



KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ



Tele: 0836-2215224
e-mail: academic.st@kud.ac.in
Pavate Nagar, Dharwad-580003
ಪಾವಟೆ ನಗರ, ಧಾರವಾಡ - 580003

NAAC Accredited
'A' Grade 2014

website: kud.ac.in

No. KU/Aca(S&T)/JS/MGJ(Gen)/2023-24/ 59

Date: 04/09/2023

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2023-24ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಪದವಿಗಳಿಗೆ 5 ಮತ್ತು 6ನೇ ಸೆಮೆಸ್ಟರ್
NEP-2020 ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿಗಳು(ವಿಶ್ವವಿದ್ಯಾಲಯ 1) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರ
ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 104 ಯುಎನ್ಇ 2023, ದಿ: 20.07.2023.
2. ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 2 ರಿಂದ 7, ದಿ: 31.08.2023.
3. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: 04/09/2023

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2023-24ನೇ
ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, ಎಲ್ಲ B.A./ BPA (Music) /BVA / BTTM / BSW/ B.Sc./B.Sc. Pulp &
Paper Science/ B.Sc. (H.M)/ BCA/ B.A.S.L.P./ B.Com/ B.Com (CS) / BBA & BA ILRD ಸ್ನಾತಕ ಪದವಿಗಳ 5
ಮತ್ತು 6ನೇ ಸೆಮೆಸ್ಟರ್‌ಗಳಿಗೆ NEP-2020ರ ಮುಂದುವರಿದ ಭಾಗವಾಗಿ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ
ಕೋರ್ಸಿನ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ www.kud.ac.in ದಲ್ಲಿ ಭಿತ್ತರಿಸಲಾಗಿದೆ. ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ.
ಅಂತರ್ಜಾಲದಿಂದ ಡೌನ್‌ಲೋಡ ಮಾಡಿಕೊಳ್ಳಲು ಸೂಚಿಸುತ್ತ ವಿದ್ಯಾರ್ಥಿಗಳ ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ
ತಂದು ಅದರಂತೆ ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕ.ವಿ.ವಿ. ಅಧೀನದ/ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ
ಸೂಚಿಸಲಾಗಿದೆ.

ಅಡಕ: ಮೇಲಿನಂತೆ


ಕುಲಸಚಿವರು.

ಗೆ,

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ
ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ. (ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ ಹಾಗೂ ಮಿಂಚಂಚೆ ಮೂಲಕ ಭಿತ್ತರಿಸಲಾಗುವುದು)

ಪ್ರತಿ:

1. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಕುಲಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ಅಧೀಕ್ಷಕರು, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ / ಗೌಪ್ಯ / ಜಿ.ಎ.ಡಿ. / ವಿದ್ಯಾಂಡಳ (ಪಿ.ಜಿ.ಪಿ.ಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ
ಕೋರ್ಸುಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.



KARNATAKUNIVERSITY, DHARWAD

**B.Sc. (Pulp and Paper)
(8 Semester Programme)**

SYLLABUS

With effect from 2023-24

DISCIPLINE SPECIFIC CORE COURSE (DSCC) FOR SEM V & VI,

DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE) FOR SEM V & VI

VOCATIONAL COURSE (Voc) FOR SEM V & VI

SKILL ENHANCEMENT COURSE (SEC) FOR SEM V and

INTERNSHIP FOR SEM VI

ASPERNEP-2020

Karnatak University, Dharwad

Four Years Under Graduate Program in Pulp and Paper for B.Sc.Pulp and Paper with effect from 2021-22

Sem	Type of Course	Course Title Theory/ Practical	Course / Paper Code	Instruction hour / week	Total hours of syllabus / Sem	Duration of Exam	Formative Assessment marks	Summative Assessment marks	Total marks	CREDITS
I	AEC	Kannada – 1	031KAN041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	English- 1	031ENG041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	Hindi - 1	031HIN041	04 hrs	42 hrs	02 hrs	40	60	100	3
	DSCC-1	Physics Theory	081BSP011	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-2	Physics Practical	081BSP012	04 hrs	52 hrs	03 hrs	25	25	50	2
	DSCC-3	Chemistry - I Theory	081BSP013	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-4	Chemistry - I Practical	081BSP014	04 hrs	52 hrs	03 hrs	25	25	50	2
	OEC -1	Chemical plant Utilities Theory	001BSP051	03 hrs	42 hrs	02 hrs	40	60	100	3
	SEC- 1	Water treatment and Analysis Practical		03 hrs	30 hrs	02 hrs	25	25	50	2
	Value Based		Health and Wellness Practical		02 hrs					
		Yoga/Sports		02 hrs						1
									TOTAL	25
II	AEC	Kannada – 2	032KAN041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	English- 2	032ENG041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	Hindi - 2	032HIN041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	Environmental Science	002EVS041	02 hrs	30 hrs	01 hr	25	25	50	2
	DSCC-5	Wood Chemistry Theory	082BSP011	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-6	Wood Chemistry Practical	082BSP012	04 hrs	52 hrs	03 hrs	25	25	50	2
	DSCC-7	Mechanical Operation and Process Calculations	082BSP013	03 hrs	42 hrs	02 hrs	40	60	100	3
	DSCC-8	Mathematics	082BSP014	03 hrs	42 hrs	02 hrs	40	60	100	3
	OEC- 2	Electrical Engineering Basics	002BSP051	03 hrs	42 hrs	02 hrs	40	60	100	3
	Value Based		NCC/NSS/R&R(S&G) / Cultural		02 hrs					
		Yoga/Sports		02 hrs						1
									TOTAL	25

Sem	Type of Course	Course Title Theory/ Practical	Course / Paper Code	Instruction hour/ week	Total hours of syllabus / Sem	Duration of Exam	Formative Assessment marks	Summative Assessment marks	Total marks	CREDITS
III	AEC	Kannada – 3	033KAN041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	English- 3	033ENG041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	Hindi - 3	033HIN041	04 hrs	42 hrs	02 hrs	40	60	100	
	DSCC-9	Pulp Manufacture Theory	083BSP011	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-10	Pulp Manufacture Practical	083BSP012	04 hrs	52 hrs	03 hrs	25	25	50	2
	DSCC-11	Chemistry- II Theory	083BSP013	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-12	Chemistry - II Practical	083BSP014	04 hrs	52 hrs	03 hrs	25	25	50	2
	OEC -3	Thermodynamics and Heat transfer	003BSP051	03 hrs	42 hrs	02 hrs	40	60	100	3
	SEC- 2	Deinking and Waste Paper Recycling		03 hrs	30 hrs	02 hrs	25	25	50	2
Value Based		Health and Wellness Practical		02 hrs						1
		Yoga/Sports		02 hrs						1
								Total		25
IV	AEC	Kannada – 4	034KAN041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	English- 4	034ENG041	04 hrs	42 hrs	02 hrs	40	60	100	3
	AEC	Hindi - 4	034HIN041	04 hrs	42 hrs	02 hrs	40	60	100	
	AEC	Constitution of India	004EVS041	02 hrs	30 hrs	01 hr	25	25	50	2
	DSCC-13	Stock Preparation and Papermaking Theory	084BSP011	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-14	Stock Preparation Practical	084BSP012	04 hrs	52 hrs	03 hrs	25	25	50	2
	DSCC-15	Computer Concepts and Fundamentals of Programming Theory	084BSP013	03 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-16	Python programming Practical	084BSP014	04 hrs	52 hrs	03 hrs	25	25	50	2
	OEC- 4	Mass Transfer and Fluid Mechanics	004BSP051	03 hrs	42 hrs	02 hrs	40	60	100	3
Value Based		NCC/NSS/R&R(S&G) /Cultural		02 hrs						1
		Yoga/Sports		02 hrs						1
								TOTAL		25

