they do, how they are related, and how they interact with us.
2. How to control bacterial growth- use of chemical and physical agents to control microbe propagation How to provide a microbe- free environment for the health professional.
3. Understand the rationale behind the use of chemicals to control bacterial propagation (antimicrobial agents).
4. How microorganisms relates with us causing disease.

UNIT-I **10 Hours**

Scope and History of Microbiology: Biogenesis and Abiogenesis Contributions of Redi,Spallanzani, Needham, Pasteur, Tyndal, Joseph Lister, Koch [Germ Theory], Edward Jenner and Flemming [Penicillin], Scope of Microbiology. Nutritional requirements, growth and cultivation of bacteria and virus, Study of different important media required for growth of aerobic and anaerobic bacteria, Fungi and Different media, microbial growth curve.

UNIT-II **10Hours**

Instrumentation and sterilization

Instruments in microscopy-microscope,Autoclave,Laminar air flow, Incubator.Sterililization and disinfection; Physical methods of microbial control- heat , Low temperature, High pressure ,filtration, Desiccation, Osmotic pressure, Radiation, Chemical methods of microbial control; disinfectants, Types and mode of action, Validation of aseptic room, Sterility testing of pharmaceutical products.

UNIT-III **10 Hours**

Bacterial classification; Biochemical, staining, Morphological.

Bacterial reproduction- Celldivision, Budding, Endospore formation, Recombination

Immunity against infection-immune system; immune cells, Concept of antigen and antibody, inflammation, Vaccines.

UNIT-IV **10 Hours**

General characteristics of viruses, differences between bacteria and viruses types of viruses, Plant virus (TMV) ,Animal virus (FMDV) ,Human virus (HIV),bacterial virus,bacteriophage

Antimicrobial drugs; mode of action of tetracycline, Penicillin, Quinolones, Polymixin.

Reference books:

1. G. Gunnz& S.J. Carter ―Cooper & Gunn's Tutorial Pharmacy‖, 6th ed., Pitman Medical Publishing Co., London 1972.
2. W.B. Hugo and A.D. Russell ―Pharmaceutical Microbiology‖, 4th ed., Blackwell Scientific Publication, Oxford, 1987.
3. ―Microbiology‖- Davis, Dulbecco, Eisen, Lippincott, 4thEdition.
4. Remington's Pharmaceutical Sciences‖ Lippincott Williams and Wilkins; 20thRevisededition (1 December 2000)
5. L.M. Prescott, G.P. Jarly, D.A. Klein, ―Microbiology‖ 2nd, ed. Wm. C. Brown Publishers, Oxford, 1993.
6. S.P. Vyas, V.K. Dixit, Pharmaceutical Biotechnology―1st ed. CBS Publishers & Distributors, New Delhi, 1998.
7. N.K. Jain, Pharmaceutical Microbiology VallabhPrakashan, Delhi.
8. K. Kieslich, Ed. ―Biotechnology‖ vol. VI a, VerlagChamie, Switzerland, 1984.
9. G. Reeves ―Lecture Notes on Immunology‖ Blackwell Scientific Publication, Oxford, 1987.
10. Laboratory Manual of Bacteriology- Salle.

BV126.4 ADVANCED ANALYTICAL CHEMISTRY -I

RATIONALE: Measuring Drug purity is a primary requirement to ensure the quality ofdrugs. Quantifying the purity of compound can be done by different techniques. Some of the most commonly used techniques will be taught in this subject. This will make the student capable to work in a quality control department of the pharmaceutical industry

COURSE OBJECTIVES:

To make students familiar with the principles of analytical chemistry (Instrumental methods) and its application in pharmaceutical chemistry.

LEARNING OUTCOMES: The student should be able to: 1. Narrate the principles of methods and instruments used in assay of various drugs and chemicals. 2. Conduct assays of some drugs using these methods and instruments. 3. Describe basic principles and guidelines pertaining to quality assurance of drugs.

UNIT-I **10 Hours**

Extraction techniques: Introduction, Simple extraction, multiple extractions, Batchextraction, Back extraction separation of drugs in multi component system. Effect of pH on extractability of drugs, continuous extractions, Ion exchange separation, Application of extraction procedure.

UNIT-II **10 Hours**

Chromatography Classification: Theories, Retention mechanism, Separation efficiency, methodology and Pharmacopoeial applications of column, paper and thin layer chromatography. Quantitative and Qualitative analysis by Chromatography.

Unit-III **10 Hours**

Electro analytical methods: Basics of electro analytical methods , Potentio and pH metricmethods, Standard reduction potentials, various electrodes, electrodes and cell potential, applications of Potentiometry and pH metry.

Conductometry: Conductance, factors affecting conductance, Kohlrausch law, Conductivitycells, Applications.

Unit-IV **10 Hours**

Miscellaneous Method, kjeldahl‟s method, Karl Fischer Titration, HPLC and GC –Principle, Instrumentation and their Applications.

Reference books:

1. Gary D. Christian, Analytical chemistry, John Wiley & Sons N.Y., 5th Ed., 1994.
2. J.A. Dean, Analytical chemistry handbook, McGraw hill Inc., 1st Ed., 1995.
3. Principles of Instrumental Analysis, Skoog, Hollar and Nieman, Harcourt College Publishers, Philadelphia, 1998.
4. P.L. Soni, O.P. Dharmarha, U.N. Dash, Textbook of Physical Chemistry, 22nd Edition, Sultan Chand and Sons, New Delhi, 2001.
5. J.H. Kemedy, Analytical chemistry: principles, W.B. Saunder publishing, 2nd Ed., 1990.
6. Practical Pharm. Chemistry, Vol. B – Backett, The athlone Press of University of London.
7. Quantitative chemical analysis – Vogel A.I, Pearson Education., 5th Edition, 1996.
8. Instrumental method of chemical analysis by GurdeepChatwal, Himalaya publishing house**,** 2005.
9. Quantitative analysis of drugs in pharmaceutical formulations by P.D.Sethi CBS Publishers N.D.3rd Edition, 1997.
10. A Textbook of pharmaceutical analysis by Kenneth A. Connors. Jon Wiley and sons, 3rd Edition, 1982.
11. Textbook of Pharmaceutical Analysis – J. W. Munson, Marcel Dekker Inc., New York. Stahl E.; Thin Layer Chromatography, a laboratory handbook, 2nd Ed, SpringerVerlag New York, LLC; 1969.

BV127.4P-MEDICINAL CHEMISTRY

Experiments:

1. Monograph analysis of the following compounds
   a) Aminophylline
   b) Ascorbic acid
   c) Aspirin
   d) Caffeine
   e) Paracetamol
   f) Sulphanilamide.
2. Assay of Diclofenac by alkalimetry.
3. Assay of Analgin by Idometry
4. Assay of Atropine sulphate by non aqueous titration.
5. Preparation of Phenytoin from Benzoin
6. Preparation of Benzocaine from p-amino benzoic acid
7. Preparation of 7-hydroxy coumarin from resorcinol
8. Preparation of Hexamine.
9. Degradation of Ephedrine to Benzoic acid.
10. Any other related experiments.

BV128.4P- ANALYTICAL CHEMISTRY

Experiments:

1. Equivalent conductance of NaCl.
2. Conductometric titration of KCl by $AgNO_3$ Solution.
3. To find out the concentration of given acid solution by potentiometer.
4. To determine the dissociation constant of given acetic acid solution by pH metry.
5. To find out the concentration of given acid solution by using conductometer.
6. To determine the strength of ferrous sulphate using 0.1N $K_2Cr_2O_7$ by Potentiometry.
7. Determination of pH and pKa of buffer solution.
8. To determine percentage of Acetic acid in a mixture of CH_3COOH +C_6H_5COOH Using water as extracting agent.
9. To study and demonstration of TLC
10. To demonstrate HPLC
11. Circular paper Chromatography.
12. Any other related experiments.

BV129.4P- BASIC MICRO BIOLOGY

Experiments:

1. Sterilization of glassware, preparation and sterilization of media.
2. Different inoculation techniques.
3. Isolation of microorganisms from soil by serial dilution.
4. Colony characterization
5. Staining techniques; simple staining ,Gram's staining
6. Negative staining.
7. Motility testing by hanging drop method.
8. Colony counting
9. Determination of MIC
10. Bacterial growth curve
11. Bacteriological analysis of water
12. Any other related experiments**.**

SCHEME OF EXAMINATION:

1.	Synopsis	-10Marks
2.	Major Experiments	-20Marks
3.	Viva voce	-10Marks
4.	Record	-10Marks
	Total	**50 Marks**

Reference books:

1. B.S.Furniss, A.J.Hannaford, V.Regers, P.W.G. Smith and A.R.Tachell, textbook of practical organic chemistry, including quantitative analysis. Longman, London.
2. J.G.Mann and S.C.Saunders, Practical Organic Chemistry, LongmannGreeCo.Ltd., London.
3. Advanced practical medicinal chemistry by Ashutoshkar , New age international publishers
4. The practice of medicinal chemistry, 2nd edition by GamilleG.Wermuth.
5. Practical medicinal chemistry by Dr. K. Yoganandareddy, Dr. K.N.Subramanyam, S.Chand publication.
6. Pharmaceutical microbiology by AushtoshKar, 1st edition, New age international publishers Ltd.
7. A textbook of pharmaceutical microbiology; with experiments by Prahlad Singh mehra, I.K.international publishing house.
8. Text book of practical microbiology by Subhash Chandra parija.
9. Practical handbook of microbiology by Emanuel Goldman, Lorrence K Green; 3rd edition
10. Microbiology- Pelczar and Chan
11. Microbiology: fundamentals and Applications- Purohit, S.S
12. Microbiology: Laboratory manual- Cappuccino, J.G and Shermman, N.
13. Prescott, Harley, and Klein's Microbiology- Joanne M.Willey, Linda Sherwood, Christopher J.Woolverton, McGraw- Hill Higher Education.

SEMESTER - V

BV124.5-MEDICINAL CHEMISTRY-II

RATIONALE: Basic chemistry learnt till previous semester is now getting extended tomedicinal chemistry where the student learns the chemistry of complex drug molecules and how a chemical structure and alter the body functions.

COURSE OBJECTIVES: To learn the structure, Structure activity relationship,physicochemical properties and therapeutic uses of drugs belonging to various therapeutic classes.

LEARNING OUTCOMES The student should be able to: 1. Draw correct chemicalstructure of drugs. 2. Give scientific name of drugs. 3. Narrate physicochemical properties and Structure activity relationship. 4. To understand the mode of action of pharmaceutical drug.

UNIT-I 10 Hours

Steroids: Introduction, Nomenclature, stereochemistry, simple reactions of cholesterol,Classification of steroids, Sterols, Sex hormones, Cardiac glycosides, Bile acids, sapogenins.

UNIT-II **10 Hours**

Chemical naming, structure activity relationship, physicochemical and steric aspects, mode of action and uses of…

a) General anaesthetic agents : Introduction, medicinal aspects of anesthetics, mode ofaction, gases and volatile liquid anesthetics, Intravenous anesthetics of fixed anaesthetics, toxicity of general anesthetics (Divinylether, Ethylchloride, Cyclopropane, Thiopentone sodium, Ketamine)

b) Local anaesthetic agents: Introduction, SAR, Benzoic acid derivatives, Amino benzoicacid derivatives, Lidocaine derivatives, Miscellaneous, toxicity, Mode of action (Benzocaine, Procaine hydrochloride, Mepivacaine).

UNIT-III **10 Hours**

Chemical naming, structure activity relationship, Physicochemical and steric aspects, mode of action and uses of…… a) CNS stimulants: CNS stimulants of natural origin, synthetic CNS stimulants (Nikethamide, Methylxanthines and modified Methylxanthines (theophylline))
b) Psychopharmacological agents: Antipsychotics, Phenothiazines (Chlorpromazine, Trifluperazine, Butyrophenones, miscellaneous), Antidepressants- TCA (amitriptyline), MAO inhibitors, a typical antidepressants, antianxiety drugs- meprobamate and related drugs, Benzodianepines (diazepam).

UNIT-IV 10 Hours

CVS agents: Introduction, Cardiac glycosides, SAR, mechanism of action, toxic effects,antihypertensive agents introduction, etiology, ganglion blocking agents, anti adrenergic agents, drugs acting directly on smooth muscles, drugs acting in CNS (propranolol), antianginals and vasodilators- introduction, mechanism of smooth muscle vasodilatation.

Reference books:

1. Wilson and Giswold's Textbook of Organic, Medicinal and Pharmaceutical Chemistry. N. Delagado and W. A. R. Remers, Eds, J. Lippincott Co. Philadelphia.
2. Principles of Medicinal Chemistry by W. C. Foye,, Lea & Fibiger, Philadelphia.
3. Burger's Medicinal Chemistry, H. E. Wolff, Ed. John Wiley & Sons, New York Oxford University Press, Oxford.
4. Singh and Kapoor ―A Text Book of Pharmaceutical and Medicinal Chemistry‖ Vallabh Prakashan, New Delhi.
5. Strategies for Organic Drug Synthesis & Design by Daniel Led nicer, John Wiley & sons, USA.
6. Organic Chemistry by L. Finar, Vol. I & II, ELBS/ Longman, London.
7. Kar, A., Medicinal Chemistry, New Age International Publishers, New Delhi, 2007.
8. Ladu, B. N., Mandel H.G. &E.L.Way, Fundamentals of Drug Metabolism & Disposition, William & Wilkins Co., Baltimore.

