



**RAJIV GANDHI UNIVERSITY OF HEALTH SCIENCES
KARNATAKA BENGALURU-560041**

**TEMPLATE FOR CURRICULUM DESIGNING
SECOND YEAR B. PHARMACY SEMESTER-III**

1. Name of subject (as per RGUHS): **PHARMACEUTICAL ORGANIC CHEMISTRY- II (BP301T)**
2. Departmental objectives (what the learners will be able to perform after completing the subject):

Course Description:

This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

Course learning objectives: Upon completion of the course the student shall be able to

- To provide the information about to write the structure, name, type of isomerism of the organic compound
- To provide basics of organic chemistry including writing the reaction, mechanism, name the reaction and understand orientation of reactions
- To provide adequate knowledge regarding principles of organic chemistry in the field of reactivity,/stability of organic compounds,
- Provide the information about the various techniques through demonstrations involving synthesis of the organic compounds
- Students are trained to purify and identify/confirm the organic compound

Learning Outcomes:

Upon completion of this course, students will be able to:

A- Knowledge and Understandings:-

- ✓ By applying examples they are able to define aromaticity, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule
- ✓ Students are able to know different electrophilic reactions of benzene wise nitration, sulphonation, halogenations, Friedel crafts alkylation- reactivity, limitations, Friedel crafts acylation identify the nomenclature and type of organic reactions.
- ✓ Students are able to know acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols.
- ✓ Students are able to know about Aromatic Amines, basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts.

- ✓ Students are able to know about fats and oils wise their synthesis and reactions like Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils. Students are able to know Analytical constants of fats and oils like Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.
- ✓ Students are able to know about synthesis and reactions of Polynuclear hydrocarbons including their structure and medicinal uses.
- ✓ Students are able to know the preparation of cycloalkanes and concepts of Bayer's strain theory, theory of strainless ring and molecular orbital concept of cycloalkanes.

3. Annual objectives (for each year, if the subject is spread over different years): NA

4. Content distribution as per the list of topics, time allotted for each topic, distribution for 'Must know', 'Desirable to know' and 'Nice to know' and the probable weightage. The following table can also be a reference frame for continuous and formative assessment of learning. If the curriculum management is scheduled as per the tabulation, there can be clarity for both learners and teachers to take stock of the mastery achieved in each objective. This will also help for professional excellence that goes beyond the examination process.

SI No`	Topic	Hours	Learning content distribution			Wt'age (Marks)
			Must know	Desirable to know	Nice to know	
1	<p>Benzene and its derivatives</p> <p>A. Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule</p> <p>B. Reactions of benzene - nitration, sulphonation, halogenations reactivity, Friedel crafts alkylation- reactivity, limitations, Friedelcrafts acylation.</p> <p>C. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction</p> <p>D. Structure and uses of DDT, Saccharin, BHC and Chloramine</p>	10	<p>Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule</p> <p>Mechanism of nitration, sulphonation, halogenations, Friedel Craft's alkylation and Friedel Craft's acylation, Reactivity and orientation, activating and deactivating groups. (o, m, p, directing) determination of orientation, relative reactivity, classification of substituent groups. Theory of reactivity and orientation, effects of halogens.</p>	<p>Definition and classification of electrophiles, definition of orientation reactivity activating group and deactivating group.</p> <p>Structure and uses of DDT, Saccharin, BHC and Chloramine</p>	<p>Orientation in disubstituted benzenes</p>	22