Sem	Type of Course	Course Title Theory/ Practical	Course / Paper Code	Instructi on hour/ week	Total hours of syllabus/ Sem	Duration of Exam	Format ive Assessment marks	Summative Assessment marks	Total marks	CREDITS
V	DSCC-17	<i>Pulp treatment and Bleaching Theory</i>	085BSP011	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-18	<i>Pulp treatment and Bleaching Practical</i>	085BSP012	04 hrs	56 hrs	03 hrs	25	25	50	2
	DSCC-19	<i>Pressing, Drying and Finishing Theory</i>	085BSP013	04 hrs	56hrs	02 hrs	40	60	100	4
	DSCC-20	<i>Paper and board evaluation Practical</i>	085BSP014	04 hrs	56 hrs	03 hrs	25	25	50	2
	DSCC-21	<i>Printing and packaging Theory</i>	085BSP015	04 hrs	56 hrs	02hrs	40	60	100	4
	DSE-1 (any one)	<i>Energy resources and management OR Computer Applications in Paper Industry</i>	085BSP021 or 085BSP022	03 hrs	42 hrs	02 hrs	60	40	100	3
	Vocational -1	<i>Process Control & Instrumentation</i>	085BSP101	03 hrs	42 hrs	02 hrs	60	40	100	3
	SEC- 3	<i>Engineering & CAD DrawingPractical</i>	085BSP061	04hrs	56 hrs	03hrs	25	25	50	2
								Total	24	
VI	DSCC-22	<i>Chemical Recovery Theory</i>	086BSP011	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-23	<i>Chemical Recovery Practical</i>	086BSP012	04 hrs	56 hrs	03 hrs	25	25	50	2
	DSCC-24	<i>Pollution abatement in Paper Industry Theory</i>	086BSP013	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSCC-25	<i>Pollution abatement in Paper Industry practical</i>	086BSP014	04 hrs	56 hrs	03 hrs	25	25	50	2
	DSCC-26	<i>Bio technology in Paper Industry Theory</i>	086BSP015	04 hrs	56 hrs	02 hrs	40	60	100	4
	DSE- 2	<i>Management and Costing OR Polymers used in Paper Industry</i>	086BSP021 or 086BSP022	03 hrs	42 hrs	02 hrs	60	40	100	3
	Vocational -2	<i>Speciality paper</i>	086BSP101	03 hrs	42 hrs	02 hrs	60	40	100	3
	Internship	<i>Mill visit/ Field visit</i>	086BSP091	04 hrs/ 56 hrs				50	50	2
								Total	24	
Exit option with Bachelor of BSc (Pulp and Paper) Degree (148 credits)										

B.Sc. Pulp and Paper Semester –V

B.Sc. Pulp and Paper Semester –V

Discipline Specific Course (DSC)

Course Title: Pulp treatment and bleaching

Course code: 085BSP011

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-17	Theory	04	04	56hrs.	2hrs.	40	60	100

Course Outcome (CO):After completion of this course, students will be able to:

CO 1: Understand different treatment steps needed after pulp preparation and before pulp bleaching

CO 2: Know how pulp is prepared for shipment

CO 3: Objectives and theory of screening and cleaning

CO 4: Basics of pulp washing and types of washers used in paper industry

CO 5: Understand basics of bleaching of pulp

CO 6: Differentiate between lignin preservative and lignin removal bleaching

CO 7: Know the importance of brightness – in papermaking process

CO 8: Know chemistry of different bleaching chemicals

CO 9: Learn methods of manufacturing different bleaching chemicals

CO 10: Learn methods of minimizing pollution load in bleach plant

CO 11: Understand basic principle of enzymetic bleaching, ECF and TCF bleaching.

Unit	Title : Pulp treatment and bleaching	56 hrs/Sem
Unit-I	<p>Post Digester Treatment of pulp:Introduction, blow tanks and agitation, thickening and storage of pulp. High density storage towers. Drying of pulp and preparation for shipment.</p> <p>Screening and cleaning of pulp:Objectives and theory of screening, coarse screening, fine screening, screening system, different types of screens, control parameters in pulp screening. Centrifugal cleaning-introduction, objectives, operation principles. Operating variables and problems.</p>	14 hrs
Unit-II	<p>Brown stock washing:Purpose, basic washing methods, cylinder washing principles and operations, variable affectingwashing soda loss, operation, control and calculations. Types of washers. Washing in continuous digesters.</p>	14 hrs

	Kraft bleaching: Introduction and general principles of pulp bleaching and chemicals employed. Lignin preservative and lignin removal bleaching methods, industrial importance of bleaching. Effect of bleaching on paper making properties.	
Unit-III	<p>Pulp chlorination and alkaline extraction:Fundamental aspects of chlorination, Mixture of Cl₂ and ClO₂ in the chlorination stage. Chlorine free bleaching advantages and applications of ECF and TCF bleaching. alkaline extraction, removal of chlorolignin, cellulose degradation</p> <p>Oxidative bleaching:Oxidative bleaching agents like hypochlorite, chlorine dioxide oxygen and peroxide, variables and control. Oxidative combinations processes.</p> <p>Reductive bleaching: Reductive bleaching agents, sodium and zinc dithionites, borohydrides, preparation, properties, factors affecting bleaching.</p>	14 hrs
Unit-IV	<p>Bleaching practices for different pulp types: Introduction, bleaching of low yield and high yield pulps with details of equipment required for multistage bleaching. Bleaching of dissolving pulps, coloured broke, deinked pulp and non woodfiber pulps.</p> <p>Bleaching and pollution: Closed cycle bleach plants, modern bleaching practices with respect to minimizing environmental degradation. Safety in storage and handling of bleaching chemicals. Principles and enzymes used in pulp bleaching. Advantages and disadvantages.</p>	14 hrs

References:

1. Bleaching of pulp by R. P. Singh - TAPPI Press, Atlanta Georgia, Year of publication-1979.
1. Alkaline Pulping, Vol.V- Published by Technical Section Canadian Pulp & Paper Association, TAPPI Press - 1983
2. Mechanical Pulping, Vol. II – Edited by Ray A. Leask -Published Joint Text Book Committee of the Paper Industry, 1983 TAPPI Press.
3. Pulp bleaching principles and practice - Ed. By Carlton W. Dence and Douglas W. Reev- TAPPI Press 2005.

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/SmallProject	10
Seminar	10
Total	40Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester –V

Discipline Specific Course(DSC)

Course Title: Pulp treatment and bleaching

Course code:085BSP012

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-18	Practical	02	04	56hrs.	3hrs.	25	25	50

Course Outcome (CO):After completion of course (Practical), students will be able to:

CO1: Understand methods of measuring chemical loss and its importance

CO 2: Know bleach liquor preparation and its analysis

CO 3: Know operation of laboratory screen and fiber classifier

CO 4: Preparation of peroxide bleach liquor and chlorine water in laboratory

CO 5: Know methods of testing various bleaching chemicals

CO 6: Understand single and multistage bleaching of various pulps in laboratory

CO 7: Know pulp viscosity testing

CO 8: Understand operation of brightness tester

Expt. No.	Title: Pulp treatment and bleaching	56 hrs/ Sem
1	Determination of soda loss by flame photometer method.	
2	Preparation of bleach liquor in laboratory	
3	Analysis of bleach liquor.	
4	Laboratory screening of pulp	
5	Testing of pulp of cleanliness and shive content (specks count)	
6	Demonstration of fiber fractionation using Bauer McNett apparatus	
7	Analysis of chlorine dioxide bleach liquor	
8	Preparation of peroxide bleach liquor and analysis	
9	Bleaching of pulp in laboratory using single stage bleaching	
10	Bleaching of pulp in laboratory using multi stage bleaching	
11	Bleaching of pulp using ClO ₂	
12	Bleaching of pulp with hydrosulfite	
13	Combination stage bleaching	
14	Measurement of brightness and brightness reversion	

Instruction to the Examiners

1. In a batch of students, at least five different experiments may be given in the practical examination.
2. Number of students in a batch may be decided depending on equipments/ heating devices available.
3. Experiments may be given from whole list of experiments considering duration of examination.
4. Viva questions may be asked on any of the experiments prescribed in the practical syllabus
5. Test marks may be divided as 8 marks for accuracy, 4 marks for method of working and 3 marks for presentation and calculations.
6. Deduction of marks may be done considering percentage of error.