9. Taylor, J. B and Triggle, D. J., Comprehensive Medicinal Chemistry II, Vol. 1-8, Quantitative Drug Design, Elsevier Ltd., 2007.

BV125.5-APPLIED BIOCHEMISTRY

Rationale: Basic biochemistry is learnt in the previous semester and applied aspects of biochemistry are given important in this paper.

Course Objectives: students should learn different types of metabolisms such as carbohydrate metabolism, lipid metabolism and Amino acid metabolism. In addition students are given introduction to Bio energetic and Biological Oxidation.

Learning outcomes: Students should be able to understand

1) Kreb's cycle , Glycogenesis and Glucogenesis
2) Students should understand Lipid metabolism.
3) Students should understand proteins metabolism and various bioenergetic process.

UNIT-I10 Hours

Bio energetic, Biological Oxidation.

Concept of free energy and its determination: Redox potential, Energy rich compounds; ATP ; Cyclic AMP ; their biological significance, Electron transfer chain, Inhibitors and Uncouplers of ETC, Oxidative Phosphorylation, Substance level Phosphorylation.

UNIT-II 10 Hours Carbohydrate metabolism

Introduction, Glycolysis, Glycogensis, glycogenolysis, TCA cycle, Gluconeogensis, Various shuttle systems (glycerol phosphate, Malate aspartate), HMP Shunt Pathway, Uronic acid pathway and Galactose metabolism.

UNIT-III10 Hours

Lipid metabolism

Introduction, Oxidation of saturated (Palmitic acid)fatty acids ,Oxidation of unsaturated fatty acids (L-linolic acid), Formation and utilization and significance of ketone bodies, Cholesteral metabolism, Biosynthesis of fatty acids, Essential Fatty acids, Antibiotics.

UNIT-IV 10 Hours

Amino acid metabolism

Amino acids: Definition, Classification, General reactions of amino acids, Transamination, Deamination, and Decarboxylation,Transmethylation of amino acids, Urea cycle, Metabolism of Sulphur containing amino acids, Catabolism of Tyrosine, Tryptophan, Phenylalanine, Synthesis and significance of biologically important substances: Creatine , Dopamine and Adrenaline.

REFERENCE BOOKS:

1) Harpers Review of Biochemistry-Martin, Pearson Education Limited; 20thedition.
2) Text book of Bio chemistry- Lehninger
3) Outlines of Biochemistry – Cohn and Stump
4) Text book of Biochemistry – Varon Kumar Malhotra
5) Hawk's Physiological Chemistry – Oser.
6) Text book of biochemistry by Satyanarayana and U.Chakrapani, Elsevier; 4thedition,2013.

BV126.5-PHARMACOGNOSY AND PHYTOCHEMISTRY

Rationale: This is one of the important subjects of pharmaceutical chemistry. This papergives an insight into photochemicals and their estimation methods.

Course Objectives: To learn the isolation and purification of natural products, to learnvarious techniques in biosynthetic pathways, to learn the method of analysis of different essential oils.

Learning outcomes: The Student should be able to
a) Understand the importance ofpurification of natural products
b) Understand the techniques employed in biosynthetic pathways
c) Understand various methods of analysis of different essential oils.

UNIT-I 10Hours
Isolation, purification, and estimation of Phytoconstituents:

General methods used for the isolation and purification of natural products including superfluid critical extraction, General methods of identification and estimation of Phytoconstituents, Detailed study of chromatographic techniques for separation , isolation and identification of Phytoconstituents.

UNIT-II 10Hours
Biogenesis of Phytopharmaceuticals:

Techniques employed in the education of biosynthetic pathways. Brief study of basic metabolic pathways, General pathway of biosynthesis of alkaloids, Glycosides, Tri terpenoids, Steroids.

UNIT-III 10 Hours
Alkaloids:

Definition, General properties, Chemical tests, General methods of isolation and estimation of alkaloids.
Sources, diagnostic characters, constituents, uses and adulterants of: Lobelia, Solanaceous drugs, Cinchona, Opium, Colchicum, Ephedra and Aconite.

UNIT-IV 10 Hours Terpenoids:

Introduction and classification, carotenoids, essential oils: Introduction, definition, generalproperties, chemical nature and classification of essential oil. Source, diagnostic Characters.Chemical constituents and uses of: Clove, Cinnamon, Coriander, Fennel, sandal wood.Methods of production and analysis of clove, Cinnamon, Eucalyptus, Mentha, and Sandal wood oils.

REFERENCE BOOKS:

1) Kolkate C.K., Purohit A.P and Gokule S.B., Pharmacognosy, 22 nd Ed, NiraliPrakashan, Pune, 2003.
2) Iyengar M.A., and Nayak S.G.K., Anatomy of Crude Drugs, 8th edition, Manipal power press, Press manipal., 2001.
3) Iyengar M.A and Nayak S.G.K., Anatomy of Crude Drugs , 8th Ed, Manipal Power Press Manipal.,2001
4) Trease G.E. and Evans, W.C., Pharmacognosy, 15th Ed, BailliereTindallEastbourne, Pune. 2003.
5) Manaske R.H.F., the Alkoloids –Academic Press, New York.

PRACTICALS

BV127.5P- PHYTOCHEMISTRY

Experiments:

1. Isolation of Chloroplast and assay of Chlorophyll.
2. Extraction of Nicotine from Cigarettes.
3. Thin layer chromatography characterization of Flavonoids.
4. Determination of tannins from tea.
5. Extraction of Caffeine from coffee powder.
6. Isolation of different pigments from Flower petals.
7. Isolation of Chlorophyll and Caretenoid pigments from Spinach.
8. Isolation of Calcium Citrate from Lemon.
9. Successive solvent extraction and detection of phytoconstituents.
10. Chemical Tests for Tannins and Resins.
11. Any other related experiments.

BV128.5P- APPLIED BIOCHEMISTRY

Experiments:

1. Identification of Carbohydrates (Scheme and identification) (Glucose, fructose, lactose, maltose, sucrose)
2. Identification of proteins(scheme and identification) (Casein, albumin, gelatin, peptone)
3. Quantitative estimation of carbohydrates-DNS reagent.
4. Quantitative estimation of proteins: Biuret Reagent
5. Quantitative Urine analysis
   a) Titrable acidity and ammonia
   b) Estimation of reducing sugars in Urine (Benedicts method)
6. Quantitative analysis of Blood
   a) Estimation of Glucose in blood (Folin-Wu method)
   b) Estimation of Cholesterol in blood.
7. Effect of pH on enzyme activity (amylase) activity.
8. Preparations of Std. Buffer solutions (Acetate, Borate, Carbonate, citrate and Phosphate) and measurement of pH (any two).

BV129.5P- PHARMACOGNOSY AND PHYTOCHEMISTRY

Experiments:

1. Quantitative Microscopy
   i. Ratio values : Stomatal number and Stomatal Index
   ii. Determination of starch grains using lycopodium spore method.
2. Chemical tests for Asafoetida, Benzoin, Tannic acid, Pale catechu, Black catechu, Aloes.
3. Study of morphology of drugs Strophanthus, Squill, Rhubarb, Cascara, Ginseng, Liquorice, Senna, Wild Cherry bark. Bitter almonds, Cinchona, Ipecac, Rauwolfia, Ergot, Nux –Vomica, Vinca, Aconite, Kurchi, Ephedra, Colchium.
4. Any other related experiments.

SCHEME OF EXAMINATION:

1.	Synopsis	-10Marks
2.	Major Experiments	-20Marks
3.	Viva voce	-10Marks
4.	Record	-10Marks
	Total	**50 Marks**

REFERENCE BOOKS:

1. Elementary practical organic chemistry; small scale preparations part-1 by Arthur I. Vogel; 2nd edition Pearson, 2010.
2. Advance practical chemistry by Dr.K.Yogananda Reddy , Dr.K.N.Jayaveera and Dr. S. Subramanyam.S.Chand publishing
3. Practical pharmacognosy by Dr.K.R.Khandelwal; Pragathi books pvt.ltd.
4. A laboratory manual of pharmacognosy by Dr.Sayeedahmed.I.K. International publishing house pvt.ltd, 2015.
5. Practical pharmacognosy by Joshi, Frank brother publication.
6. Joshi, A. Rashmi, A text book of practical biochemistry', B.jain publishers.2002.

Semester -VI

BV124.6-PHARMACOLOGY

RATIONALE: This is one of the core subjects of Pharmacy field where student learns thebiological effects of drugs. The subject has direct application to the profession as it teaches the student about how the drug produce effect, what effects are produced, what side effects are produced, where and when it should be used etc.

COURSE OBJECTIVES: 1) To learn general concepts how the drug produces effect andwhat factors can contribute in producing the drug effects. 2) To learn the mechanism of action, pharmacological effects, pharmacokinetics, adverse effects, therapeutic application of various classes of drugs.

LEARNING OUTCOMES: The student should be able to:

1. Explain the basic principles of Pharmacokinetics and pharmacodynamics.
2. Narrate the principals involved in measurement of drug effects.
3. Explain the mechanism of action, pharmacodynamics and pharmacokinetic effects of drugs, adverse effects.

UNIT-I 10 Hours

General pharmacology: Introduction to pharmacology, sources of drugs, Dosage forms andRoutes of administration.

Pharmacokinetics: Absorption, Distribution, Metabolism and excretion of drugs. Principlesof Pharmacokinetics, Bioavailability and Bioequivalence, Pharmacogenetics, Adverse Drug Reaction, Drug interactions, Bioassays & Preclinical studies.

UNIT-II 10Hours

Pharmacology of Peripheral Nervous system: Neurohumoral transmission (autonomic andsomatic), Parasympathomimetics, Parasympatholytics, Sympathomimetics, adrenergic receptor and neuron, blocking agents, ganglionic stimulants and blocking agents, Neuromuscular blocking agents, Basics of ANS disorders.

UNIT-III 10 Hours

Pharmacology of Respiratory and Cardiovascular system: System Drugs used in treatmentof Bronchial asthma, Dry cough, COPD (also Mucolytics, Expectorants, Antitussives) Anti hypertensive and Antianginal drugs.

UNIT-IV **10Hours**

Pharmacology of Nitric oxide, Endothelins and Purines, General anesthetics, Drug dependence and drug abuse -convulsants

Reference books:

1. Pharmacological Basis of Therapeutics by Goodman & Gillman.
2. Pharmacology and Pharmacotherapeutics by Satoshkar&Bhandarkar.
3. Essentials of Pharmacotherapeutics by F.S.K. Barar.
4. Essentials of Medical Pharmacology by K.D. Tripathi.
5. Pharmacology by Rang & Dale.
6. Fundamentals of Experimental Pharmacology by M.N. Ghosh, Sixth edition, 2008.
7. Handbook of Experimental Pharmacology by S.K. Kulkarni.
8. Pharmacology by V. J. Sharma.
9. Lippincot‟s Pharmacology by Heavy & Champ.
10. General P‟cology: Basic Concept by H.L. Sharma.
11. Practicals in Pharmacology by Dr. Goyal.
12. Medical Pharmacology by Goth, 10thRevised edition (1 August 1981)
13. Pharmacology by Gaddum, Oxford University Press; 7thRevised edition (17 August 1972.
14. Principles of Drug Action by Goldstein Aronow&Kalaman.
15. Lewis Pharmacology by Crossland. Springer; 1981 edition, 31 January 1982.
16. Elements of Pharmacology by Dr. Derasari& Dr. Gandhi.
17. Drug Interactions by Hansten. Lippincott Williams & Wilkins (1st April 2006)
18. Pharmacological Experiments on Isolated Preparations by Perry, Churchill Livingstone; 2nd Revised edition (4 December 1970).

BV125.6 PHARMACEUTICAL TECHNOLOGY

Rationale: Basic knowledge in pharmaceutical chemistry needs a through knowledge of useof technology in pharmaceuticals. Various criteria for validation are required to be learnt by the students.

Course Objectives:

1) Student should learn the procedure of formulation

2) Student is exposed to different procedure of process validation.

Learning Outcomes: 1) The student should be able to understand the different procedures informulations.2) Understand different procedures in formulations.3) Students should be able to understand different quality control tests of tablets and capsules

UNIT-I 10 Hours

Tablets

Introduction –Definition, Advantages, Disadvantages, Classification of tablets, Formulation,Granule properties, granulation techniques, equipment employed in granulation, tablet compression, tablet presses, problems in tablet manufacture, Evaluation of tablets and Packaging.

UNIT-II10 Hours

Capsules:

Introduction –Definition, advantages, disadvantages, and Types.

a) Hard shelled capsules: Extraction of Gelatine, Production, and filling of hard gelatinecapsules, capsule size, finishing and special techniques quality control test for capsule.

b) Soft shelled capsules: Nature of shell and capsule content, importance of base adsorptionand minim/gram factors, production, in process and final product quality control tests, stability testing and storage of capsule dosage forms.

UNIT-III 10 Hours

Parenteral preparation: Definition, types, advantages and limitation, routes of injection.Formulation – water for injection, manufacture of parenterals, sterile powders, implants and long acting parenterals.

Ophthalmic formulations: Types and requirements, Formulation and preparation of eye drops, Eye lotions and Eye ointments, Containers and Evaluation.

UNIT-IV 10 Hours

Introduction to validation

Validation – Introduction, Definition and types. Process validation – Elements, Steps and Options

Process validation of pharmaceutical operations involved in the production of tablets, liquids and Parenterals.