2.	<p>Phenols* - Acidity of phenols, effect of substituent's on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols</p> <p>Aromatic Amines* - Basicity of amines, effect of substituents on basicity and synthetic uses of aryl diazonium salts.</p> <p>Aromatic acids: acidity, effect of substituents on acidity and important reactions of benzoic acid.</p>	10	<p>Acidity of phenols, effect of substituent on acidity of phenols. qualitative tests,</p> <p>Basicity of Amines, effect of substituent's on basicity of aliphatic and aromatic amines. Diazotisation and its mechanism, coupling reaction of Diazonium salts. Synthetic uses of aryl diazonium salts. acidity, effect of substituents on acidity and important reactions of benzoic acid</p>	<p>Definition of acidity, acidity constant, chemistry of phenols. Structure and uses of phenol, cresols, resorcinol, naphthols</p> <p>Definition of basicity, basicity constant, chemistry of aromatic amines.</p>	---	22
3.	<p>Fats and Oils</p> <p>a. Fatty acids – reactions.</p> <p>b. Hydrolysis, hydrogenation, Saponification and Rancidity of oils, Drying oils.</p> <p>c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination</p>	10	<p>Definition, Properties and reactions of fats and oils with emphasis to Hydrolysis, hydrogenation, Saponification and Rancidity of oils, Drying oils.</p> <p>Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination</p>	. definition, chemistry, reactions, classification, composition	---	21

4.	Polynuclear hydrocarbons: a. Synthesis, reactions b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives.	8	Definition, classification, Methods of synthesis Properties and Reaction of Poly nuclear hydrocarbons Such as Naphthalene, Anthracene and Phenanthrene.	Definition, medicinal uses of polynuclear hydrocarbons and derivatives.	---	16
5.	Cyclo alkanes* Stabilities Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachtel's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only	7	Preparation of cycloalkanes, Bayer's strain theory and its limitations. Molecular orbital concept. Coulson and Moffitt's modification, Sachtel's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane.	Definition, anglestrain, reactions	---	14



THIRD SEMESTER B PHARM- PHARMACEUTICAL ORGANIC CHEMISTRY-II

TIME: 3 HOURS

BLUE PRINT OF MODEL QUESTION PAPER

MAX. MARKS: 75

Unit No.	TOPIC TITLE	HOURS	Must Know			Desirable to Know			WEIGHTAGE OF MARKS
			LONG ESSAYS	SHORT ESSAYS	SHORT ANSWERS	LONG ESSAYS	SHORT ESSAYS	SHORT ANSWERS	
			(10x3)	(5x8)	(2x4)	(10x0)	(5x1)	(2x6)	
Unit-I	Benzene and its derivatives	10	01	02	---	--	--	01	22
Unit-II	Phenols, Aromatic Amines and Aromatic acids	10	01	02	---	--	--	01	22
Unit-III	Fats and Oils	10	01	01	01	--	---	02	21
Unit-IV	Poly Nuclear hydrocarbans	8	---	02	---	--	--	03	16
Unit-V	Cycloalkanes	7	---	02	---	--	--	02	14
TOTAL MARKS		45	30	45	02	--	---	18	95
			77			18			95

NOTE: 1) the question paper must be prepared based on the individual blue print which is based on the weightage of marks fixed for each chapter/unit



Rajiv Gandhi University of Health Sciences, Karnataka
4th T Block Jayanagar, Bengaluru

Curriculum design, continuous and formative assessment evaluation of B. Pharm. course of Semester III w.e.f Academic year 2018-19

SEMESTER-III

BP 302 T:Physical Pharmaceutics-I

5. Departmental objectives (what the learners will be able to perform after completing the subject):

A. Learning Objectives:

Upon completion of this course the student should be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage form
 2. Know the principles of chemical kinetics & to use them in assigning expiry date for Formulation
 3. Demonstrate use of physicochemical properties in evaluation of dosage forms.
 4. Appreciate physicochemical properties of drug molecules in formulation research and Development
6. Content distribution as per the list of topics, time allotted for each topic, distribution for 'Must know', 'Desirable to know' and 'Nice to know' and the probable weightage.

The following table can also be a reference frame for continuous and formative assessment of learning. If the curriculum management is scheduled as per the tabulation, there can be clarity for both learners and teachers to take stock of the mastery achieved in each objective. This will also help for professional excellence that goes beyond the examination process.