Formative Assessment for Practical	
Assessment	Distribution of Marks
Test	20 (Accuracy : 10, Working Technique : 06, Calculation & Presentation : 04)
Viva	02
Journal	03
Total	25 Marks
<i>Formative Assessment as per guidelines.</i>	

Note: The same shall be used for semester end Examination

References:

1. TAPPI Test methods 1996-97, TAPPI Press, Atlanta Georgia.
2. Laboratory manual of testing procedures published by Director, CPPRI, Saharanpur, UP, 2001

B.Sc. Pulp and Paper Semester –V

Discipline Specific Course (DSC)

Course Title: Pressing Drying and Finishing

Course code: 085BSP013

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-19	Theory	04	04	56hrs.	2hrs.	40	60	100

Course Outcome (CO):After completion of this course, students will be able to:

CO 1:Understand theory and principles involved in paper pressing and accessories needed.

CO 2:They will know different types of presses and their merits and demerits

CO 3:Get knowledge of paper related problems in papermaking, their causes and remedies

CO 4: Understand theory of drying, dryer accessories and types of dryers

CO 5:Know types of drives and regulators, drive fundamentals and requirements

CO 6:Understand basics of calendaring, supercalendering, reeling and winding operations.

CO 7: Understand different finishing operations needed after production of paper

Unit	Title: Pressing Drying and Finishing	56hrs/Sem
Unit-I	Pick up and press: Introduction, objectives types of presses, theory of pressing section pick up section, factors affecting moisture distribution, felts and felt conditioning, suction rolls, open draw - press operation and controls, roll crown, mechanical details of press section, calculations	14 hrs
Unit-II	Paper drying: Introduction, theory of drying, cylinder drying, general description, dryer cylinders. dryer felts, steam and condensate system, dryer ventilation system, hoods and hood exhaust, pocket ventilation, dryer section run ability, dryer safety. Bearing and lubrications, performance calculation, types of drying, air drying, radiant drying, Yankee dryers, design and construction, creeping process. Cross direction control and calculations Calendering and super calendaring: Introduction, calender roll construction, heating systems for metal rolls, calender stack operation, hardness of rolls, crowning of rolls, swimming rolls, calender defects, variable, super calendars, special features, factors affecting	14 hrs
Unit-III	Reeling and winding: Introduction, reeling winding definition and theory, finishing room winders and unwinding, productivity and manpower, roll build up. Finishing of paper: Introduction, rotary slitters, cutters, types of cutters, back stands, combination cutters, automatic layboys, counting and tagging reams, cutter knives and dust cutter broke, sorting and	14 hrs

	inspection, recent trends in finishing. Paper Machine and winder drives: Introduction, types of drives and regulators, drive fundamentals and requirements in press section, dryer section, calender section, reel section and winder	
Unit-IV	Paper defects and control: Paper related problems in papermaking, coating, printing, and converting. Operating difficulties in paper machine, their causes and remedies. Paper evaluation: Review of paper testing and process properties relationship, importance of paper properties in defining usage of paper. Effect of atmospheric conditions on paper properties. Physical properties of paper, strength properties of paper, optical properties of paper, chemical properties of paper Paper and Corrugated board testing: Crush properties of paper board, flat crush, ring crush, ply bond, stiffness & IGT printability (Measurement control and significance of these tests to be taught)	14 hrs

References:

1. Joint textbook series volume 7 paper machine Operations edited by M. J. Kocurek and B.A.Thorp,TAPPI Press -1983
2. Hand book for Pulp and Paper Technologists - Gray A. Smook, 1934
3. Joint textbook committee volume 8 of the pulp and Paper manufacture series edited byM.J.Kocurek and Kouris1983 TAPPI Press.
4. Pulp and Paper chemistry and chemical Technology - volume I to III James P. Casey.
5. Paper Physics edited by KarrloNiskanen.
6. Handbook of Pulp Volume I and II – edited by Herbert Sixta Wiley – VCH verlag GmbH & Co. KGaA2006 ISBN: 3-527-30999-3.

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester –V

Discipline Specific Course(DSC)

Course Title: Paper and board evaluation

Course code: 085BSP014

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration ofExam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-20	Practical	02	04	56 hrs.	3hrs.	25	25	50

Course Outcome (CO): After completion of this course, students will be able to:

CO 1: Understand importance of paper properties in usage of paper

CO 2: Learn different methods of paper and paper board evaluation

CO 3: Learn testing methods for physical and chemical properties of paper

CO 4: Will be able to understand optical properties of paper, their importance and testing Procedure and equipment

CO 5: Understand handling of different paper and corrugated board testing equipments

CO 6: Learn testing methods for structural and surface properties of paper

Expt. No.	Title: Paper and board evaluation	56.hrs/ Sem
1	Determination of moisture and ash	
2	Physical properties: grammage, thickness, density, bulk, grain, folding strength, dimensional stability, smoothness, fluffing, strength index	
3	Mechanical properties: burst, impact, tensile, elongation, tear	
4	Determination of smoothness and porosity	
5	Chemical properties: acidity, pH, sulfate, chloride	
6	Determination of copper number	
7	Determination of rosin content	
8	Optical properties: brightness, brightness reversion (P.C.NO), gloss, opacity, Haze	
9	Paper board testing: flat crush, ring crush	
10	IGT printability	
11	Stiffness of board and corrugating medium	
12	Determination of wax pick, sizing, and oil absorbency	
13	Edge wick test	
14	Ply bond strength and stiffness of different boards	

Instruction to the Examiners

1. In a batch of students, at least five different experiments may be given in the practical examination.
2. Number of students in a batch may be decided depending on equipments/ heating devices available.
3. Experiments may be given from whole list of experiments considering duration of examination.
4. Viva questions may be asked on any of the experiments prescribed in the practical syllabus
5. Test marks may be divided as 8 marks for accuracy, 4 marks for method of working and 3 marks for presentation and calculations.
6. Deduction of marks may be done considering percentage of error.

Formative Assessment for Practical	
Assessment	Distribution of Marks
Test	20 (Accuracy : 10, Working Technique : 06, Calculation & Presentation : 04)
Viva	02
Journal	03
Total	25 Marks
<i>Formative Assessment as per guidelines.</i>	

Note: The same shall be used for semester end Examination

References:

1. TAPPI Test methods 1996-97, TAPPI Press, Atlanta Georgia.
2. Laboratory manual of testing procedures published by Director, CPPRI, Saharanpur, UP, 2001

B.Sc. Pulp and Paper Semester –V

Discipline Specific Course (DSC)

Course Title: Printing and Packaging

Course code: 085BSP015

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours/ Semester	Duration ofExam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-21	Theory	04	04	56hrs.	2hrs.	40	60	100

Course Outcome (CO):After completion of this course, students will be able to:

CO1:Understand different grades of paper used for printing and their requirements

CO2 :Get knowledge of commonly used printing processes, their working principles and base paper requirements and applications.