Stability Studies

Basic concept and objective of stability study. Importance of accelerated stability study.Regulatory requirements related to stability testing with enphasis on ICH guidelines, climate zone impurities in stability study, Photo stability testing etc.

REFERENCE BOOKS:

1) Leon Lachman, Lieberman and J.L Kanig. Theory and Practice of Industrial Pharmacy , Varghese Publishing House , Bombay , 3 rd edition , 1987.
2) M.E. Aulton , Pharmaceutics –The Churchill Livingstone; 3rdedition (28 September2007) science of Dosage Form design ,
3) Banker and Rhodes ,Modern Pharmaceutics , Marcel Dekker Inc., New York , 2nd edition,1990
4) Lachman and Liberman , Pharmaceutical Dosage Form – Tablets , Volume 1-3, Marcel Dekker Inc.,New York , 2nd edition , 1989
5) Dr.N. Udupa, Drug delivery Systems – Manipal Experience.
6) Y.W. Chien , Novel Drug delivery Systems , Marcel Dekker Inc., New York , 2nd edition ,1992
7) Remington: The science and practice of Pharmacy, Lippincott Williams, 20th edition, 2000.

BV126.6-PHARMACOLOGY AND TOXICOLOGY

RATIONALE: This topic is one of the core subjects gives an overview of Autacoids andtheir antagonists. It exposes the students towards endocrine drugs and chemotherapy.

C**OURSE OBJECTIVE:**

1) To learn about pharmacology of Autacoids and their antagonists
2) To learn about different endocrine drugs and chemotherapeutic drugs.
3) To learn about toxicology and treatment of toxicity.

Learning outcomes: Students should be able to

1) Understand the pharmacology of Autacoidsand their antagonists.
2) To understand varies chemotherapeutic drugs.
3) Understand the general principles of toxicology and the treatment for toxicity of various types.

UNIT-I10 Hours

Pharmacology of Autacoids and their
Antagonists. Histamine and antihistamine

5-Hydroxytryptamine and its antagonists, Lipid derived autocoids and platelet activating factor, Pharmacology of drugs acting on Respiratory tract, Bronchodilators, Mucolytics, Expectorants, Antitussives, Nasal decongestants.

Pharmacology of drugs acting on gastro intestinal tract

Antiulcer drugs, Laxatives and Purgatives, Emetics, and Antiemetics, Appetizers, Digestants, Carminatives.

UNIT-II 10 Hours

Endocrine Drugs.

Hypothalamic and pituitary hormones, Thyroid and Anti thyroid drugs, Insulin, Insulin analogues and Oral hypoglycemic agents, Adrenocortico steroids and Adrenocotical antagonist, sex hormones and oral contraceptives, Oxytocin and other uterine stimulants and relaxants.

UNIT-III10 Hours

Chemotherapy

Introduction, Sulphonamides and Co-trimoxazole, Pencillins, Cephalosporins, Tetracyclins and Chloramphenicol, Macrolides Aminoglycosides Polyene and polypeptide antibiotics, Quinolones and Fluroquinolines, Antifungal antibiotics, Antiviral agents.

UNIT-IV10 Hours

Bio assay

Scope, Principles involved and General methods

Immunopharmacology

Pharmacology of Immunosuppressants and stimulants.

Principles of Toxicology

Acute, subacute, chronic toxicity, General principles of treatment of acute toxicity and acute poisoining, Signs, Symptoms and treatment of acute and chronic poisoning due to – Barbiturates, Alcohols, Benzodiazepines, Antidepressants, Neuroleptics, Insecticides, Snake bite, Heavy metals (Iron, Lead, Mercury, Arsenic)

REFERENCE:

1) Ghosh M.N., Fundamentals of Experimental Pharmacology, Scientific book agency, Calcutta.
2) Goodman and Gilman's the Pharmacological basis of Therapeutics. McGraw-Hill Inc., US; 10th Revised edition (1 September 2001).
3) M.P.Rang, M.M. Dale, J.M. Riter., Pharmacology , Churchill Livingstone; 8th International edition (21 January 2015)
4) Tripati KD: Essentials of Medical Pharmacology, Jaypee Brothers Medical Publishers Private Limited; 7th edition (28 July 2013).
5) Barar F.S.K., Test book of Pharmacology, Interprint , New Delhi. S.Chand (G/L) & Company Ltd (1 December 2012).
6) Pharmacotherapy: A Pathophysiological approach, Dipiro, J.L. Elsevier.
7) Handbook of Experimental Pharmacology, 2nd Ed., S.K. Kulkarni., VallabhPrakashan, Delhi.

PRACTICALS

BV127.6P- PHARMACEUTICAL TECHNOLOGY

Experiments:

1) Introduction to different types of dosage forms and apparatus
2) Preparation of aromatic waters-chloroform water/ camphor water
3) Friability test and weight variation test for tablets
4) Preparation of NaCl tablets by direct compression method
5) Preparation and compression of tablets by wet granulation
6) Preparation of creams-Aqueous cream/buffered cream/calamine cream
7) Preparation of ear drops- sodium carbonate/ aluminium acetate/hydrogen peroxide/boric acid
8) Preparation of elixirs- low alcohol elixir, high alcohol elixir, paediatric chloral hydrate elixir, phenobatbitone
9) Determination of angle of repose of powders
10) Preparation of enemas- chloral hrdrate, magnesium sulphate, paraldehyde
11) Preparation of emulsions- liquid paraffin emulsion/ castor oil emulsion
12) Preparation of linctuses- codeine linctus/ simple linctus
13) Preparation of absorbable dusting powder
14) Any related experiments.

BV128.6P- PHARMACOLOGY AND TOXICOLOGY

Experiments:

1. Introduction to Instruments used in Experimental Pharmacology
2. Introduction to Bio assays
3. General study of different isolated tissue preparation.
4. Bioassay of some important drugs.
5. Graded dose response curve of acetyl choline.
6. Bio assay of acetyl choline by interpolation method.
7. Bio assay of acetyl choline/Histamine by 3 point method.
8. Effect of various drugs on Dog's BP by computer stimulated model.
9. Identification of unknown drugs in EP Dog software.
10. Bioassay of histamine by interpolation method.
11. Any other related experiments.

BV129.6P- DRUG ANALYSIS

Experiments:

1. To isolate volatile Oil in a Drug using distillation method
2. To interpret the given IR spectra of the drug.
3. Assay of Sulphadiazine by Diazotisation.
4. Assay of Benzyl penicillin by Idometry.
5. Assay of Chloroquine by non aqueous titration
6. Preparation of Sulphaacetamide from Sulphanilide.
7. Preparation of Fluorescein from Pthalic anhydride.
8. Estimation of hydroxyl group in Cholesterol.
9. Preparation of Benzimidazole from O-Phenylenediamine.
10. Estimation of total Tannins in given sample by Redox titration
11. Any other related experiments.

SCHEME OF EXAMINATION:

1.	Synopsis	-10Marks
2.	Major Experiments	-20Marks
3.	Viva voce	-10Marks
4.	Record	-10Marks
	Total	**50 Marks**

Reference books:

1) Ghosh M.N., Fundamental of Experimental Pharmacology, Scientific Book agency, Calcutta.
2) Hand book of Experimental Pharmacology, 2nd Ed., S.K. Kulkarni., Vallabhprakashan, Delhi.
3) Experimental pharmacology by J.Sujatha Devi, 2013.
4) Practical manual of pharmacology by Badyal Dinesh, 2013, edition 1/e. Japee.
5) Practical manual of pharmacology by Badyal; Jaypee brother's medical publisher's private ltd.1st edition.2008.
6) Pharmaceutical drug analysis by S.C.Mehta, ASHUTOSH Kar, new age international limited.
7) Practicals in Pharmacology by Dr. Goyal.
8) Vogel's text book of practical organic chemistry, 5th Edition, 2012.

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2015 - 2016

SEMESTER- III
BV 124.3-Basic Physical Chemistry

RATIONALE: Physical properties of drugs and chemicals have immense effect on drug manufacturing, efficacy and stability. Strong knowledge of these subjects becomes mandatory for any professional.

COURSE OBJECTIVES:

1. To learn the important physical properties of drugs and chemicals, that can significantly affect the drug manufacturing.
2. To quantify these physical properties and methods to alter the same so as to avail desired levels.

LEARNING OUTCOMES: The student should be able to:

1. Define and explain the various physical properties.
2. Measure the physical properties and demonstrate the methods to alter the same by different ways.
3. Narrate and explain the laws, theories pertaining to these properties.
4. Carry out simple calculations involved with these properties.

UNIT-I 10 Hours Gaseous and solid state chemistry

Behavior of Gases: Kinetic theory of gases, deviation from ideal behaviors and explanation. **Solid State:** Crystalline structures, lattices, Unit cell, Coordination number, Radius ratio, Types of Packing, Imperfection in Solids.

Adsorption: Basics of Adsorption, Freundlich and Gibbs adsorption isotherms, Langmuir theory of adsorption.

UNIT-II 10Hours The Liquid State

The Liquid State: Physical properties (Surface tension, Perachor, viscosity, Refractive index, Optical rotation, Dipole moments and Chemical constituents)

Solutions:

Ideal and real solutions, solutions of gases in liquids, Henry's law, Colligative properties.

UNIT-III 10Hours Thermodynamics: Terms used in Thermodynamics, Intensive and Extensive properties , Enthalpy , Entropy , Free energy , first, second and third laws, Zeroth law, Work done in

Isothermal and Adiabatic process, phase equilibria and phase rule.

UNIT-IV **10Hours**

Chemical Kinetics: Zero, first and second order reactions, complex reactions, theories of reaction Kinetics, Characteristics of homogeneous and heterogeneous catalysis. Effect of catalyst on reaction rate and activation energy.

Photochemistry: Consequences of light absorption, Jablenski diagram, Lambert-Beer Law, Quantum efficiency.

Reference Books:

1. G. Raj Advanced Physical Chemistry, 20th Edition, Goel Publishing House, Meerut, 1996-97.
2. Dr. J.N. Gurtu, Dr. Hemant Snehi, Advanced Physical Chemistry, 7th Revised and Enlarged Edition, Pragati Prakashan, Meerut, 2000.
3. P.L. Soni, O.P. Dharmarha, U.N. Dash, Textbook of Physical Chemistry, 22nd Edition, Sultan Chand and Sons, New Delhi, 2001.
4. B.S. Bahl, G.D. Tuli, Arun Bahl, Essentials of Physical Chemistry, Reprinted 24th Edition, S. Chand and Company Ltd., New Delhi, 2004.
5. B. Viswanathan, P.S. Raghawan, Practical Physical Chemistry, 1st Edition, Viva Books Pvt. Ltd., 2005.
6. I. Das, A. Sharma, N. R. Agrawal, an Introduction to Physical Chemistry, Revised 2nd Edition, New Age International Publishers, New Delhi, 2005.
7. W. J. Moore, Physical Chemistry, 5th Edition, Orient Longman Pvt. Ltd., New Delhi, 2004.
8. Prof. S.K. Dutta, Principles of Physical Chemistry and Biophysical Chemistry, 1st Edition, Books and Allied (P) Ltd., Kolkata, 2007.
9. L.M. Atherden, Bentley and Driver's Textbook of PharmaceuticalChemistry, 8th Edition, Oxford University Press, Bombay, 1994.
10. S. Glasstone , Textbook of Physical Chemistry, 2nd Edition, Rajiv Beri for Macmillan India Limited, New Delhi, 1995.
11. J. B. Yadav Advanced Practical Physical Chemistry, 33rd Edition, Krishna Prakashan Media (P) Ltd., 2013.
12. C.R. Metz, Schaum's Solved Problems Series, 2000 solved problems in Physical Chemistry, 2nd Edition, McGraw Hill Publishing Company, USA, 1989

2018 – 2019
80 %. change

SEMESTER- III

BV 124.3-BASIC PHYSICAL CHEMISTRY

RATIONALE: Physical properties of drugs and chemicals have immense effect on drug manufacturing, efficacy and stability. Strong knowledge of these subjects becomes mandatory for any professional.

COURSE OBJECTIVES:

1. To learn the important physical properties of drugs and chemicals, that can significantly affect the drug manufacturing.
2. To quantify these physical properties and methods to alter the same so as to avail desired levels.

LEARNING OUTCOMES: The student should be able to:

1. Define and explain the various physical properties.
2. Measure the physical properties and demonstrate the methods to alter the same by different ways.
3. Narrate and explain the laws, theories pertaining to these properties.
4. Carry out simple calculations involved with these properties.

UNIT-I **10 Hours**

Gaseous state: **4 Hours**

Self study: (Molecular velocities: root mean square velocity, average velocity and most probable velocities-definition and calculation relation between RMS, average and most probable velocities.)

Critical phenomenon: PV isotherms of real gases, Andrew's isotherms of carbon dioxide-continuity of states. Isotherms of Vander Waal's equation, relation between critical constants and vanderwaals's constants-derivation of the expressions for Tc, Pc and Vc based on Vanderwal's constants.

Solid state: **4 Hours**

Elementary account of unit cell and Bravais lattice. Laws of crystallography: Law of constantncy of interfacial angles-definition and explanation taking hexagonal crystal system as an example. Law of rationality indices. Miller indices, calculation of Millar indices foe different planes in a cubic crystal system. Law f symmetry-definition. Types of elements of symmetry –a) axis of symmetry b) plane of symmetry c) centre of symmetry-definition and explanation taking cubic crystal system as an example. X-ray diffraction by crystals. Derivation of Bragg's equation.