UNIT-I		Hours: 10	Weightage: 22 Marks
Learning content distribution	Topics		
	Solubility of drugs		
	Must know	Solubility expressions, mechanisms of solute solvent interactions, Dissolution & drug release, diffusion principles in biological systems., solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions, azeotropic mixtures, fractional distillation.. Quantitative approach to the factors influencing solubility of drugs Distribution law, its limitations and applications	
Desirable to know	Ideal solubility parameters, solvation & association Solubility of gas in liquids Partially miscible liquids, Critical solution temperature and applications		

Nice to know	BCS Classification of drugs
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UNIT-II	Hours: 10	Weightage: 19 Marks
Learning content distribution	Topics	
	States of Matter and properties of matter Physicochemical properties of drug molecules	
Must know	State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers. Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications	
Desirable to know	Relative humidity, liquid complexes, liquid crystals, glassy states, solid-crystalline, amorphous & polymorphism.	
Nice to know	Importance of states of matter in designing various dosage forms.	

UNIT-III	Hours: 10	Weightage: 22 Marks
Learning content distribution	Topics	
	Surface and interfacial phenomenon	
Must know	Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.	
Desirable to know	Freundlich and Langmuir adsorption isotherms and BET equation	
Nice to know	Electrical properties of interfaces.	

UNIT-IV	Hours: 8	Weightage: 16 Marks
Learning content distribution	Topics	
	Complexation and protein binding	
Must know	Introduction, Classification of Complexation, Applications, protein binding, complexation and drug action,	
Desirable to know	Methods of analysis, crystalline structures of complexes and thermodynamic treatment of stability constants.	
Nice to know	Examples of various marketed dosage forms formulated by complexation process	

UNIT-V	Hours: 7	Weightage: 16 Marks
Learning content distribution	Topics	
	pH, buffers and Isotonic solutions	
Must know	Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity,	

Desirable to know	Buffers in pharmaceutical and biological systems, buffered isotonic solutions
Nice to know	Importance of buffers in dissolution study

Blueprint of question paper for each QP. This shows the weightage given to each chapter in the summative assessment. This improves the content validity by distributing the assessment of learners in the competencies that are represented by learning objectives under each chapter.

BLUE PRINT OF MODEL QUESTION PAPER								
BP302T: Physical Pharmaceutics-I								
TIME: 3 HOURS			MAX. MARKS: 75					
Unit No	Hours	Must know			Desirable to know			Weightage of marks
		LE (10X3)	SE (5X8)	SA (2X5)	LE (10X0)	SE (5X1)	SA (2X5)	
Unit-I	10	1	1	1	-	1	-	22
Unit-II	10	1	1	1	-		1	19
Unit-III	10	1	2	-	-		1	22
Unit-IV	08	-	2	2	-		1	16
Unit-V	07	-	2	1	-	-	2	16
Total	45	30	40	10	-	5	10	95
		80			15			95



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Curriculum design, continuous and formative assessment evaluation of B.
Pharm. course of Semester 1 & 2 w.e.f Academic year 2018-19

SEMESTER-III

BP303T:Pharmaceutical Microbiology

7. Departmental objectives (what the learners will be able to perform after completing the subject):

B. Learning Objectives:

Upon completion of this course the student should be able to

1. To know about microorganisms, their growth/reproduction, identification, cultivation, quantification and preservation.
2. To apply microbial control techniques such as sterilization, sterility tests, disinfection and preservation of pharmaceutical products.
3. To study sources of contamination, types spoilage, prevention and entire concept of aseptic area.
4. To know microbiological standardization and cell culture technology.

8. Content distribution as per the list of topics, time allotted for each topic, distribution for 'Must know', 'Desirable to know' and 'Nice to know' and the probable weightage.

The following table can also be a reference frame for continuous and formative assessment of learning. If the curriculum management is scheduled as per the tabulation, there can be clarity for both learners and teachers to take stock of the mastery achieved in each objective. This will also help for professional excellence that goes beyond the examination process.