CO3:Will be able to identify paper related printing problems, their causes and remedies

CO4:Types of printing inks, printing problems related to printing inks, their causes and remedies

CO5: Understand methods of evaluation of paper and paper board for printing

CO6:Understand basics of packaging and requirements of good packaging, industrial packaging papers and specialized packaging papers, their types and requirements.

Unit	Title: Printing and Packaging	56hrs/Sem
Unit-I	<p>Base paper for Printing: Introduction to printing. Different grades of paper for printing, news paper, cartridge, craft, duplex, tissue, blotting, map litho, bond, art paper, coated and uncoated, book publishing and paper boards, paper related printing problems, their causes and remedies</p> <p>Types of printing: Commonly used printing processes, letterpress, gravure, flexographic and offset, non impact printing, screenprinting. machine parts, working principle and base paper requirements and applications, limitations of process.Latest trends in printing, waterless lithography, dot matrix printing, inkjet printing, laser printing and digital printing.</p>	14 hrs
Unit-II	<p>Printing Inks: Types of printing inks, formulation, ink component, methods of ink drying and ink terminology, printing problems related to printing inks, their causes and remedies.Testing and predicting print quality,introduction, nonprinting tests, ink holdout printing tests, evaluation of paper and paper board for printing</p> <p>Industrial packaging papers: Base paper requirements for textile paper cones, paper cores, edge protectors, fiber drums, box boards, boxes and cartons, extensible sack kraftpapers.Various printing processes used for packaging</p>	14 hrs

Unit-III	Introduction to packaging: Introduction, elements of packaging, scope of packaging, requirements of good packaging, different grades of paper required for packaging. Rigid packaging, paper and paper based packaging materials, kinds of boards, solid board, food approved board, corrugated board, paper cartons, folding cartons, boxes multiply, types of flute, pitch, thickness.	14 hrs
Unit-IV	Specialized packaging papers: Food packaging papers, base paper requirements, tetrapack and aseptic packaging papers, methods of storage and packing of foods, pharmaceuticals, cosmetics and chemicals, rules and regulations. Packaging and life cycle: Packaging life cycle, environmental aspects, recovery and recycling, waste disposal, bans and restrictions	14 hrs

References:

1. Printing Science – Young and Pateman
2. Printing basic science – Wallis- Pergaman
3. What the printer should know about ink- Scarlett – GATF
4. What the printer should know about paper – Bureau - GATF
5. Printing fundamentals by Alex Glassman, Tappi Press (1985)
6. Printing by PirkkoOittiren, Vol. 13, Papermaking Science and Technology Series of TAPPI and Finish Paper Engineers Association. (1998)
7. Package printing by N. R. Edward (1993), TAPPI Press.
8. Handbook of printing processes- GATF
9. Survey of printing processes- Krishnamurthy
10. Printing Technology- Delmar publication
11. Converting for flexible packaging by A. Miller, 1994. Tappi Press.

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester–V

Discipline Specific Elective (DSE) - IA

(Student will select any one DSE either IA or IB for 03 credits)

Course Title: Energy resources and management

Course code: 085BSP021

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSE-1A	Theory	03	03	42 hrs.	2 hrs.	40	60	100

Course Outcomes (COs):At the end of the course, students will be able to:

CO1: Understand different energy resources and differences between renewable and non-renewable energy resources

CO2: Get knowledge of forms of energy and advances in energy storage and transfer

CO3: Will be able to identify commercially viable waste heat recovery devices

CO 4: Understand classification of fuels and characteristics of good fuels

CO 5: Will be able to learn advances in energy storage and transfer.

CO 6: Understand waste heat recovery devices and saving potential.

CO 7: Understand basics of energy management and auditing.

CO 8: Learn different methods of energy conservation in various sections of paper mills.

Unit	Title: Energy resources and management	42 hrs/Sem
Unit-I	Energy Resources: Renewable and non renewable energy, Indian energy scenario Converting System: Forms of energy, electricity basics, DC & AC currents, methods of producing various forms of energy from resources, thermal basics. Fuels: Introduction, classification of fuels, calorific value, characteristics of good fuels. Comparison between solid, liquid and gaseous fuels. Thermal energy contents of fuel, heat transfer, units and conversion. Thermodynamics of energy carrier/transfer media. Advances in energy storage and transfer. Instrumentation and control of energy systems	14 hrs

Unit-II	Design of Waste Heat Recovery Systems: Classification, advantages and applications, commercially viable waste heat recovery devices, saving potential. Energy Management and Auditing: Energy audit, need, types of energy audit, understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution.	14 hrs
Unit-III	Scope for Energy conservation in paper mills: Water recycling, VFDs for centrifugal pumps, fans and blowers, type of steam and condensate systems for paper machines, heat exchangers, insulation and refractories, co-generation, boilers, high efficiency motors, compressed air system, cooling towers, lighting systems.	14 hrs

References :

1. Non-Conventional Energy Sources –GD Rai, 4th Edition, Second Reprint, 1997, Khannapublications.
2. Engineering Chemistry – PC Jain & M. Jain, 10th Edition, 3rd Reprint, 1995, DhanpatRai& Sons.
3. BEE (Bureau of Energy Efficiency, Govt. of India) Books

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester–V

Discipline Specific Elective(DSE) - IB

(Student will select any one DSE either IA or IB for 03 credits)

Course Title: Computer Applications in Paper Industry

Course code: 085BSP022

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSE-1B	Theory	03	03	42hrs.	2hrs.	40	60	100

Course Outcomes (COs):At the end of the course students will be able to:

CO 1: Understand various computer operating systems

CO 2: Learn network concepts and categories of network

CO 3: Learn basics of e commerce and e business

CO 4: Learn basics of online electronic payment systems

CO5: Understand advantages and technologies of Enterprise Resource Planning

CO6: Learn basics of ERP modules and ERP implementation

Unit	Title: Computer Applications in Paper Industry	42 hrs/Sem
Unit I	<p>Open Source Office Automation: Introduction to computer operating systems, Libre office and Google Office, applications, use of documents, ESS, presentations, interactive videos, quizzes and forms. Introduction of SPSS and sample case studies</p> <p>DBMS: Introduction and SQL commands and queries, industry/services based case studies</p> <p>Computer Networks and Internet: Network concepts, categories of network. Types, seven layers of the OSI reference model, business through internet, introduction to internet and services.</p>	14 hrs
Unit II	<p>E-commerce: Concepts of ecommerce, why ecommerce, types of ecommerce, areas of ecommerce, types of transaction web, presenting an organization in web. Launching e-business.</p> <p>Electronic Payment Systems: Online electronic payment systems, prepaid and post paid electronic payment systems, information directories and search Engines.</p> <p>Enterprise Resource planning (ERP) Introduction: What is ERP, need of ERP, advantages of ERP, growth of ERP, ERP and related technologies. Business Process Reengineering (BPR), Management Information System (MIS), Decision Support Systems (DSS), Executive</p>	14 hrs

	Support Systems (ESS), data warehousing, data mining, Online Analytical Processing (OLTP), Supply Chain Management (SCM), and Customer Relationship Management (CRM)	
Unit III	<p>ERP Modules: Finance production planning, control and maintenance, sales and distribution, Human Resource Management (HRM), inventory control system, and quality management ERP Market.</p> <p>ERP Implementation: Life cycles, evaluation and selection of ERP package, project planning, implementation team training and testing, end user training & going live, post evaluation and maintenance, E-business, ISO 9000, quality check module, send and receive module etc. Online practical problems: Applications/discussions/building online workplace based on OER and softwares.</p>	14hrs

References:

1. V. Rajaraman, Fundamentals of computer, Year of publication - 1994
2. Peter Norton, Introduction to computers
3. Sagman, Microsoft office for windows
4. Microsoft Office – Complete Reference – BPB Publication
5. SQL, PL\SQL – Ivan Bayross - BPB, Year of publication - 1996
6. Oracle PL\SQL programming –Urman - Tech Media, Year of publication-1999
7. Enterprise Resource Planning - Alexis Leon
8. ERP Ware: ERP Implementation Framework –V.K. Garg& NK Venkitakrishnan
9. ERP: By Leon, ERP Concepts and Planning –Garg&Venkitakrishnan
10. Google corporations and khan academy

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester–V

Vocational: Voc-1

Course Title: Process Control and Instrumentation

Course code: 005BSP101

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours/ Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
Voc-1	Theory	03	03	42hrs.	2hrs.	40	60	100

Course Outcomes (COs):At the end of the course students will be able to:

CO 1: Understand the importance of Process Control for process industry.