(Self study: Stoichiometric defects-Frenkel and Schottky defects,Their effect on density)

ADSORPTION: **2 Hours**

Basics of adsorption, Freundlich and Gibbs adsorption isotherms, Langmuir theory of adsorption.

UNIT-II **10 Hours**

Liquid state: **4 Hours**

(Self study: differences between solids, liquids and gases.)

Structure of liquids-qualitative description. Properties of liquids-Viscosity-definitions Unit, principle and method determination. Surface tension-definition, SI unit, principle and method of determination. Parachor-expression, definition in deciding the structures of organic compounds (vogel's method only).

Dilute solutions and colligative properties- **3 Hours**

Ideal and non-ideal solutions-Raoult's law, thermodynamic properties (ΔG, ΔH and ΔS) of ideal solutions. Colligative properties (definition) and an elementary account of the 4 colligative properties.

Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.

BINARY MIXTURES: **3 Hours**

Ideal liquid mixtures-Raoult's law, vapour pressure vs composition (mole fraction) curves. Azeotropes-HCl-H_2O and ethanol-water system. Partially miscible liquids: Phenol water, TEA-water and nicotine –water systems.

UNIT-III **10 Hours**

Thermodynamics:

Self study-(system, surroundings, types of system, process, types of process, enthalpy, internal energy, I^{st} law of thermodynamics)

Variation of heat of reaction with temperature. Derivation of Kirchoff's equation.

Second law of thermodynamics (definition), efficiency (definition), Carnot's theorem. Expression for efficiency of carnot's engine. Thermodynamic scale of temperature (definition), concept of entropy, entropy as a state function, statement of zeroth and third law of thermodynamics (definition)

Entropy change in reversible process, Irreversible process, for a ideal gas under different conditions (derivations) $\Delta S=Cv\ \ln T_2/T_1+R\ln\ V_2/V_1$ and $\Delta S=C_p\ln T_2/T_1+R\ln P_1/P_2$.Derivation of ΔS during phase change and on mixing of ideal gases. Gibbs free energy, Helmholtz free energy: significance, variation of G with T and P. Problems bases on above topics.

UNIT- IV **10 Hours**

Chemical kinetics **4 Hours**

(Self study: Rate of a reaction-definition, rate equations of simple chemical reactions-two examples.

Effect of concentration on the rate of a chemical reaction. Order of a reaction-zero order, first order second order pseudo order-definition two examples for each. Half life definition and general mathematical expression)

Rate constants for II and n^{th} order reactions. Derivation with equal and unequal concentrations for second order reaction. Termination of the order of a reaction-differential, integration, half life period and isolation methods. Problems on determination of order of the reaction and half life.

Catalysis- **2 Hours**

(Self study: General characteristics of catalytic reactions, homogeneous and heterogeneous reactions)

Acid-base catalysis general and specific-(qualitative treatment only) Enzyme catalysis-examples, Characteristics of enzyme catalysis, mechanism of enzyme catalysis (qualitative treatment only)

Photochemistry- **4 Hours**

Differences between thermal and photochemical reactions: laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Primary and secondary reactions, quantum yield .Photosensitized reactions with examples. Photo-physical process-Jablonski diagram depicting various process occurring in the excited state-fluorescence and phosphorescence-definition, Explanation of fluorescence .Definition, explanation of phosphorescence with examples. Chemiluminescence.

Reference Books:

1. G. Raj Advanced Physical Chemistry, 20th Edition, Goel Publishing House, Meerut, 1996-97.
2. Dr. J.N. Gurtu, Dr. Hemant Snehi, Advanced Physical Chemistry, 7th Revised and Enlarged Edition, Pragati Prakashan, Meerut, 2000.
3. P.L. Soni, O.P. Dharmarha, U.N. Dash, Textbook of Physical Chemistry, 22nd Edition, Sultan Chand and Sons, New Delhi, 2001.
4. B.S. Bahl, G.D. Tuli, Arun Bahl, Essentials of Physical Chemistry, Reprinted 24th Edition, S. Chand and Company Ltd., New Delhi, 2004.
5. B. Viswanathan, P.S. Raghawan, Practical Physical Chemistry, 1st Edition, Viva Books Pvt. Ltd., 2005.
6. I. Das, A. Sharma, N. R. Agrawal, an Introduction to Physical Chemistry, Revised 2nd Edition, New Age International Publishers, New Delhi, 2005.
7. W. J. Moore, Physical Chemistry, 5th Edition, Orient Longman Pvt. Ltd., New Delhi, 2004.
8. Prof. S.K. Dutta, Principles of Physical Chemistry and Biophysical Chemistry, 1st Edition, Books and Allied (P) Ltd., Kolkata, 2007.
9. L.M. Atherden, Bentley and Driver's Textbook of PharmaceuticalChemistry, 8th Edition, Oxford University Press, Bombay, 1994.
10. S. Glasstone , Textbook of Physical Chemistry, 2nd Edition, Rajiv Beri for Macmillan India Limited, New Delhi, 1995.
11. J. B. Yadav Advanced Practical Physical Chemistry, 33rd Edition, Krishna Prakashan Media (P) Ltd., 2013.
12. C.R. Metz, Schaum's Solved Problems Series, 2000 solved problems in Physical Chemistry, 2nd Edition, McGraw Hill Publishing Company, USA, 1989

2015–16

BV126.1- Basic Organic Chemistry

RATIONALE: Majority of the drugs used are organic in nature and therefore understanding the basics of organic chemistry, naming these complex chemical structures, understanding the chemical and physical properties of the common groups of compounds and also doing synthesis of these compounds becomes very important in understanding drug properties.

COURSE OBJECTIVES:

1. To learn fundamentals of chemical bonds, stereochemistry.
2. To learn basic chemical functional groups of compounds with respect to their physical and chemical properties.
3. To learn the simple organic chemical reactions.
4. To identify organic compounds by testing their physical and chemical properties.

LEARNING OUTCOMES: The student should be able to:

1. Define and explain different types of chemical bonds.
2. Name the organic compounds according to IUPAC nomenclature system.
3. Narrate physical and chemical properties of different compounds representing different functional group.
4. Write chemical reactions depicting synthesis and chemical properties of these Organic compounds.
5. Synthesis some organic compounds.
6. Identify unknown organic compounds by conducting different physical and chemical tests.

UNIT-I **10 Hours**

Molecular orbitals, Bonding and Anti-bonding orbitals, Covalent bond, Hybrid orbitals, Intramolecular forces, Bond dissociation energy, Polarity of bonds, Polarity of molecules, structure and physical properties, Intermolecular forces, Acids and bases.

UNIT-II **10 Hours**

Structure and Nomenclature:

Structure, Nomenclature of compounds with one and two functional groups. Different representations of formula writing. Types of arrows. Simple nomenclature of aromatic and Heterocyclic compounds. Types of organic reactions.

UNIT-III 10 Hours Preparation and Reactions of: Alkanes, Alkenes, Alkynes: Cycloalkanes, Dienes, Benzene, Polynuclear aromatic compounds, Reactive intermediates –

Carbocations, Carbanions, Carbenes, Nitrenes and Free radicals.

UNIT-IV **10 Hours**

Stereochemistry: Isomerism and its types and Associated physicochemical Properties, optical activity, stereoisomerism, specification of configuration, Reactions involving stereoisomers, chirality, chiral reagents, conformations, stereochemistry of specific reactions and intermediates, Stereo selective and stereo specific reactions.

Reference Books:

1. Morrison & Boyd, Organic Chemistry, Prentice-Hall, 6th, 2001.
2. March J, Advanced Organic Chemistry, MacGraw-Hill, 3rd, 1985.
3. Solomon & Fryhle, Organic Chemistry, Wiley, 8th, 2004.
4. Shriner & Morill, The systemic Identification of Organic Compounds, Wiley, 8th, 2004.
5. Furniss, Vogel's Textbook of Practical Organic Chemistry, Pearson education, 5th, 2004.
6. Eliel E, Stereochemistry of Carbon Compounds, McGraw-Hill, 7th, 1962.
7. Eliel E, Elements of Stereochemistry, wily, 3rd, 1969.
8. Cahn & Dermer, Introduction to Chemical Nomenclature, Butterworths, 3rd, 1979.
9. Warren S, Organic synthesis-The disconnection approach, Wiley, 4th, 1982.
10. Wheland G Advanced Organic Chemistry, Wiley, 3rd, 1960.
11. Kagan H, Organic Stereochemistry, Wiley, 4th, 1965.
12. House H, Modern Synthetic Reactions, Wiley, 2nd, 1972.

PRACTICALS

BV127.1P- Organic chemistry-I

RATIONALE: To provide the basic knowledge of very important concepts and to provide overview of the applications of the concepts in applied field to the students.

PREREQUISITES: Basic knowledge of mathematics, physics and chemistry of H.S.C level

Experiments:

1. Introduction to laboratory and safety hazards.
2. Introduction to organic compound identification test.
3. Introduction to reagent test.
4. Analysis of the given unknown organic compound.

75% change.

2018-2019.

BV126.1- BASIC ORGANIC CHEMISTRY

RATIONALE: Majority of the drugs used are organic in nature and therefore understanding the basics of organic chemistry, naming these complex chemical structures, understanding the chemical and physical properties of the common groups of compounds and also doing synthesis of these compounds becomes very important in understanding drug properties.

COURSE OBJECTIVES:

1. To learn fundamentals of chemical bonds, stereochemistry.
2. To learn basic chemical functional groups of compounds with respect to their physical and chemical properties.
3. To learn the simple organic chemical reactions.
4. To identify organic compounds by testing their physical and chemical properties.

LEARNING OUTCOMES: The student should be able to:

1. Define and explain different types of chemical bonds.
2. Name the organic compounds according to IUPAC nomenclature system.
3. Narrate physical and chemical properties of different compounds representing different functional group.
4. Write chemical reactions depicting synthesis and chemical properties of these Organic compounds.
5. Synthesis some organic compounds.
6. Identify unknown organic compounds by conducting different physical and chemical tests.

UNIT-I **10 Hours**

Chemical bonding, covalent bonding, VBT, VSEPR and MOT

Chemical bonding – (self study-definition, types-ionic, covalent, coordinate and hydrogen bonding-inter and intra molecular hydrogen bonding.)

Covalent bonding-(self study: definition, atomic orbital overlap concept of covalency, formation of H_2 , F_2 O_2, HF. VBT-Postulates (Pauling approach.)

VSEPR Theory-Postulates, geometry of molecules-BeF_2,BF_3,CH_4 ,PF_5,SF_6,NH_3,H_2O,SF_4,ClF_3, XeF_2,XeF_4,IF_4, Geometry of ions-carbonate,nitrate.

MOT-LCAO, explanation for formation of bonding and antibonding molecular orbitals. Conditions using LCAO approach. Energy level diagram for molecular orbitals ,mixing of orbitals ,filling up of electrons in molecular orbitals ,molecular orbital configuration, bond order and magnetic properties of species like He_2,B_2,C_2,N_2,O_2.

UNIT-II **10 Hours**

Structure and Nomenclature:

STRUCTURE AND BONDING IN ORGANIC MOLECULES. - **10 hours**

(SELF STUDY: Introduction to organic chemistry, aim and scope of organic chemistry, importance of organic compounds, catenation, and classification of organic compounds, representations and conventions of writing formula. IUPAC nomenclature of aliphatic organic compounds-simple and bifunctional).

Inductive ,mesomeric ,electromeric and hyperconjugative effect-explanation and examples.Notations-curved arrows ,drawing electron movements, half headed(in tautomerism) and double headed arrows. Types Of bond breaking-homolytic and heterolytic, Types of reagents-electrophiles and Nucleophiles. Types of reactions-addition, substitution, elimination and rearrangement .

UNIT-III **10 Hours**

Preparation and Reactions of: Alkanes, Alkenes, Alkynes; Cycloalkanes, Dienes, Benzene, Polynuclear aromatic compounds, Reactive intermediates –

Carbocations, Carbanions, Carbenes, Nitrenes and Free radicals

UNIT-IV **10 Hours**

Stereochemistry of Organic compounds-

Optical isomerism, plane of symmetry, molecular c hirality,sterogenic centre,chiral and achiral molecules,enantiomers,properties of enantionmers,optical activity in example-lactic acid and tartaric acid.Diasteromers,threo and erythro diasteromers,meso compounds,resolution of enantioomers(mechanical, biochemical and chemical) inversion,and racemization.Relative and absolute configuration,sequence rules,D and L , R and S systems of nomenclature. Geometric isomerism (cis-trans) . E and Z system of nomenclature, geometric isomerism in oximes and acyclic compounds. Conformational isomerism-conformational analysis of ethane and 1, 2-dichloroethane.Conformations of cyclohexane (Newman projection).

Reference Books:

1. Morrison & Boyd, Organic Chemistry, Prentice-Hall, 6th, 2001.
2. March J, Advanced Organic Chemistry, MacGraw-Hill, 3rd, 1985.
3. Solomon & Fryhle, Organic Chemistry, Wiley, 8th, 2004.
4. Shriner & Morill, The systemic Identification of Organic Compounds, Wiley, 8th, 2004.
5. Furniss, Vogel's Textbook of Practical Organic Chemistry, Pearson education, 5th, 2004.
6. Eliel E, Stereochemistry of Carbon Compounds, McGraw-Hill, 7th, 1962.
7. Eliel E, Elements of Stereochemistry, wily, 3rd, 1969.
8. Cahn & Dermer, Introduction to Chemical Nomenclature, Butterworths, 3rd, 1979.
9. Warren S, Organic synthesis-The disconnection approach, Wiley, 4th, 1982.
10. Wheland G Advanced Organic Chemistry, Wiley, 3rd, 1960.
11. Kagan H, Organic Stereochemistry, Wiley, 4th, 1965.
12. House H, Modern Synthetic Reactions, Wiley, 2nd, 1972.