UNIT-I	Hours: 10	Weightage: 22 Marks
Learning content distribution	Topics	
	Introduction to microbiology and microscopy. Bacteriology	
Must know	-Important contributors and development microbiology. - Differences between prokaryotes and eukaryotes. -Different microscopic techniques. Principle and design of electronic microscopy. -Study of structural components of bacteria and morphological classification. -Nutrition, raw material, Culture media, growth, cultivation and enumeration methods - Isolation, preservation of pure cultures and cultivation of anaerobes.	
Desirable to know	Application of microbiology Advantages and disadvantages different microscopic techniques.	

	<ul style="list-style-type: none"> -Special features of important culture media, -Synchronous and diauxic growth. -Classification of bacteria on physical factors affecting growth -Industrially important preservation techniques.
Nice to know	<p>Scope of Pharmaceutically important branches of Microbiology</p> <p>Accessory electronic gadgets.</p> <ul style="list-style-type: none"> -Example gram positive and negative pathogens. -Medically important anaerobes. -Endospores. -Antibacterial agents used in their control.

UNIT-II		Hours: 10	Weightage: 22 Marks
Learning content distribution	Topics		
	Identification of bacteria. Sterilization.		
Must know	<ul style="list-style-type: none"> - Identification of bacteria by important staining techniques and IMViC tests. - Study of principle, procedure, merits, demerits and applications of thermal, radiation, gaseous (ethylene oxide) and filtration methods of sterilization. -Validation of sterilization methods and sterilization indicators. 		
Desirable to know	<ul style="list-style-type: none"> -Microscopic and cultural characters used in the identification of bacteria. - Study of large scale sterilizers -Methods for sterilisation of different types of pharmaceutical preparations. 		
Nice to know	<ul style="list-style-type: none"> - Modern techniques of identification of bacteria. - D value, Z value, thermal death time. 		

UNIT-III		Hours: 10	Weightage: 22 Marks
Learning content distribution	Topics		
	Fungi and Virus. Disinfectants		
Must know	<p>Study of morphology, classification, replication and cultivation of Fungi and virus</p> <ul style="list-style-type: none"> -Classification and factors affecting the action of disinfectants. - Mode of action and uses of phenols, halogens, metallic salts and aldehydes. - Evaluation of bacteriostatic, bactericidal activities 		
Desirable to know	<ul style="list-style-type: none"> -Merits and demerits of methods of cultivation of virus. -Ideal properties. -List of commonly used disinfectants, antiseptics and preservatives. - Evaluation of antiseptics. 		

Nice to know	<ul style="list-style-type: none"> -Pathogenic and opportunistic fungi and virus. -Antiviral and antifungal agents used in their control. -Standards for disinfectant fluids as per Schedule O of The drugs and cosmetics act.
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UNIT-IV	Hours: 8	Weightage: 15 Marks
Learning content distribution	Topics	
	Sterility testing Aseptic area Microbiological standardization	
Must know	<ul style="list-style-type: none"> -Sources of contamination, their prevention and designing of aseptic area including laminar air flow equipment. - Sterility testing of various pharmaceutical products. - Principles and methods of microbiological assays of antibiotics. - Microbiological assay of Streptomycin and cyanocobalamin. - Steps involved in evaluation of new antibiotic. 	
Desirable to know	<ul style="list-style-type: none"> -Sterility testing of antimicrobial agents -Clean area classification. - Standardization of amino acids. 	
Nice to know	<ul style="list-style-type: none"> -Certification of aseptic area -Sterility testing of surgical dressings. - Aspects of environmental cleanliness. 	