CO 2: Learn methods to represent the process in the form of blocks and circulation of information in the loop.

CO 3: Understand the concepts of controlling the process parameters w.r.t. time and make control loops.

CO 4: Learn the different types of controllers and their advantages and disadvantages.

CO 5: Understand the behaviour of first order and second order systems, for different types of inputs – Step, Ramp, Sinusoidal, impulse etc.

CO 6: Check the stability of the systems.

CO 7: Understand measurement of process parameter

CO 8: Understand measurement of pulp and paper parameters

CO 9: Understand types of Control valves and Actuators

CO 10: Learn Analog and Digital signal transmissions

CO 11: Understand control systems – DCS/PLC

CO 12: Integration of above in P&IDs for system instrumentation

Unit	Title: Process Control and Instrumentation	42.hrs/Sem
Unit1	<p>Introduction to Control Systems: Transfer functions, laplacetransformations, block diagrams, closed loop and open loopcontrol systems, on-off control.</p> <p>Transducers: Analog transducers, electrical types, digital transducers, frequency domain transducers, digital encoders,</p> <p>Open loop response of simple systems: Response to step, semisudal inputs, first order systems, second order systems</p>	14 hrs

UnitII	Measurements: Temperature measurements, resistance thermometer, bimetallic thermometer. Pressure measurements: pressure standards, pressure transducers, pressuregauge, measuring high and low pressure, Flow measurement: Venturimeter, Orificemeter,Rotameter	14 hrs
UnitIII	Control systems: Control of Chemical reactors and drying operations, control systems in rotary dryers, drum dryers, spray dryers, control of stirred tank reactors, tubularreactors and batch reactors	14 hrs

References:

1. Process system analysis and control, Coughanour and Koppel McGraw Hill International Edition, New York
2. An introduction to Theory and Practical, Prentice Hall, New Delhi.
3. Chemical process control, George Stephanopoulos, Prentice Hall of India, New Delhi, 1990
4. Industrial instrumentation Eckmann, Willey Eastern Ltd., New Delhi, 1991
- 5.Industrial instrumentation fundamentals, Tata McGraw Hill Co., New Delhi.

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest 1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester–V

Skill Enhancement Course: SEC-3

Course Title: Engineering and CAD drawing

Course code: 085BSP061

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
SEC-3	Practical	02	04	56hrs.	3hrs.	25	25	50

Course Outcomes (COs):At the end of the course students will be able to:

CO 1: Understand basics of engineering drawings

CO 2: Understand basics of lettering

CO 3: Learn use of drawing instruments

CO 4: Get knowledge of scales and curves

CO 5: Learn creation of drawings of simple machine parts using CAD

CO 6: Learn dimensioning and bill of material

CO 7: Understand conversation of pictorial views into orthographic views.

Expt. No	Title: Engineering and CAD drawing	56.hrs/ Sem
1	Introduction, use of drawing instruments, line work and geometrical constructions, lettering. Scales and curves, plain, diagonal and vernier scales, engineer curves	6 hrs
2	Lettering and geometrical construction	3 hrs
3	Scales and engineering curves	3 hrs
4	Orthographic projections, projections of points and lines, projection of planes, projection of simple solids	8 hrs
5	Development of lateral surface	3 hrs
6	Study of CAD graphic package, creation of drawings of simple machine parts, (Orthographic and Isometric), minimum six drawings.	6 hrs
7	Drawing of Assembly of machine parts, minimum four assembly drawings complete with specifications, dimensioning and bill of material.	6 hrs
8	Forms of thread	3 hrs
9	Types of rivetted joints	3 hrs
10	Couplings	3 hrs
11	Pipe joints	3 hrs
12	Pulleys and chain drives	3 hrs
13	Valves and types	3 hrs
14	Conversation of pictorial views into orthographic views.	3 hrs

References:

1. Engineering Drawing by N. D. Bhat – Charotra Publications, Anand, India, Delhi, 1989
2. Engineering Drawing by K. R. Gopalkrishna, Subhash stores, Bangalore, 2001
3. Machine Drawing by N. D. Bhat- Charotra Publications, Anand, India, Delhi, 1989.
4. Process equipment design by M. V. Joshi – Mcmillan India Ltd., Delhi, 2007
5. CAD-CAM – P N Rao

Instruction to the Examiners

1. In a batch of students, at least two different questions may be given in the practical examination.
2. Number of students in a batch may be decided depending on equipments available.
3. Drawings may be given from whole list of experiments considering duration of examination.
4. Viva questions may be asked on any of the experiments prescribed in the practical syllabus
5. Deduction of marks may be done considering percentage of error.

Formative Assessment for Practical	
Assessment	Distribution of Marks
Drawing No. 1	10
Drawing No.2	10
Viva	02
Sheets	03
Total	25Marks
<i>Formative Assessment as per guidelines.</i>	

Note: The same shall be used for semester end Examination

UG programme: 2023-24

GENERAL PATTERN OF THEORY QUESTION COURSE FOR DSCC/ OEC

(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10 marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total : 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed

B.Sc. Pulp and Paper VI Semester

B.Sc. Pulp and Paper Semester –VI

Discipline Specific Course (DSC)

Course Title: Chemical Recovery

Course code: 086BSP011

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-22	Theory	04	04	56hrs.	2hrs.	40	60	100

Course Outcome (CO): After completion of this course, students will be able to:

CO 1: Understand different treatment steps needed after separation of black liquor

CO 2: Know different types of evaporators and principle of multiple effect evaporation.

CO 3: Learn methods of black liquor oxidation and desilication.

CO4: Understand Basics of byproduct recovery from black liquor and their industrial applications

CO 5: Understand basics of black liquor burning and chemistry involved

CO 6: Will be able to differentiate between oil fired, coal fired and black liquor fired furnace

CO 7: Importance of fume and heat recovery equipments

CO 8: Know chemistry of causticizing, green liquor and white liquor preparation.

CO 9: Learn methods of lime mud reburning and slaking

CO 10: Learn methods of minimizing solid waste disposal in recovery plant

CO 11: Understand basic principle of non condensed gases and their handling

CO12: Learn methods of heat recovery, heat distribution throughout mill and power generation and distribution

CO 13: Will be able to solve problems on material and energy balance

CO 14: Sources of air pollutants, emission and control.