St Aloysius College (Autonomous)

Mangaluru

Re-accredited by NAAC "A" Grade

Bachelor of Vocational Studies

In

Retail Management

CREDIT BASED SEMESTER SYSTEM

(2018 –19 ONWARDS)

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(ಸ್ವಾಯತ್ತ)

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ST ALOYSIUS COLLEGE
(Autonomous)
P.B.No.720
MANGALURU- 575 003, INDIA
Phone:+91-0824 2449700,2449701
Fax: 0824-2449705
Email: principal_sac@yahoo.com
Website: www.staloysius.edu.in

Re-accredited by NAAC with 'A' Grade - CGPA 3.62
Ranked 44 in College Category by NIRF, MHRD, Government of India
Recognised by UGC as "College with Potential for Excellence"
College with 'STAR STATUS' conferred by DBT, Government of India

No: SAC 40/Syllabus 2018-19 Date: 04-12-2017

NOTIFICATION

Sub: Syllabus of **B.Voc. in Retail Management** Course under Credit Based Semester System.

Ref: 1. Academic Council decision dated 28-10-2017
2. Office Notification dated 04-12-2017

Pursuant to the Notification cited under reference (2) above, the Syllabus of **B.Voc. in Retail Management** Course under Credit Based Semester System is hereby notified for implementation with effect from the academic year **2018-19.**

PRINCIPAL **REGISTRAR**

To:

1. The Chairman/Dean/HOD.
2. The Registrar
3. Library

PREAMBLE

The course in Retail Management (RM) is a comprehensive programme, designed to enhance leadership in the context of Indian retail. This programme enables participants to evaluate their own retail strategies, discover newer models from international markets, and explore various challenges that are synonymous with this industry. With adequate practical exposure backed by relevant case studies, lectures, and discussions, the programme seeks to help students gain newer perspectives to stay ahead in a fiercely competitive market.

The Indian Retail Industry is one of the largest in the world and is estimated to be over USD 450 billion. It is in a high growth phase and is expected to grow continuously for the next two decades. The Indian retail industry - a sun rise industry has registered a strong growth during the recent past, which is evidenced, in terms of volume, size of operations and style of functioning across the nation. A shift from traditional retailing to well organized retailing has-been very much noticeable and that stands to testify the pattern of development in the retail industry in India. However in India, even now most of the retail business rely on unorganized retail business units small in size catering to the needs of neighbourhood areas.

An estimated more than 3 lakhs people are required by the retail industry. Since the workforce in the retail industry works on a per-project basis, the actual number of people employed by the industry may be higher, and utilization per person may be lower. The scale and workforce requirement can vary significantly from industry to industry – with some industry requiring manpower up to 1,000 people on certain days. Resource requirements for the retail sector alone are expected to grow at a rate of 30% to reach 4,00,000 people by 2017.

Education and training has not become a norm in the industry. This course tends to bridge the gap and tap the vast opportunity available to equip students gain adequate insights right from Semester I. Further, the flexibility of the course allows the candidate to benefit in terms of course completion certificates should there be an early exit from the course. There is also the freedom of continuing the course at a later date.

Semester	Certification	Job Profile
Semester I	Certificate	Store Operation Assistant
Semester II	Diploma	Cashier
Semester IV	Advanced Diploma	Trainee Associate / Sales Associate
Semester VI	Degree B. Voc	Team Leader / Department Manager

Store Operation and Minor Projects

B. Voc Retail Management strives to balance the in-class instruction with the practical hands-on experience to the learner. Store Operation component of the curriculum attempts to provide an experiential focus to the course. Through this, the learner can experiment what he/she learns in the classroom in real-time retail environment. The course entails a Minor Project in each semester to make the course outcome-based and also equip the learner with practical skills at the job place.

The practical component will have twelve hours every week, that will be spent in the various retail outlets around the city. The outlets identified for the Practicals are:

1. Shoppin
2. Soch
3. Peter England
4. Manyavar
5. Van Heusen
6. Louie Phillipe
7. Favourite Shop
8. FBB

SEMESTER - I								
Sl. No.	**Course Code**	**Title**	**Hrs per Week**	**Duration of examination**	**MARKS**			**Credits**
					IA	**Sem Exam**	**Total**	
1	BV 111.1	Communication Skills-1	4	3	30	70	100	4
2	BV 112.1 BV 110.1	Hindi-1 Kannada	4	3	30	70	100	4
3	BV 113.1	Basic Computer Skills -1	4	3	30	70	100	4
4	BV 114.1	Introduction To Retailing	3	3	30	70	100	3
5	BV 115.1	Elements Of Salesmanship	3	3	30	70	100	3
6	BV 116.1	Principles Of Management	3	3	30	70	100	3
7	BV 117.1	Fundamentals Of Customer Service	3	3	30	70	100	3
8	BV 118.1P	Store Operations-1	6	VIVA		100	100	3
9	BV 119.1P	Project Work On Elements Of Salesmanship	6	VIVA		100	100	3
		Total			**210**	**690**	**900**	**30**

SEMESTER - II								
Sl. No.	**Course Code**	**Title**	**Hrs per Week**	**Duration of examination**	**MARKS**			**Credits**
					IA	**Sem Exam**	**Total**	
1	BV 111.2	Communication Skills-2	4	3	30	70	100	4
2	BV 112.2 BV 110.2	Hindi-2 Kannada	4	3	30	70	100	4
3	BV 113.2	Basic Computer Skills – 2	4	3	30	70	100	4
4	BV 114.2	Stores Layout And Design	3	3	30	70	100	3
5	BV 115.2	Business Organization And Environment	3	3	30	70	100	3
6	BV 116.2	Brand Management And Consumer Marketing	3	3	30	70	100	3
7	BV 117.2	Human Resource Management And Industrial Relation	3	3	30	70	100	3
8	BV 118.2P	Store Operations-2	6	VIVA		100	100	3
9	BV 119.2P	Project Work On Stores Layout And Design	6	VIVA		100	100	3
		Total			**210**	**690**	**900**	**30**

SEMESTER III								
Sl. No.	**Course Code**	**Title**	**Hrs per Week**	**Duration of examination**	**MARKS**			**Credits**
					IA	**Sem Exam**	**Total**	
1	BV 111.3	Personality And Soft Skills	4	3	30	70	100	4
2	BV 112.3	Health Safety And Environment	4	3	30	70	100	4
3	BV 113.3	Fundamentals Of Indian Constitution	4	3	30	70	100	4
4	BV 114.3	Retail Management-Functional Principles And Practices	3	3	30	70	100	3
5	BV 115.3	Advertising, Sales and Promotion	3	3	30	70	100	3
6	BV 116.3	Visual Merchandising	3	3	30	70	100	3
7	BV 117.3	Marketing For Services	3	3	30	70	100	3
8	BV 118.3P	Store Operations-3	6	VIVA		100	100	3
9	BV 119.3P	Project Work On Visual Merchandising	6	VIVA		100	100	3
		Total			**210**	**690**	**900**	**30**

SEMESTER IV								
Sl. No.	**Course Code**	**Title**	**Hrs per Week**	**Duration of examination**	**MARKS**			**Credits**
					IA	**Sem Exam**	**Total**	
1	BV 111.4	Behavioral Skills	4	3	30	70	100	4
2	BV 112.4	Human Rights & Value Education	4	3	30	70	100	4
3	BV 113.4	Taxation Law & Practice In Business	4	3	30	70	100	4
4	BV 114.4	Accounting Fundamentals	3	3	30	70	100	3
5	BV 115.4	Retail Consumer Behaviour	3	3	30	70	100	3
6	BV 116.4	Retail Supply Chain Management	3	3	30	70	100	3
7	BV 117.4	Mall Management	3	3	30	70	100	3
8	BV 118.4P	Store Operations-4	6	VIVA		100	100	3
9	BV 119.4P	Project Work On Mall Management	6	VIVA		100	100	3
		Total			**210**	**690**	**900**	**30**

SEMESTER V								
Sl. No.	**Course Code**	**Title**	**Hrs per Week**	**Duration of examination**	**MARKS**			**Credits**
					IA	**Sem Exam**	**Total**	
1	BV 111.5	Gender Equity And Value Education	4	3	30	70	100	4
2	BV 112.5	Legal And Ethical Aspects Of Business	4	3	30	70	100	4
3	BV 113.5	Entrepreneurship	4	3	30	70	100	4
4	BV 114.5	General Economics	3	3	30	70	100	3
5	BV 115.5	Marketing Management	3	3	30	70	100	3
6	BV 116.5	Customer Relationship Management	3	3	30	70	100	3
7	BV 117.5	E-Commerce	3	3	30	70	100	3
8	BV 118.5P	Store Operations-5	6	VIVA		100	100	3
9	BV 119.5P	Project Work On CRM	6	VIVA		100	100	3
		Total			**210**	**690**	**900**	**30**

SEMESTER VI								
Sl. No.	**Course Code**	**Title**	**Hrs per Week**	**Duration of examination**	**MARKS**			**Credits**
					IA	**Sem Exam**	**Total**	
1	BV 111.6	General Project Management	4	3	30	70	100	4
2	BV 112.6	Inventory Management	4	3	30	70	100	4
3	BV 113.6	Industrial & Rural Marketing	4	3	30	70	100	4
4	BV 114.6	Retail Logistics Management	3	3	30	70	100	3
5	BV 115.6	IT And Administration In Retail	3	3	30	70	100	3
6	BV 116.6	Operations Management	3	3	30	70	100	3
7	BV 117.6	Franchising Management	3	3	30	70	100	3
8	BV 118.6P	Store Operations-6	6	VIVA		100	100	3
9	BV 119.6P	Comprehensive Viva-Voce	6	VIVA		100	100	3
		Total			**210**	**690**	**900**	**30**

SEMESTER-1
BV 114.1 INTRODUCTION TO RETAILING

OBJECTIVES:

- To provide in-depth understanding of all aspects of retail business.
- To provide an understanding of retailing as an Economic and social process.

MODULE I: AN OVERVIEW OF RETAIL

Definition and scope of Retailing-The role of Retailer –The Retailer as a Link between the Producer and the consumer-The Retailer as a channel Member and an image creator, need of channels of distribution-the rise of the retailer-Challenge faced by retailer worldwide-Retail as career,

MODULE II: THEORIES OF RETAIL DEVELOPMENT AND FORMATS IN RETAILING

Evolution of Retail Formats-Development of Supermarkets and convenience stores-Understanding Retail formats-Non-store AND Non-traditional Retail Formats, methods of retail expansion.

MODULE III: RETAIL IN INDIA

Concept of organized Retail-Evolution of Retail in India-Traditional business market in India-Drivers of Retail change in India-Size of Retail In India-Key Sector in India-Retail Realities-

MODULE IV: RETAIL MIX

Define supply chain and Supply Chain Management- Retail Store operation-Understanding the Retail customer-Retail Strategy-Retail marketing and Strategies - Basics of Retails merchandising

LEARNING RESOURCES:

1. Gibson G Vedamani (2013), Retail Management Functional Principles and Practices Rev Ed 3, Jaico Publishing House.
2. Varley and MohammudRafiq (2007), Principles of Retail Management, Palgrave Macmillan.
3. M A Shewan (2008), Retail Management, Sonali Publications
4. Swapnanpradhan (2015) Retail Management Graw Hill Education
5. Harjit Singh (2011) Retail Management: a global perspective text and cases, Sultan Chand & Co Ltd

SEMESTER-1
BV 115.1 ELEMENTS OF SALESMANSHIP

OBJECTIVE:

- To impart conceptual knowledge of salesmanship and understanding consumer behavior

MODULE I:INTRODUCTION AND BASIC CONCEPTS

Personal selling- Definition of Salesmen and Salesmanship- characteristics of good salesman - Sales forecasting-Methods of forecasting, Methods of selling, selling process-benefits and drawbacks of personal selling,

MODULE: IIORGANIZING AND EXECUTING THE SALES

Introduction – Meaning-Benefits/Purpose, functions of sales management, theories of selling, sales organization structure, sales department relation

MODULE: III SALES FORCE MANAGEMENT

Introduction -Salesmen motivation -objectives and benefits –types of selling jobs – Salesmen compensation – Sales budgeting- procedures, Features, benefits and objectives

MODULE: IV SALES TRAINING

Introduction-Sales training – objectives, benefits, methods of training, sales training steps

LEARNING RESOURCES:

1. Inbalakshmi M, Dharani N (2015), Advertising and Salesmanship, Kalyani Publishers
2. Padmanabhan V.S, Murthy H.S (2011) Advertising and Sales Promotion An Indian Perspective, Ane Books Pvt Ltd, New Delhi.
3. Agarwal P.K(2009) Advertising, Sales Promotion and CRM,PragatiPrakashan Educational Publishers
4. G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House.

SEMESTER -1

BV 116.1 PRINCIPLES OF MANAGEMENT

OBJECTIVES:

- To understand the Principles of management
- To get an overview of managing the business and role of managers
- To understand the concepts of planning, organizing, directing and controlling
- To develop the skill of managing business

MODULE I: OVERVIEW OF MANAGEMENT

Definition – Management- Elements of management - Role of managers – Function of Managers- Levels of Management – managerial skills-Henrys Fayols Principles.