UNIT-V	Hours: 7	Weightage: 14 Marks
Learning content distribution	Topics	
	Microbial spoilage, Cell culture	
Must know	<ul style="list-style-type: none"> -Types of microbial spoilage, sources, factors affecting and assessment of microbial contamination. -Anti microbial preservatives in pharmaceutical products and their evaluation. Types of cell lines, General procedure, advantages, disadvantages and applications of animal cell culture. 	
Desirable to know	<ul style="list-style-type: none"> - Evaluation of microbial stability of formulations. Basic requirements to establish cell culture lab. 	
Nice to know	<ul style="list-style-type: none"> -Osmotic preservatives and their mode of action. Production and applications of monoclonal antibodies. 	

Blueprint of question paper, for each QP. This shows the weightage given to each chapter in the summative assessment. This improves the content validity by distributing the assessment of learners in the competencies that are represented by learning objectives under each chapter.

BLUE PRINT OF MODEL QUESTION PAPER

BP303T: Pharmaceutical Microbiology

TIME: 3 HOURS

MAX. MARKS: 75

Unit No	Hours	Must know			Desirable to know			Weightage of marks
		LE (10X3)	SE (5X8)	SA (2X5)	LE (10X0)	SE (5X1)	SA (2X5)	
Unit-I	10	1	1	1		1	1	24
Unit-II	10	1	2	1			1	24
Unit-III	10	1	1				1	17
Unit-IV	08		2	1			1	14
Unit-V	07		2	2			1	16
Total	45	30	40	10	-	5	10	95
		80			15			95

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Curriculum delivery design of B. Pharm. course of Semester III System
w.e.f Academic year 2018-19

SEMESTER-III

BP 304 T. PHARMACEUTICAL ENGINEERING

9. Departmental objectives (what the learners will be able to perform after completing the subject):

C. Learning Objectives:

Upon completion of this course the student should be able to

1. Know various unit operations used in Pharmaceutical industries.
2. Understand the material handling techniques.
3. Perform various processes involved in pharmaceutical manufacturing process.
4. Carry out various tests to prevent environmental pollution.
5. Appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. Appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

B. Learning Outcomes: This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.

1. Understand the theories involved in flow of fluids, methods of measurement of flow of fluids.
2. Learn the various equipment used for transportation of solids and measures to be taken while handling.
3. Describe various mechanisms of heat transfer mechanisms, theories involved, and equipment used.
4. Gain knowledge about various metal and non-metallic materials used in the industry.
5. Appreciate the theories involved in separation techniques like filtration, centrifugation, size separation, distillation and suitable equipment used for separation.
6. Exposure to the reasons and preventive measures to hazards in the industry.
7. Understand the mechanisms of size reduction and energy involved with the knowledge about the mills.
8. Employ scientific methods to prepare crystals using the knowledge about the crystals.
9. Explain the heat operations like evaporation and drying with the sound theoretical knowledge.

10. Content distribution as per the list of topics, time allotted for each topic, distribution for 'Must know', 'Desirable to know' and 'Nice to know' and the probable weightage.

The following table can also be a reference frame for continuous and formative assessment of learning. If the curriculum management is scheduled as per the tabulation, there can be clarity for both learners and teachers to take stock of the mastery achieved in each objective. This will also help for professional excellence that goes beyond the examination process.

UNIT-I		Hours: 10	Weightage: 24 Marks
Learning content distribution	Topics		
	Flow of fluids		
Must know	Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Orifice meter, Venturimeter, Energy losses.		
Desirable to know	Pitot tube and Rotameter.		
Nice to know	Latest equipment available other than mentioned in the syllabus		
Learning content distribution	Size Reduction		
	Must know	Principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.	
Desirable to know	Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction.		
Nice to know	Latest mills available other than mentioned in the syllabus		
Learning content distribution	Size Separation		
	Must know	Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.	
Desirable to know	Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation		
Nice to know	Latest equipment available other than mentioned in the syllabus		

UNIT-II		Hours: 10	Weightage: 24 Marks
Learning content distribution	Heat Transfer		
	Must know	Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation.	
Desirable to know	Heat interchangers & heat exchangers.		
Nice to know	Latest equipment available other than mentioned in the syllabus		