Unit	Title: Chemical Recovery	56.hrs/ Sem
UnitI	Introduction and Principles of Chemical Recovery: Standard terms used in recovery, early development, overview of chemical recovery system. By product recovery, its merits demerits. Black liquor oxidation, desilication and their merits and demerits. Non Condensable Gases (NCG): Introduction, composition of NCG. Properties of NCG, ignition sources, transporting NCG, scrubbing NCG, burning NCG, conclusion.	14 hrs

UnitII	Evaporation and concentration of black liquor: Introduction, properties of black liquor, principles of heat transfer, multiple effect evaporator types, calculation of performance, instrumentation and process control. Auxiliary operations in the evaporation plant. Direct contact evaporators, cyclone and cascade high density evaporation, process technology advantages and limitations.	14 hrs
UnitIII	Chemical Recovery process chemistry: Chemical recovery boilers, overview of burning chemistry material and energy balance, burning methods, deposits and plugging. Chemical recovery equipment: Introduction, pressure parts, air and liquor systems chemical recovery boiler, selection criteria, auxiliary systems, operation and control safety measures, Air emissions and control.	14 hrs
UnitIV	Green liquor preparation: Smelt, composition and analysis, smelt dissolving tanks, green liquor clarifiers, dreghandling. White liquor preparation: Introduction, process description, slakers, causticizers, white liquor clarifiers, recausticizing plant, equipment, system design, calculations for causticizingandrecausticizing. Lime reburning: Introduction, lime productionprocess equipment, rotary lime kiln, auxiliary lime kiln operations, instrumentation and control. Air emissions during burning and their control.	14 hrs

References:

1. Chemical Recovery in the Alkaline Pulping Processes co edited by Robert P. Green and Gerald Hough, TAPPI Press, Atlanta, 1992
2. Pulp and Paper Manufacture Volume-V Alkaline Pulping Edited by T M Grace and E W Malcolm Published by the Technical Section Canadian Pulp and paper Association, TAPPI press 1993
3. Kraft pulping - Edited by A. MimmsM.J.Kocurek TAPPI press 1993
4. Handbook of Pulp Volume I and II – edited by Herbert Sixta, 2006
5. Hand book of Pulp and Paper by Gray A. Smook, 1995

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester –VI

Discipline Specific Course(DSC)

Course Title: Chemical recovery

Course code: 086BSP012

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-23	Practical	02	04	56hrs.	3hrs.	25	25	50

Course Outcome (CO): After completion of this course, students will be able to:

CO1: Understand methods of analyzing make up chemicals and lime stone

CO 2: Know white liquor composition and its analysis

CO 3: Know operation of brooks field viscometer and rota evaporator

CO 4: Preparation of white liquor in laboratory by caustizing green liquor

CO 5: Know methods of testing lime and filtercake

Expt. No	Title: Chemical Recovery	56.hrs/ Sem
1	Analysis of salt cake- moisture. pH, chloride, insoluble	
2	Analysis of soda ash- moisture. purity, chloride, insoluble	
3	Analysis of lime -purity and free Na ₂ O.	
4	Analysis of lime stone and seashell - moisture calcium, magnesium and silica	
5	Analysis of filter cake-moisture Na ₂ O, CaO, CaCO ₃ ,hydrated lime and silica	
6	Determination of total solids of black liquor	
7	Analysis of black liquor – Active alkali, Total titrable alkali and activity	
8	Determination of pH and conductivity of black liquor	
9	Determination of viscosity of black liquor at different temperature.	
10	Determination of granulation point	
11	Determination of calorific valueof black liquor	
12	Analysis of white liquor	
13	Analysis of mill green liquor	
14	Causticizing of green liquor, settling rate and analysis of white liquor and lime mud produced	

References:

1. TAPPI Test methods 1996-97, TAPPI Press, Atlanta Georgia.
2. Laboratory manual of testing procedures published by Director, CPPRI, Saharanpur,UP, 2001

Instruction to the Examiners

1. In a batch of students, at least five different experiments may be given in the practical examination.
2. Number of students in a batch may be decided depending on equipments/ heating devices available.
3. Experiments may be given from whole list of experiments considering duration of examination.
4. Viva questions may be asked on any of the experiments prescribed in the practical syllabus
5. Test marks may be divided as 8 marks for accuracy, 4 marks for method of working and 3 marks for presentation and calculations.
6. Deduction of marks may be done considering percentage of error.

Formative Assessment for Practical	
Assessment	Distribution of Marks
Test	20 (Accuracy : 10, Working Technique : 06, Calculation & Presentation : 04)
Viva	02
Journal	03
Total	25 Marks
<i>Formative Assessment as per guidelines.</i>	

Note: The same shall be used for semester end Examination

B.Sc. Pulp and Paper Semester –VI

Discipline Specific Course (DSC)

Course Title: Pollution abatement in Paper Industry

Course code: 086BSP013

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-24	Theory	04	04	56hrs.	2hrs.	40	60	100

Course Outcome (CO): After completion of this course, students will be able to:

CO 1: Understand odour and noise pollution, air pollutants from different units of paper mill.

CO 2: Know how air pollution can be controlled at source

CO3: Will understand objectives and principles of electrostatic precipitator and wet scrubbers.

CO 4: Learn sources of water pollutants and methods to minimize them.

CO 5: Understand basics of primary, secondary and tertiary treatments of effluent

CO 6: Understand characteristics and perspectives of solid waste and their utilization and disposal methods

CO 7: Importance of regulations and statutory requirements of solid, water and air pollutants in paper industry.

CO 8: Know basics of ISO 14000 systems, and environment protection acts

CO 9: Learn issues involved in enforcement of environmental legislation and public awareness

CO 10: Learn process modifications in various sections of paper industry to reduce pollution.

CO 11: Understand basic principle of colour removal monitoring and control of paper industry emission and control of odour pollution.

Unit	Title: Pollution abatement in Paper Industry	56.hrs/ Sem
Unit I	<p>Introduction:Air pollution, definition and causes of photochemical smog, acid rain, green house effect.</p> <p>Air Pollution in paper mill:Definition, units of expression, classification of pollutants, gaseous pollutants, particulate pollutants, aerosol pollutants, sources of pollution on the receiving environment, organic pollutants inorganic pollutants like carbon CH₂, CH, CH₃, SCH₃, compounds, sulphur, photochemical oxidants biological and nonbiological odourous pollutants. Odour and noise pollution air pollutants from different units of paper mill.</p> <p>Techniques for Air Pollution Control: Zoning, air pollution control at source, installation of controlling devices and equipment, control by stack, by planting trees and growing vegetation. Advances in pollution control methods, measures to minimize air pollution, absorption, adsorption, combustion and other control of gaseous pollutants, filter bags, ESP and wet scrubbers.</p>	14 hrs

UnitII	Water Pollution: Sources and characteristic of water pollution, pollutions from different unit operations of themill practices followed to minimize the generation of pollution at source, close kraftmill concept, effluent treatment, primary, secondary, biological and tertiary treatments,advances in pollution control methods, analysis methods for COD, BOD, AOX, pH, colour,suspended solids and other pollutants.	14 hrs
UnitIII	Environmental managements, legislations and methods: Introduction to regulations and statutory requirements Solid, water and air pollutants in paper industry. ISO 14000 systems. Environment protection act, air (prevention and control of pollution)act, water (prevention and control of pollution) act, forest conservation act, issues involved in enforcement of environmental legislation, public awareness	14 hrs
UnitIV	Solid waste: Definition, characteristics and perspectives of solid waste,types of solid waste in an integrated paper mill, physical and chemical characteristics, solid waste utilization and disposal in paper mills. Process modifications: Process modifications in stock preparations, paper machine, Kraft mill processes, high yield processes like NSSC, TMP & RMP process modifications, new pulping and bleaching technologies for pollution abatement, colour removal monitoring and control of paper industry emissions including odour pollution.	14 hrs

References:

1. Pollution control in process Industries - S. P. Mahajan, TATA Mcgrow Hill PublishingCompany Ltd., New Delhi, 1985
2. Industrial Environmental Control Pulp and Paper Industry - Allan M. Springer 3rd Edition
3. Environmental Chemistry, Sameer K. Banerji, 1999, Prentice Hall of India, New Delhi.
4. Environmental Chemistry, A.K. Day – New Age International Ltd. Publishers 1994, WileyEstern Ltd., New Delhi.
5. Environmental Encyclopedia edited by William P. Cunningham, Jaico Publishing House, Mumbai,2001

Formative Assessment for Theory	
AssessmentOccasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester –VI

Discipline Specific Course(DSC)

Course Title: Pollution abatement

Course code: 086BSP014

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-25	Practical	02	04	56hrs.	3hrs.	25	25	50

Course Outcome (CO): After completion of this course, students will be able to

CO1: Understand methods of industrial waste water and sewage testing

CO 2: Know testing of effluents for organic and inorganic pollutants

CO 3: Know operation of ORSAT apparatus.