MODULE II: PLANNING

Nature and purpose of planning - Planning process - Types of plans – Objectives - Types of strategies - Policies – Decision Making - Types of decision - Decision Making Process - Rational Decision Making.

MODULE III: ORGANIZING

Nature and purpose of organizing - Organization structure - Formal and informal groups Organization - Line and Staff authority - Centralization and Decentralization - Delegation of authority .

MODULE IV: DIRECTING

Motivation and Satisfaction - Motivation Theories –Leadership Styles, Controlling: Process of controlling - Types of control - Budgetary and non-budgetary Control techniques.

LEARNING RESOURCES:

1. Raman B.S. (2014), Principles of Management, United Publishers
2. Harold Koontz and Heinz Weihrich (2013), Essentials of Management, McGraw hills Publications
3. T N Chabra Dhanpath Rai& company (2014)
4. Gupta RN (2010), Principles of Management, S. Chand Co. and Sons.
5. Gupta Meenakshi (2012), Principles of Management, PHI Learning Pvt. Ltd.

SEMESTER –I

BV 117.1 FUNDAMENTALS OF CUSTOMER SERVICE

OBJECTIVE:

To help students understand the critical need for service orientation in the current business scenario.

MODULE: I INTRODUCTION

Importance of customer service- Changing attitude of customers – Customer service and the bottom line – Lifetime value of the customer – Goods and services – Competition and market share

MODULE: II WHO IS A CUSTOMER

Needs and wants – Internal and External customers – Product and Customer value – Promotion and communication – place and convenience- delighting the customer

MODULE: III CUSTOMER LOYALTY

Belonging – Comfort zones – Types of loyalty- customer behavior- loyalist- complaint and recovery – how and why customer complain – recovery- types of complainers – why do customers complain- dealing with complains – importance of front line staff

MODULE: IV CUSTOMER CARE AND NEW TECHNOLOGY

Speed of technology change – credit cards- debit cards- store cards – loyalty cads- online banking- online shopping- customer relation at a distance- call centers

LEARNING RESOURCES:

1. Mastering Customer Relation (2000) Roger Cartwright Macmillan Press Ltd London
2. Swapnanpradhan (2015) Retail Management Graw Hill Education
3. G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House

SEMESTER-II

BV 114.2 STORES LAYOUT AND DESIGN

OBJECTIVES:

- To familiarize the learner with the various facets of retail store and its significance in a retail business.
- To understand the practical implications of store layout, space management and store design.

MODULE I: RETAIL STORE

Retail Store and its Organization; Centralized and Decentralized Retail Stores; Store Location:

Nature and Significance of Retail Location; Factors Affecting Store Location, Location and Site

Evaluation; Trading Area Analysis; Recent Trends in Location of Store

MODULE II: STORE LAYOUT

Nature and Objectives of Store Layout: Allocation of Floor Space; Classification of Store Offerings; Traffic Flow Pattern of the Store; Space Requirement/ Need; Interior Display

MODULE III: SPACE MANAGEMENT

Space Management the Cost of Space; Drivers of the Size of the Store; The SMG Model; Impact on Space of Future Changes ; Space Management Methods in Various Sectors; Promoting Space Efficiency in Building Design; Space Utilization.

MODULE IV: STORE DESIGN

Store Design Objective and Types of Retail Format; Impact on Consumer Behavior; Impulsive Buying Out; Out-Store and In-Store Tactics; Store Security

LEARNING RESOURCES

1. N Panchanatham., Gnanguru R. (2008) Emerging Trends in Retail Management. Excel Books
2. Gopal V.V. (2007) Visual Merchandising: An Introduction. ICFAI University Press Amicus-, ISBN-13: 9788131415351
3. Cox Emmet. (2011) Retail Analytics: The Secret Weapon. Wiley Publications
4. 4.G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House
5. Swapnanpradhan (2015) Retail Management Graw Hill Education

SEMESTER-II
BV 115.2 BUSINESS ORGANIZATION AND ENVIRONMENT

OBJECTIVE:

- To familiarize the students with aspects of business organization and environment

MODULE I: INTRODUCTION TO BUSINESS ORGANIZATION

Meaning of business- classification of business activities-industry – types of industry-commerce – trade- aids to trade-meaning – advantages and disadvantages

MODULE II: **FORMS OF BUSINESS ORGANIZATION**

Sole proprietorship-meaning-characteristics- advantages and disadvantages. Partnership – meaning-characteristics-advantages and disadvantages-types of partners .co-operative society-meaning-characteristic- types- advantages and disadvantages

MODULE III JOINT STOCK COMPANY& STOCK EXCHANGE

Meaning- definition- features- types of companies- formation of company, winding of company

Function of stock exchanges Services of Stock Exchange.

MODULE IV: BUSINESS ENVIRONMENT

Meaning and importance, dimensions of business environment- political, economic, social, legal, natural and technological environment –Social Responsibility of cpmpany.

LEARNING RESOURCES:

1. Alice Mani(2014), Business Organisation and Environment, Sapna Book House, Bangalore
2. C.B Gupta(2016)Business Environment, Sultan Chand & Sons, New Delhi
3. Swapnanpradhan (2015) Retail Management Graw Hill Education
4. G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House

SEMESTER-II

BV 116.2 BRAND MANAGEMENT AND CONSUMER MARKETING

MODULE I: INTRODUCTION TO BRANDS

Define Brand- functions of brand – types of brands - Development of Branding- Products to Brands-Developing new ideas to products and brands- World top 50 international Brands

MODULE II – ELEMENTS OF BRAND MANAGEMENT

Introduction- Brand positioning; Brand equity; Brand awareness; Brand personality; Brand communication; Brand image ; Brand management framework, online brand management

MODULE III: BRAND IDENTITY

Introduction; Definition; Models of brand identity; Elements of brand identity; examples and case studies

MODULEIV: BRAND EQUITY AND POSITIONING

Brand equity- Introduction, Meaning, Need for building, brand equity, Steps, methods to measure brand equity. Brand positioning- Introduction, Meaning , concept, crafting the positioning strategy, repositioning strategies

LEARNING RESOURCES:

1. Vinod N Patel, Sandeep Sharma ,(2011),Brand Management and Consumer Marketing, Oxford book Company .
2. SagarMahim(2012) Band Management, Ane Books Pvt Ltd
3. SwapnaPradhan (2015) Retail Management Text and Cases,4th edition, McGraw Hill Education Pvt Ltd
4. G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House

SEMESTER -II

BV 117.2 HUMAN RESOURCE MANAGEMENT AND INDUSTRIAL RELATION

OBJECTIVES:

- To make students aware of the various functions and importance of the Human Resource Department in any organization.
- To highlight the importance of managing the human resources, whereby the underlying objective is to attract retain and motivate the human resources in any organizations, which is the most challenging and daunting task or any organization today.

MODULE I: INTRODUCTION TO HUMAN RESOURCE MANAGEMENT

HRM – Meaning - Functions –Importance of HRM – Line VS Staff authority - Challenges – Job
Analysis –Methods – Job description – Job specification.

MODULE II: RECRUITMENT AND SELECTION:

Recruitment – Definition - concept –– sources – Selection –meaning – process – types of tests – Selection Interview – methods and process – Placement and Induction.-Training and Development –Methods of training and development

MODULLE III: MANAGING RETAIL PERSONNEL

Human Resources Issues and concerns in Retailing-Manpower planning-work task organization-productive requirements-Retail employment options-Special features of retail recruitment-Motivation and rewards for performance-Retention-Remuneration-

MODULE IV: INDUSTRIAL RELATION

Introduction – Trade union- Industrial disputes – Collective bargaining- Grievances and Disciplinary procedure – workers participation in management

LEARNING RESOURCES:

1. V.S.P.Rao (2008) Human Resource Management: Text and Cases, 2/e, Excel Books
2. K. Aswathappa (2009) Human Resource Management: Text and Cases, 5/e, Himalaya Publishing House.
3. P. SubbaRao (2009) Essentials of Human Resource Management and Industrial Relations, 3/e, Himalaya Publishing House.
4. 4 G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House.
5. R.K Saxena(2009) Employee Relationship Management, Kalyani Publishers

SEMESTER-III

BV 114.3 RETAIL MANAGEMENT - FUNCTIONAL PRINCIPLES AND PRACTICES

OBJECTIVES:

- To expose the learner to the conceptual framework of Retail environment
- To familiarize with retail management scenario and its challenges

MODULE I: ETHICAL AND LEGAL ISSUES IN RETAILING

Retailing- meaning, dealing with ethical issues, social responsibility, environmental orientation, waste reduction at retail stores

MODULE II: RETAIL SELLING

Introduction -Retail sales people role, Role of personal selling, Requirement for affective selling, Retail selling process

MODULE III: INVESTMENT MANAGEMENT FOR RETAILING

Meaning- characteristics – need and modes of investment- investment process- who is an investor- types and qualities of an investor. Investment risk- meaning and types of risk

MODULE IV: INTERNATIONAL RETAILING

Factors contributing to the growth of international retailing; the retail internalization process and theory; operational challenges of retail internalization; opportunities in retail internalization, trends in retailing – retail scenario worldwide

LEARNING RESOURCES:

1. Bajaj. Chetan, Tuli Rajesh., Srivastav. Nidhi (2005) Retail Management, Oxford University Press
1. PradhanSwapna, Retail Management- Texts & Cases 4/e, Tata McGrawhill Publication
2. Berman Barry, Evans Joel R (2005) Retail Management- A Strategic Approach, Prentice Hall India
3. Lusch Robert, Dunne Patrick, Gebhardt Randall (2002) Retail Marketing, South Western Publishing Company
4. G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House

SEMESTER- III

BV 115.3 ADVERTISING, SALES AND PROMOTION

OBJECTIVE:

- To make the students understand the importance of advertising and medias' role in advertising and sales promotion

MODULE: I INTRODUCTION TO ADVERTISEMENT

Definition -Nature and scope of Advertising,, advantages and disadvantages advertising differences between advertising and sales promotion.

MODULE: II ADVERTISEMENT MEDIA

Advertisement Media: Indoor and outdoor advertising, Advertising agency-role-importance Media Plan, Type and Choice Criteria,

MODULE: III RETAIL MARKETING AND ADVERTISING

Retail market and strategies-Store positioning –Retail Marketing Mix-direct marketing-digital Marketing Advertising in Retail-micro marketing in Retail

MODULE: IV INTRODUCTION TO SALES PROMOTION:

Definition, Scope and Role of Sale Promotion, Objectives of Sales Promotion; Sales Promotion Techniques, Trade Oriented and Consumer Oriented-Identification, Designing of Sales Promotion Campaign, Online Sales Promotions.

LEARNING RESOURCES:

1. P.K Agarwal Advertising And Sales Promotion, Pragathi Prakashan, Meerut,2009
2. M Inbalakshmi, Advertising and Salesmanship, Kalyani Publishers, New Delhi, 2015
3. S.H.H.Kazmi, Satish K Batra, "Advertising &Sale s Promotion", Excel Books, New Delhi, 2001.
4. V S Padmanabhan 'Advertising and Sales promotion ' Ane books Pvt ltd2011
5. G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House

SEMESTER-III

BV 116.3 VISUAL MERCHANDISING

OBJECTIVES:

- To equip the students with an overall understanding of significance of visual Merchandising.
- To understand the need and impact of layout, balance and harmony.
- To strategically use the display props, fixtures and mannequins

MODULE I: INTRODUCTION

Introduction to Visual Merchandising, Roles of a Visual Merchandiser, Challenges Of Visual Merchandiser, And Window Principles Of Visual Merchandising. Visual Merchandising- Supports Retail Strategies, Communicates With Customers, Communicates Retail Image, Supports Selling, Supports Retailing Trends

MODULE II: IMAGE MIX

Store Exteriors –Store signs and the façade-Banners, planters and Canopies- Interiors - Windows – High Points –Nestling Tables-focal points-Staircase landings-Step raisers-danglers-entrances-Cash counters Image, Atmosphere & Theatrics

MODULE III: ELEMENTS OF VISUAL MERCHANDISING

Strategic Use and Deployment of Elements of Visual Merchandising For Maximum Impact And Results. Display props, fixtures, mannequins, floral, signage & graphics**.**

MODULE IV: DESIGN PRINCIPLES AND COMPOSITION

Balance And Emphasis, Harmony, Proportion And Rhythm, The Theories Of Color, Color Definitions, Systems And Schemes, Lighting And Sound Effects, Light And Sound As Selling Tools, Store Planning, Planograms

LEARNING RESOURCES:

1. Martin M Pegler (2011); Visual Merchandising and Display; Bloomsbury Publishing India Private Limited; 6th Revised edition; ISBN-10: 1609010841 ISBN-13: 978- 1609010843
2. Tony Morgan (2011); Visual Merchandising; Laurence King Publishing; 2nd Revised edition (19 October 2011): ISBN-10: 1856697630 ISBN-10: 1856697630
3. Diamond Professor Emeritus, Jay ; Contemporary Visual Merchandising 5/e, (fashion Series) ,; Prentice Hall; ISBN-10: 0135007615, ISBN-13 9780135007617
4. Kate Ternus, Judith Bell ; Silent Selling: Best Practices And Effective Strategies In Visual Merchandising;; Fairchild Books; 3 edition
5. Romeo Richards (2013); Visual Merchandise Display; Create Space Independent Publishing; ISBN-10 1493564129 ISBN-13: 9781493564125

SEMESTER-III
BV 117.3 MARKETING FOR SERVICES

OBJECTIVES:

- To develop the skills of marketing of services.
- To understand the importance and role of services in the total marketing concept.
- To have an understanding about the conceptual issues in service marketing.