Learning content distribution	Evaporation
Must know	Principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator & Economy of multiple effect evaporator.
Desirable to know	Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process.
Nice to know	Latest evaporators available other than mentioned in the syllabus
Nice to know	Latest dryers available other than mentioned in the syllabus
Learning content distribution	Distillation
Must know	principles, construction, working, uses, merits and demerits of (lab scale and industrial scale) equipment used for Simple distillation, preparation of purified water and water for injection BP by distillation, flash distillation, fractional distillation, distillation under reduced pressure & steam distillation
Desirable to know	Objectives, applications & types of distillation. molecular distillation
Nice to know	Latest equipment available other than mentioned in the syllabus

UNIT-III	Hours: 8	Weightage: 19 Marks
Learning content distribution	Topics	
	Drying	
Must know	Measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.	
Desirable to know	Objectives, applications & mechanism of drying process.	
Learning content distribution	Mixing	
Must know	Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier.	
Desirable to know	Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing.	
Nice to know	Latest mixers available other than mentioned in the syllabus	

UNIT-IV		Hours: 8	Weightage: 14 Marks
Learning content distribution	Topics		
	Filtration		
Must know	Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter. Theories of filtration		
Desirable to know	Objectives, applications, Factors influencing filtration, filter aids, filter media.		
Nice to know	Latest filters available other than mentioned in the syllabus		
Learning content distribution	Centrifugation		
	Must know		
Must know	Principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge. Applications of Centrifugation		
Desirable to know	Objectives and principle.		
Nice to know	Latest centrifuges available other than mentioned in the syllabus		

UNIT-V		Hours: 9	Weightage: 14 Marks
Learning content distribution	Materials of pharmaceutical plant construction, Corrosion and its prevention		
	Must know		
Must know	Theories of corrosion, types of corrosion and their prevention.		
Desirable to know	Factors affecting during materials selected for Pharmaceutical plant construction, Ferrous and nonferrous metals, inorganic and organic non metals. Basics of material handling systems.		
Nice to know	Pharmaceutical examples		

Blueprint of question paper, for each QP. This shows the weightage given to each chapter in the summative assessment. This improves the content validity by distributing the assessment of learners in the competencies that are represented by learning objectives under each chapter.

BLUE PRINT OF MODEL QUESTION PAPER BP 304 T. PHARMACEUTICAL ENGINEERING								
TIME: 3 HOURS					MAX. MARKS: 75			
Unit No	Hours	Must know			Desirable to know			Weightage of marks
		LE (10X3)	SE (5X8)	SA (2X5)	LE (10X0)	SE (5X1)	SA (2X5)	
Unit-I	10	1	2	1			1	24
Unit-II	10	1	1	1		1	1	24
Unit-III	08	1	1	1			1	19
Unit-IV	08		2	1			1	14
Unit-V	09		2	1			1	14
Total	45	30	40	10	-	5	10	95
		80			15			95

Question paper layout to show which question number will represent which chapter (s)

Long Essay:

2X 10 = 20 Marks

1	Unit I (Must Know)
2	Unit II (Must Know)
3	Unit III (Must Know)

Short Essays:

7x 5 = 35 Marks

4	Unit I (Must Know)
5	Unit I (Must Know)
6	Unit II (Must Know)
7	Unit II (Desirable to know)
8	Unit III (Must Know)
9	Unit IV (Must Know)
10	Unit IV (Must Know)
11	Unit V (Must Know)
12	Unit V (Must Know)

Short Answers:

10X2 = 20 Marks

13	Unit I (Must Know)
14	Unit I (Desirable to know)
15	Unit II (Must Know)
16	Unit II (Desirable to know)
17	Unit III (Must Know)
18	Unit III (Desirable to know)
19	Unit IV (Must Know)
20	Unit IV (Desirable to know)
21	Unit V (Must Know)
22	Unit V (Desirable to know)