CO 4: Understand importance of COD and BOD and methods of testing

CO 5: Know methods of meteorological tests and their significance

CO 6: Norms for discharge of effluent and gaseous pollutants

Expt. No.	Title: Pollution abatement	56.hrs/ Sem
1	Industrial waste water and sewage testing for SS DS and T.S	
2	Determination of Alkalinity and acidity.	
3	Determination of Calcium and magnesium hardness	
4	Determination of Calcium	
5	Determination of Sulphite	
6	Determination of Sulphide	
7	Determination of Residual Chlorine.	
8	Determination of Chloride	
9	Determination of sulphate.	
10	Determination of B.O.D.	

11	Determination of C.O.D.	
12	Analysis of fresh air using ORSAT apparatus	
13	Analysis of fresh flue gas using ORSAT apparatus	
14	Demonstration of meteorological tests like ambient temp Relative humidity, Rainfall measurement wind velocity and direction.	

References:

1. Standard methods for the examination of water and waste water (1980) – American Public Health Association, Washington DC
2. TAPPI Test methods 1996-97, TAPPI Press, Atlanta Georgia.
3. Laboratory manual of testing procedures published by Director, CPPRI, Saharanpur, UP, 2001

Instruction to the Examiners

1. In a batch of students, at least five different experiments may be given in the practical examination.
2. Number of students in a batch may be decided depending on equipments/ heating devices available.
3. Experiments may be given from whole list of experiments considering duration of examination.
4. Viva questions may be asked on any of the experiments prescribed in the practical syllabus
5. Test marks may be divided as 8 marks for accuracy, 4 marks for method of working and 3 marks for presentation and calculations.
6. Deduction of marks may be done considering percentage of error.

Formative Assessment for Practical	
Assessment	Distribution of Marks
Test	20 (Accuracy : 10, Working Technique : 06, Calculation & Presentation : 04)
Viva	02
Journal	03
Total	25 Marks
<i>Formative Assessment as per guidelines.</i>	

Note: The same shall be used for semester end Examination

B.Sc. Pulp and Paper Semester –VI

Discipline Specific Course (DSC)

Course Title: Biotechnology in paper industry

Course code: 086BSP015

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSCC-26	Theory	04	04	56hrs.	2hrs.	40	60	100

Course Outcome (CO): After completion of this course, students will be able to:

CO 1: Understand concept of Industrial Biotechnology and its uses in paper field.

CO 2: Know how enzymes are produced and purified

CO3: Will understand objectives and principles of culturing of microorganisms.

CO4: Learn details of enzyme applications in paper making like, deinking, refining, drainage improvement and bleaching operations

CO 5: Understand basics of preparation and applications of enzymetic starch in paper coating

CO6: Will understand objectives and applications of enzymes in pitch and deposit control

CO 7: Understand reductions of CO₂ emission by conversion and biofuels

CO 8: Will get knowledge of using enzymes in treatments of paper mill effluent

Unit	Title: Biotechnology in paper industry	56.hrs/Sem
Unit I	<p>Introduction: Concept of Industrial Biotechnology, An introduction to microbiology, structure of cells, prokaryotes and eukaryotes, different trends in classification of microorganisms.</p> <p>Enzymes and Proteins: Detailed structure of proteins and enzymes. Functions methods of production and purification of enzymes. Nomenclature and classification of enzymes. Kinetics of enzyme action. Enzyme inhibition.</p> <p>Culturing of Microorganisms: Culture media- synthetic and non synthetic, solid, liquid and semi solid media. Special media, enriched, selective, transport, differential, enrichment media, methods of isolation of bacteria, fungi, serial dilution, pour plate, spread plate and streak plate. Maintenance of pure cultures. Cultivation of anaerobic bacteria, anaerobic jar method</p>	14 hrs

UnitII	<p>Enzymetic Deinking and refining: Enzymatic deinking, application of enzymes in the deinking process to reduce the need for chemicals, merits and demerits. enzymatic refining, application of enzymes in the refining process to reduce the refining time and amount of electricity. Effect of enzyme cellulase on cellulose fibres during refining.</p> <p>Drainage improvement and Bleach Boosting: Poor drainage properties of secondary fibers. Cellulase and hemicellulase treatment of ONP, OCC, and virgin. Enzymatic treatment of the linerboard furnish with crude cellulase to improve drainage and to increase the compression strength.</p> <p>Enzymetic delignification: Fungal treatment of wood chips for chemical pulping, organosolv pulping, biomechanical and dissolving pulp production, effect of xylanase on lignin. Bleach boosting technique used in the treatment of kraft pulp.</p>	14 hrs
UnitIII	<p>Enzymetic starch hydrolysis, stickies control and pitch control: Coating and surface sizing of paper using modified starches, preparation of starch pastes, Modifying starch with amylase enzymes. Merits and demerits. Mechanical and chemical cleaning to remove stickies. Use of enzyme esterase to hydrolyse the PVA and to remove stickies and to reduce downtime of the paper machine. Pitch deposit problem for thermo-mechanical pulp (TMP) and ground wood pulp (GP) mills, frequent shutdowns and inferior pulp quality problems due to pitch deposits, enzymatic pitch control technology.</p>	14 hrs
UnitIV	<p>Biomass: CO₂ emission reductions from transportation using biofuels. Conversion of lignocellulosic biomass to ethanol. Liberation of sugars from biomass feed stocks and conversion of cellulose and hemicellulose sugars in polymeric form by enzymes to fermentable monomers and subsequent fermentation.</p> <p>Downstream processing (Enzyme application in effluent treatment): Waste treatment of Kraft effluent by white rot fungi. Strategies and steps involved in product purification. Methods of cell disruption, filtration, centrifugation, sedimentation, chromatography, freeze drying/lyophilization, membrane separation technology, reverse osmosis, ultra filtration, micro filtration, dialysis. Reducing the colour of the effluent stream using enzymes like Laccase</p>	14 hrs

References:

1. Biotechnology in the pulp and paper industry- 8th ICBPPI by LiisaViikari; R Lantto; ScienceDirect (Online service) Amsterdam ; New York : Elsevier, 2002.
2. Lignocellulose biotechnology- future prospects by Ramesh ChanderKuhad; Ajay SinghNew Delhi : I.K. International Pub. House, ©2007
3. Biotechnological Applications of Microbes-Volume II Editor(s):AjitVarma, Gopi K. PodilaISBN:9788188237319, 2005
4. Environmentally friendly technologies for the pulp and paper industry-Raymond A Young; MasoodAkhtarNewYork : J. Wiley, 1997.

5. Wood and Cellulosic Chemistry-Second Edition, Revised, and Expanded David N.-S. Hon, Clemson University, South Carolina, USA; Nobuo Shiraishi Kyoto, JAPAN Cat. #: DK1364 ISBN: 9780824700249 ISBN 10: 0824700244
6. Handbook on Bioethanol Production and Utilization ISBN:978-1-56032-553-6
7. The Realm of Industrial Biotechnology – Ashok Pandey – Asia Tech Publishers New Delhi.