MODULE I: AN INTRODUCTION TO SERVICES

Services: Meaning, Growth, Characteristics, Services and Marketing Mix, Role of Physical Evidence, Process and People, Service Scapes, Internal Response to Service Scopes; Cognitive
Response; Emotional Response, Physiological Response, Behavioral Response

MODULE II: DIFFERENTIATION IN SERVICES

High Contact and Low Contact Services, Differentiation in Services, Strategies for Differentiation, Pricing of Services, Distribution of Services, Understanding Service Process-Variety in Process, Value Addition in Process, Task Allocation.

MODULE III: SERVICE PROCESS

Managing Demand and Capacity, Service Branding, Service Recovery and Empowerment, Service Quality-Quality Dimensions, Technical Quality and Functional Quality

MODULE IV: INTERNATIONAL MARKETING OF SERVICES

Elements of global transactional strategy, Industry globalization drivers, How drivers affect service business, Problems connected with marketing service internationally

LEARNING RESOURCES:

1. Adrian Paye (2009):The essence of services Marketing, Prentice Hall India
2. Sanjay P. Palankar (2012): Services Marketing, Himalaya Publishing House, New Delhi
3. J. N. Jain and P. P. Singh (2011):Modern marketing of services-Principles and techniques, Regal publications, New Delhi
4. Deepak Bhandari and Amit Sharma(2012): Marketing of Services, Vrinda Publications,New Delhi
5. Bidhi Chand(2009):Marketing of services, Rawot Publications, New Delhi

SEMESTER- IV

BV 114.4 ACCOUNTING FUNDAMENTALS

OBJECTIVES:

- To understand the basic principles and practices of accountancy and book keeping.
- To develop acquaintance with basic techniques of accountancy.
- To build potential to use appropriate accounting tools and techniques of financial and management accounting.
- To prepare and analyze financial statements.

MODULE I: ACCOUNTING

Basic Accounting concepts and conventions, Accounting Principles, Accounting equation, Accounting cycle, Type of accounts. Rules of accounts.

MODULE II: JOURNAL AND LEDGER

Introduction to Journal and Ledger, Recording of Journal Entries and Posting of Ledger Accounts and preparation of Trial Balance

MODULE III: SUBSIDIARY BOOKS

Preparation of Subsidiary books – purchases, Sales, Purchase Returns, Sales Returns, Bills Receivable and Bills Payable. Meaning – Definition – Types of Cash Book, Preparation of Petty cash book, three Column Cash Book.

MODULE IV: FINAL ACCOUNTS

Meaning – Steps to prepare Final Accounts – Preparation of Trading and Profit and Loss Account and Balance Sheet. Adjustment entries – Treatment of Bad debts, Depreciation, Outstanding expenses and Incomes, Pre-paid expenses and Incomes received in advance.

LEARNING RESOURCES:

1. B.S. Raman (2012), Financial Accounting Vol. I, United Publishers, Mangalore
2. SN Maheshwari (2012), Accounting for Management, Vikas Publishing House, New Delhi
3. N.R.Swamy(2013), Financial Accounting-A managerial Perspective, Prentice Hall India, New Delhi
4. HanifMukherjee(2013), Financial Accounting, Tata McGraw Hill, New Delhi.

SEMESTER- IV
BV 115.4 RETAIL CONSUMER BEHAVIOUR

OBJECTIVES:

- To examine the basic concepts impacting consumer behavior in retail outlets.
- To understand the psychological concepts that account for individual and group Consumer behavior.

MODULE 1: INTRODUCTION TO CONSUMER BEHAVIOUR

Scope of Consumer Behavior, Importance of Consumer Behavior in the Indian Context, Consumer Decision Making Process, types of Consumer Behavior in the Indian Context

MODULE 1I: APPLICATIONOF CONSUMER BEHAVIOUR IN RETAILING

Distinction between consumer and Customer-consumer behavior and shopping patterns-Purchase decision process-buying decision roles-Application of consumer behavior in retailing-consumer Psychology

MODULE III: COMMUNICATION AND CONSUMER BEHAVIOUR

Communication and Consumer Behavior: Impersonal and Interpersonal communication –Credibility and dynamics of Informal sources and Word of Mouth; The word of mouth environment and e-WOM. Attitude Formation and Change - Components of Attitude: Belief,Affect and Intention - Strategies for Attitude Change - Consumer satisfaction.

MODULE IV: CONSUMERS IN THEIR SOCIAL AND CULTURAL SETTINGS

Consumer Socialization- Family Influences –Importance of Group Influence on CB - The Power of Reference Groups - Groups and their Appeal - Family Lifecycle influences on Consumption Patterns -Family Decision Making. Applications of Social Class.

LEARNING RESOURCES:

1. Schiffman L.G., Kanuk.L.L, Ramesh Kumar. S (2013) Consumer Behaviour, 10/e Pearson Education, New Delhi.
2. Del L Hawkins *et. al.* Consumer Behaviour: Building Marketing Strategy (2013) 11/e McGraw Hill, New Delhi.
3. Ramesh Kumar.S (2009) Consumer Behaviour & Branding Concepts, Readings and Cases The Indian Context Prentice Hall, New Delhi.
4. Blackwell, Minniard& Engel (2009) Consumer Behaviour, CengageLearning,New Delhi

SEMESTER -IV

BV 116.4 RETAIL SUPPLY CHAIN MANAGEMENT

OBJECTIVES:

- To create awareness about the supply chain activities taken in order to deliver the goods
- To understand the functioning of Supply chains in modern organization
- To learn to the role of supply chain in business processes

MODULE I: INTRODUCTION TO SUPPLYCHAIN MANAGEMENT

Supply Chain Management: Concepts, Scope and Importance, Integrated Supply Chain, Key Drivers of SCM, Characteristics of a Competitive Supply Chain, Supply Chain Network, Major Trends in SCM

MODULE II: SUPPLY CHAIN STRATEGY

Supply Chain Strategy: Meaning and Importance, Achieving Competitive Advantage, Building Blocks of Supply Chain Strategy, Supply Chain Integrates: Push, Pull Strategies, Demand Driven Strategies, Customer Focus in Supply Chain Strategy

MODULE III: LOGISTICS AND SUPPLY CHAIN

Logistic Management: Concepts, Logistic operational factors, Logistics Tasks, Transportation, Warehousing Third Party Logistics (3PL) Providers, Fourth Party Logistics (4PL) Providers, Reverse Logistics

MODULE IV: INVENTORY MANAGEMENT

Inventory Management: Concepts and Nature, Types of Inventory, Reasons for Carrying Inventory, Inventory Related Costs, Inventory Systems, Tools and Techniques in Managing Supply Chain Inventory

LEARNING RESOURCES

1. Sanders Nada R. (2012) Supply Chain Management: A Global Perspective, John Wiley & Sons, Inc., New Delhi
2. Mohanty R. P., Deshmukh S. G. (2004), Essentials of Supply Chain Management, Jaico Publishing House, Mumbai
3. Rushton, A. Oxley J. &Croucher, P. (2000) Handbook of Logistics and Distribution Management, Kogan Page, 2/e
4. Simchi-Levi, David, Kamisnsky, Philip, and Simchi-Levi, Edith. (2004) Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies, Irwin/McGraw Hill 32, 2/e.
5. Heinz Weihrich, Mark V. Cannice and Harold Koontz, (2009). Management: A Global and Entrepreneurial Perspective, 12/e, TMH., New Delhi.

SEMESTER-IV

BV 117.4 MALL MANAGEMENT

MODULE I: INTRODUCTION

Concept of shopping mall, Growth of malls in India, Mall positioning strategies, Strategic planning for malls.

MODULE II: ASPECT IN MALL MANAGEMENT

Concepts in mall design, Factors influencing malls' establishment, Recovery management,

Aspect in finance, Human resources, Security and accounting, Legal compliances and issues, Measuring mall performance.

MODULE II: MALL OPERATIONS

Store allocation, Leasing negotiations, Maintenance and repairs, Security and safety procedures and regulations, Operational activities, Footfalls measurement, Common area management.

MODULE IV *:* TENANT MANAGEMENT

Selection of anchor tenant, Tenant mix, Types of retail formats, Multiplexes, Food courts, Branded stores, Specialty stores,

Hypermarkets, Supermarkets, Mall resource allocation, Owner-tenant relationship.

LEARNING RESOURCES :

1. Abhijit Das, A Comprehensive text book cum Practice Guide on Mall Management, Taxmann Publication Pvt Ltd.
2. Harvinder Singh, Mall Management /;Operating in Indian Retail space, Tata McGraw- Hill Education
3. SwapnaPradhan (2015) Retail Management Text and Cases,4th edition, McGraw Hill Education Pvt Ltd
4. G Gibson, Vedamani(2013), Retail Management Functional Principles and Practices, Jaico Publishing House

SEMESTER –V
BV 114.5 GENERAL ECONOMICS

OBJECTIVE

- To have a grasp of the elements of economics
- To prepare students to face competitive examinations in economics

MODULE 1

Microeconomics Nature and scope of economics- Concepts of demand and supply concepts of costs and revenue- Competitive market structure and determination of prices- Pricing under monopoly

MODULE II:

Money supply and price level Measures of money supply; Velocity of money- Determination of the price level Inflation and Deflation – causes and remedies

MODULE III:

Retail Environment

Retail consolidation-GST- Market access- pricing strategy-factors influencing pricing decision- governance of pricing- online pricing

MODULE IV:

Contribution of retailing to the Indian economics scenario

Real estate, tourism/outbound shopping, higher GDP, outsourcing opportunities, FDI in retail in India, FDI in retailing/inclusive policy. Role of transportation in economic development

LEARNING RESOURCES:

1. Jhingan, 2004,m.l.,Money Banking International Trade andPublicFinance, Ed.8, Veranda Publishers , New Delhi .
2. Datt, Ruddar and KPM Sundaram, 2005, Indian Economy,Scan and Company Private ltd., New Delhi .

SEMESTER -V

BV 115.5 MARKETING MANAGEMENT

OBJECTIVES:

- To understand the changing business environment
- To identify the indicators of management thoughts and practices in marketing
- To enhance the analytical skills in solving marketing related problems
- To understand the fundamental premise underlying market driven strategies

MODULE 1: MARKETING

Marketing – Definitions – Scope, Core concepts of Marketing, Importance of Marketing, Functions of Marketing, Recent trends in marketing.

MODULE II: PRODUCT AND PRICING

Product: Meaning, Types, Product Knowledge: Product, Make/Brand, Model, Design and Color/Fashion, Product planning and development – Product life Cycle, Pilferage.
Price: Meaning, Importance, Pricing Objectives and methods.

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MODULE III: PROMOTION

Promotion: Meaning, Objectives, Elements of Promotion Mix, Distribution Channels and Physical

MODULE IV: PHYSICAL DISTRIBUTION

Distribution: Meaning, Definition, Factors affecting choice of Distribution Channels, Below the Line activity

LEARNING RESOURCES:

1. KS Chandrasekar (2010), ―Marketing management-Text and Cases‖, Tata McGraw Hill Vijaynicole.
2. Ramaswamy and Namakumari(2013), Marketing Management, McGraw Hill Education
3. Paritosh Sharma (2012), Marketing Management, Gagankapur, New Delhi
4. S. H. Khazmi (2011), Marketing Management, Excel Books, New Delhi
5. Philip Kotler and Kevin Lane Keller(2012), Marketing Management, Prentice Hall India

SEMESTER -V

BV 116.5 CUSTOMER RELATIONSHIP MANAGEMENT

OBJECTIVES:

- To explore the practical idea that information about past, present and future customers should form the heart of strategic plans.
- To provide a central focus in customer management by understanding market segmentation
- To understand attitude/ behavior of customers in the light of creating loyalty.

MODULE 1: INTRODUCTION TO CUSTOMER RELATIONSHIP MANAGEMENT

Concept of CRM – Types of CRM - CRM in Front-office and Back-office Operations - Definition of Relationship – Theories – Evolution – Principles of Relationship Management Stages in Customer Life Cycle – Concept of Relationship Marketing – Relationship Marketing and CRM.

MODULE II: CRM AND CUSTOMER VALUE

Creating value for customers – concept of value – sources of customer value: Products, Services, Processes, People, Physical evidence, Customer communication, Channels, Customer experience and CRM: Methods for empowering customer experience – strategies for gaining customer experience.

MODULE III: MANAGING CUSTOMER LIFE CYCLE

Defining new customer – methods of acquiring new customers, customer acquisition using customer date – concept of customer relation – customer relation strategies – customer development – KPL's of customer Acquisition, Relations & Development – Strategies for terminating customer relationship – customer database – database marketing – Data Analysis.

MODULE IV: SALES AND CRM

Role of CRM in sales – sales force Automation – Marketing Automation - e CRM – Digital Marketing. Emerging trends in CRM: Social CRM – Mobile CRM – Global CRM – CRM in Rural Market.

LEARNING RESOURCES:

1. Dr.Jaspreet KaurBhasin, (2014) Customer Relationship Management, Dream Tech Press, New Delhi.
2. William G. Zikmund*et. al.* (2014) Customer Relationship Management, Wiley India (P) Ltd, New Delhi.
3. Jill Dyche, (2011) The Customer Relationship Management Handbook, Pearson Education,New Delhi.
4. Rojar J Baran*et. al.* (2008) Customer Relationship Management, Cengage Learning, New Delhi.
5. Simon Knox *et. al.* (2008) Customer Relationship Management, Elsevier, New Delhi

SEMESTER-V

BV 117.5 E-COMMERCE

OBJECTIVES:

- To familiarize the learner with E-Commerce and e-Transition challenges
- Analyze different business transaction models, types and parties.
- To understand the significance of e-marketing, e-security, e-payment

MODULE I: E-COMMERCE

Electronic Commerce, Emergence of the Internet, Emergence of the World Wide Web, Advantages and Disadvantages of E-Commerce, E-transition Challenges (Indian Scenario), Business Models for E-Commerce: B2C, B2B, C2C, C2B

MODULE II: E-MARKETING

Traditional Marketing, Online Marketing, E-Advertising, Internet Marketing Trends, E-branding, E-Security: Security Breach, Information System Security, Security on the Internet, E-Business Risk Management issues, E-Payments systems

MODULE III: E-CRM

Customer Relationship Management, Business Touch pints – Converting clicks to customers, CRM Life cycle, Privacy issues in CRM, Data Mining in CRM, E-Supply Chain Management

MODULE IV: REMOTE BANKING

Internet Banking, Internet Bill Pay, Telephone Banking, E- Commerce Technologies for building E- commerce applications. Distributed objects, object request brokers and object oriented application frameworks

MODULE V: MOBILE COMMERCE

Cell Phone double as Electronic Wallets, Mobile Commerce, Wireless Application, CellularNetwork, Technologies for Mobile Commerce, Wireless Technologies, Different Generations in Wireless Communication – 1G, 2G, 3G, 4G; Security issues.

LEARNING RESOURCES:

1. P.T Joseph SJ, (2012) ―E-Commerce an Indian Perspective‖, 4th Edition, PHI Learning India, ISBN 978-81-203-4505-8.
2. Bharat Bhasker, (2008) ―Electronic Commerce Framework, Technologies and Applications‖ 3/e, Tata McGraw Hill Publishers. ISBN 978-00-702-6432-8
3. Laudon, (2011) ―E-Commerce: Business, Technology, Society‖, 4th Edition, Pearson India Education. ISBN 978-81-317-2541-2
4. Gary P Schneider, (2007) ―E-Commerce Strategy, Technology and Implementation‖, 1/e, Cengage Learning, India, ISBN 978-81-315-0533-5
5. Henry Chan, Raymond Lee, Tharan Dillon, Elizabeth Chang, (2012) ―E-Commerce Fundamentals and Applications‖, 2/e, Wiley India. ISBN 978-81-265-1469-4.

SEMESTER- VI
BV 113.6 INDUSTRIAL AND RURAL MARKETING

OBJECTIVES:

- To learn the basic concepts of industrial marketing and its prominence in the retail business world
- To understand the importance of rural market and its potential
- To acquaint the learner with strategic outlook for Industrial and Rural retail marketing scenario

MODULE I: DIMENSIONS OF INDUSTRIAL MARKETING

Nature of Industrial Marketing; Understanding Industrial Markets and Environment; Nature of Industrial Buying and Buying Behavior; Buyer Seller Relationships

MODULE II: STRATEGY FORMULATION IN THE INDUSTRIAL MARKET

Strategic Planning Process In Industrial Marketing; Assessing Marketing Opportunities; Industrial Market Segmentation, Targeting And Positioning; Developing Product Strategy; Strategic Innovation And New Product Development; Formulating Channel Strategy

MODULE III: INTRODUCTION TO RURAL MARKETING

Defining Rural Marketing; Defining Rural India; Rural Market Structure; Constitution Of Rural Market; Rural Economy A Reality Check; Rural And Urban Market A Comparative Analysis; Rural Marketing Challenges And Opportunities

MODULE IV: STRATEGIC FORMULATION FOR RURAL MARKET

Targeting, Segmenting and Positioning; Product Strategy; Pricing Strategy; Distribution Strategy; Communication Strategy; Innovation in Rural Marketing

LEARNING RESOURCES:

1. Reeder Robert, BriertyEdard, Reeder Betty. (2012) Industrial Marketing- Analysis Planning & Control 2/e, Prentice Hall India
2. Hawaldar Krishna, (2009) Industrial Marketing- Texts & Cases 2/e. Tata McGraw Hill
3. KashyapPradeep, Raut Siddhartha,(2009). Biztantra Publication
4. DograBalram, GhumanKarminder (2008) Rural Marketing- Concepts & Practices. TataMcGraw Hill
5.Krishnamacharyulu C S G, RamkrishnaLalitha. (2009) Rural Marketing- Texts & Cases.Pearson Education
6. Habeeb Ur Rahman K.S., (2011) Rural Marketing in India. Himalaya Publishing House

SEMESTER- VI

BV 114.6 RETAIL LOGISTICS MANAGEMENT

OBJECTIVES:

- The objective of the paper is to provide a comprehensive analysis of the principles and practices of international distribution and logistics**.**
- To examine the basic concepts impacting retail logistics with the goal of understanding how to apply these concepts within the managerial context.

MODULE I: UNDERSTANDING LOGISTICS

Logistics framework: concept, Objective and scope, the work of logistics - Logistics interface with marketing - Retails logistics. Transportation, warehousing, inventory management, packing and unitization, control and communication

MODULE II: LOGISTICS INFORMATION SYSTEM

Role of Information Technology in Logistics, Logistics Service Firms and third party logistics;

Meaning and Need Forms – LIS – Definition - Information functionality - activities involved in transaction system - Principles of designing or evaluating LIS applications.

MODULE III : LOGISTICS PLANNING

Planning and Resourcing: Need for Planning – Fleet management – Main types of road freight transport – Transport resource requirements – Vehicle routing and scheduling issues – Data requirements – Manual methods of vehicle routing and scheduling – Computer routing and scheduling – Information system applications – GPS – RFID.

MODULE IV: SHIPPING AND OCEAN FREIGHT LOGISTICS MANAGEMENT

Shipping Industry and Business: Description of a ship – Uses of a ship or a floating vessel –

Classification of ship (route point)(cargo carried) – Superstructure – Tonnages and Cubics

Drafts and Load lines – Flag Registration – Different Cargo (Packing, Utility or Value) – Trimming – Cleansing – Unitized Cargo.

LEARNING RESOURCES

1. David J. Bloomberg, Stephen LeMay& Joe B. Hanna (2003) Logistics, Prentice-Hall of India Pvt Ltd., New Delhi.
2. Donald J. Bowersox& David J. Closs (2004) Logistical Management, Tata McGraw Hill Publishing Co. Ltd, New Delhi.
3. Satish C. Ailawadi&Rakesh Singh (2005) Logistics Management, Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Donald Waters (2004) Logistics. Palgrave Macmillan, New York.
5. SarikaKulkarni (2004) Supply Chain Management, Tata Mc-Graw Hill Publishing Co Ltd., New Delhi.

SEMESTER- VI
BV 115.6 IT AND ADMINISTRATION

OBJECTIVES:

- To learn the basics of Information Technology in Retail sector
- To understand the concept of Information Systems in the purview of Information Technology
- To understand the conceptual application of Technology in retail business and its outcomes

MODULE I: INTRODUCTION TO INFORMATION TECHNOLOGY

Basics of Computers: History and Architecture, Programming Languages and Tools, Doing Business in the Digital Economy, Information Systems and Information Technology: Concepts, Definitions and Classification, Components of Retail Information Systems, Critical Managerial Issues and Success Factors for IT Managers.

MODULE II: DATA AND IT INFRASTRUCTURE

Managing Data to Improve Business Performance: Data, Master Data, Document Management, File Management Systems, Databases and Database Management Systems, Data Warehouses, Data Charts and Data Centers, Enterprise Content Management, Managerial Issues in Data Management, Data and Enterprise Security Incidents

MODULE III: E-BUSINESS AND ERP

E-Business and E-Commerce: Concepts, Overview, and Applications, Major Models of E-Business, Mobile Commerce: Mobile Shopping, Advertising and Content Providing, Mobile Enterprise and Inter-Business Application, Mobile Consumer Services and Entertainment, Ethical and Legal Issues in E-Business, Enterprise Resource Planning (ERP): Concepts, Meaning and Importance, Enterprise Systems, Advantages and Challenges of ERP, Core Areas of ERP, Managerial Issues

MODULE IV: E-TAILING

E-Commerce and E-Tailing, Essentials of E-Tailing, E-Shopping, Support Services, Advantages and Disadvantages, Introduction to Retail Information Systems: Electronic Point of Sales (EPOS), Auto Identification and Data Capture (AIDC), Modern Electronic Payment Methods, Ethical and Security Issues in E-Tailing

LEARNING RESOURCES

1. Turban Efraim.,Volonino Linda.(2007) Information Technology for Management: Transforming Organizations in the Digital Economy, John Wiley & Sons, (Asia) Pvt. Ltd. New Delhi, 7/e.
2. Joshi Girdhar.(2009) Information Technology for Retail, Oxford University Press, New Delhi
3. Amin BijalZaveri.(2013) The Impact of E-Marketing on E-Buyer Behavior, Biztantra, Delhi
4. Amor Daniel.(2000) The E-Business (R)Evolution, Hewlett-Packard Professional Books, Prentice Hall PTR, New Jersey, US
5. Garroll W. Frenzel, Johne. Frenzel (2004), Management of Information Technology, Thomson Course Technology, Boston

VI SEMESTER
BV 116.6 OPERATIONS MANAGEMENT

OBJECTIVES:

- To develop an understanding of how operations can provide a competitive advantage in the market place.
- To develop knowledge of the issues related to designing and managing operations and the techniques to do so.
- To evaluate the interaction between operations management and other business functions.
- To analyze contemporary theory and applications of manufacturing or service operations in a global business environment

MODULE I: INTRODUCTION TO OPERATOPNS MANAGEMENT

Meaning, definition, Importance of operations research, Basic concepts of Operation Research (OR): OR models, Application of OR in Business, importance of operations Research.

MODULEII: NETWORK ANALYSIS

Networking Concepts; methods, CPM Computations:, Finding critical path - Different Floats; PERT Computations: Computation of earliest and latest allowable times, difference between PERT and CPM, Crashing of a Project. (Problems to be worked out)

MODULE III: TRANSPORTATION AND ASSIGNMENT MODELS

Methods for finding initial solution: North West Corner Method, Least Cost Method, Vogel's Approximation Method; Finding Optimal Solution: Assignment problems; Hungarian Assignment Method. (Simple problems to be worked out)

MODULE IV: JOB DESIGN AND WORK MEASUREMENT

Fundamentals of job design, considerations in job design, work environment, uses of job design, setting work standards, work measurement techniques.

LEARNING RESOURCES:

1. Chase, Jacob, Aquilan, Agrawal (2010)Operations Management for competitive Advantage, TMH
2. Kalavathy S. (2009) Operations Research, 2/e, Vikas Publishing House.
3. Sharma J.K. (2008), Operations Research, McMillan India.
4. Gupta and Khanna (2005) Quantitative Techniques for Decision Making, PHI Publication.
5. Natarajan, Balasubramani and Tamilarasi (2002) Operations Research, Tata McGraw Hill, Delhi

VI SEMESTER
BV 117.6 FRANCHISING MANAGEMENT

OBJECTIVES:

- To create an in-depth understanding of Franchising
- To familiarize with the Legal and Global aspects of Franchising

MODULE I: AN INTRODUCTION TO FRANCHISING

Meaning, Definition of franchising, History and Overview, Types of Franchises, Advantages and Disadvantages to Franchisor, Advantages and Disadvantages to Franchisee, Elements of a Successful System, Recognizing Franchising Opportunities, Accessing Franchise Feasibility.

MODULE II: CHOOSING FRANCHISEES

Right Profile of choosing franchisees, Sources of Revenue, The Role of Real Estate, Infrastructure/Services Provided, Profit Pie to Share, Multi-Level Franchising, Company Owned Stores, Managing and Marketing the Franchisee Business, Franchisor Support Services.

MODULE III: FRANCHISE BUSINESS DEVELOPMENT MODEL

Preconditions for Franchising- Brand License to Use the Brand; Business System; Taxes; Business Development Investments of Franchisee in Local Country or Defined Territory, Stages of Franchise System Development- The Stage of Establishment of Franchise and Development Elements for its Initial Stage, Next Step – The Second Stage – Initiative of Franchisor, Final Stage – Functioning of Franchise System, Advantages and Disadvantages of Franchising.

MODULE IV: ADVANCE CONCEPTS IN FRANCHISING

Multi-Concept Franchises, Market Development/Encroachment, International Considerations, Enforcement of Standards, the Franchising Relationship

LEARNING RESOURCES:

1. Manish Sidhpuria, (2009) Retail Franchising, McGraw Hill Publishing Company, New Delhi.
2. Steven Rogers, and RozaMakonnen , Entrepreneurial Finance, Finance and Business Strategies for the Serious Entrepreneur, 3/e, Harvard business school 2014
3. Harold Brown (2002) Franchising: Realities and Remedies, Law Journal Press, Law journal Press 105 Madison Avenue, New York
5. Joe Mathews, Don DeBolt, Deb Percival (2011), Street Smart Franchising, CWL Publishing Enterprises.
6. Stephen Spinelli, Robert Rosenberg, Sue Birley (2003), Franchising: Pathway to Wealth Creation, Prentice Hall India.

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