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester–VI

Discipline Specific Elective(DSE)- IIA

(Student will select any one DSE either IIA or IIB for 03 credits)

Course Title: Business Management

Course code: 086BSP021

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSE-IIA	Theory	03	03	42hrs.	2hrs.	40	60	100

Course Outcomes COs: On successful completion of the course, the Students will demonstrate

CO 1: The ability to understand concepts of business management, principles and function of management.

CO2: The ability to explain the process of planning and decision making.

CO3: The ability to create organization structures based on authority, task and responsibilities.

CO 4: The ability to explain the principles of direction, importance of communication, barrier of communication, motivation theories and leadership styles.

CO 5: The ability to understand the requirement of good control system and control techniques.

Unit	Title: Business Management	42.hrs/ Sem
Unit I	<p>Introduction to management: Introduction, meaning, evolution of management thought, Pre-Scientific Management Era, Classical Management Era, Neo-Classical Management Era, Modern Management Era. Nature and characteristics of management. Scope and functional areas of management. Management as a science, art or profession; Management and administration. Principles of management.</p> <p>Planning and decision making: Introduction and meaning, nature, importance of planning, planning process, objectives. Types of plans (meaning only). Meaning and definition, importance, decision making process, techniques of decision making.</p>	14 hrs
Unit II	<p>Organizing: Nature and purpose of organization, principles of organizing, delegation of authority, types of organization, centralization vs decentralization of authority and responsibility.</p> <p>Directing and communicating: Meaning and nature of direction, principles of direction. Communication, meaning and importance, communication process, barriers to communication, steps to overcome communication barriers, types of communication, motivation theories, Maslow's Need Hierarchy Theory, Herzberg's Two Factor Theory, Mc.Gregor's X and Y theory.</p>	14 hrs

Unit III	<p>Coordinating and controlling: Coordination, meaning, importance and principles. Controlling, meaning and steps in controlling, essentials of effective control system, techniques of control (in brief).</p> <p>Business social responsibility and ethics: Business social responsibility, meaning, arguments for and against business social responsibility. Green management, meaning, green management actions, ethics, meaning, importance of ethics in business, factors that determine ethical or unethical behavior.</p>	14 hrs
-----------------	--	---------------

Skill developments activities:

1. Two cases on the above syllabus should be analyzed by the teacher in the classroom and the same needs to be recorded by the student in the Skill Development Book.
2. Draft different types of Organization structure.
3. Draft Control charts.

References:

1. Business organization and principles of management –BasuMcGraw Hill.
2. Management by Stephen P. Robbins,Pearson
3. Management by Koontz and O'Donnell, McGraw Hill.
4. Principles of management by L M Prasad,Sultan Chand and Sons
5. Management process and organization V.S.P Rao/Bajaj, Excel Books.GH25
6. Management by Appanniah and Reddy, HPH.
7. Principles of Management by T. Ramaswamy HPH.
8. Principles of Management by Prof K D Basava . A K Basava ,VidyavahiniPrakashana, Hubli
9. Principles and practices of Management by Prof K D Basava . A K Basava ,VidyavahiniPrakashana, Hubli

Note: Latest edition of text books may be used.

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester–VI

Discipline Specific Elective(DSE)-IIB

(Student will select any one DSE either IIA or IIB for 03 credits)

Course Title: Polymers used in Paper Industry

Course code: 086BSP022

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
DSE-IIB	Theory	03	03	42hrs.	2hrs.	40	60	100

Course Outcomes (COs):Attheend ofthecoursestudentswillbeableto:

CO1: Understand basics of polymers and their classification

CO2: Get basic knowledge of plastic laminates

CO3: Manufacture and properties of polymers used in paper industry

CO4: Get basic knowledge of polymers used in specialty processes

CO5: Get basic knowledge of polymerization

CO 6: Understand function of plasticizers, stabilizers and lubricants used in paper coating

Unit	Title: Polymers used in Paper Industry	42.hrs/ Sem
Unit I	Introduction: Basic definitions, polymerization, functionality and their monomers, degree of polymerization. Classification of Polymers: Natural and synthetic polymers, thermoplastics and thermosetting resins, addition and condensation polymers, elastomers, fibers, resins and plastics. Plastic laminates: Manufacture of plastic laminates, decorative laminates and industrial laminates.	14 hrs
Unit II	Manufacture and properties of polymers used in paper industry - Manufacture, processing and properties and applications of urea formaldehyde, phenol formaldehyde and melamine formaldehyde, Polyethylene, polypropylene, polyvinyl chloride, polystyrene, polyethylene and their phthalates	14 hrs
Unit III	Polymers: Polymers used in specialty processes, special co extrusion adhesives, Cellulose derivatives (film forming resins), vinyl polymers(film forming resins), terpene resins, silicone resins, chlorinated poly phenols Polymerisation: Addition polymerization, condensation polymerization, methods of polymerization.plasticisers, stabilisers and lubricants	14 hrs

References:

1. Pulp and Paper Manufacture Volume 8 Coating, Converting edited by Michael Kouris Published by Joint textbook committee of the Paper Industry
2. Industrial and Speciality Papers, Robert H. Mosher, Volume I to IV Chemical Publishing Co. Inc. New York, 1969.

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and Paper Semester–VI

Vocational: Voc-2

Course Title: Speciality Papers

Course code: 086BSP101

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
Voc-2	Theory	03	03	42 hrs	2hrs.	40	60	100

Course Outcomes (COs):Atthe end of thecoursestudentswillbeableto:

CO 1: Understand production and applications of gift wraps and decorative papers

CO 2: Learn technology and methods of paper saturation

CO 3: Understand basics of functional papers and their manufacture methods

CO 4: Learn types of carbon papers and their production

CO 5: Learn chemistry of release treatment for release papers and details of pressure sensitive papers

CO 6: Understand production and applications of gum tapes, paper bags and envelopes

CO 7: Learn chemistry of nonwovens and non cellulosicfibers used in papermaking

Unit	Title :Speciality Papers	42.hrs/ Sem
UnitI	<p>History of speciality papers, modern development and new techniques.</p> <p>Paper saturation and saturating agents:Base paper requirements, technology and methods of saturating agents, applications of saturated papers.</p> <p>Gift wraps and decorative papers: Gift wraps, decorative papers, domestic and display papers, paper draperies, wallpapers, lamp shade stock and other miscellaneous papers.</p> <p>Waxed papers:Types of waxed papers,manufacturing process and its application. Asphalt and polyolefin papers</p>	14 hrs
Unit II	<p>Functional papers:Safety papers, coated chart papers, solvent coated papers. Electrical papers, filter papers, cigarette papers, protective packaging papers, metal foil papers.</p> <p>Carbon and other copying papers:Introduction, types of carbon papers, base paper requirements, carbon inks used and its formulation. Manufacture of different carbon papers and its applications,carbonless papers.</p> <p>Pressure sensitive and release papers:Chemistry of release treatment, manufacture of pressure sensitive and release papers, types of release papers and their uses.</p>	14 hrs

UnitIII	<p>Gum tapes: Materials used for gum tapes description of gumming plant and equipment properties of gum tapes and applications, gummed papers. and other speciality tapes and labels.</p> <p>Paper bags and envelopes: materials used, description of plant and equipment, properties and applications, cover papers, synthetic leathers, coated tags</p> <p>Nonwovens and Non cellulosic Fibers: Fibers used, method of manufacture, synthetic fibers used forming drying and calendaring applications. NoncellulosicFibers and their Applications</p>	14 hrs
----------------	--	---------------

References:

1. Pulp and Paper Manufacture Volume VIII Coating,Converting edited by Michael Kouris Published by Joint textbook committee of the Paper IndustryTAPPIPress 1999
2. Industrial and Speciality Papers, Robert H. Mosher, Volume I to IV Chemical PublishingCo. Inc. New York, 1969
3. The essential guide to Aqueous coating of paper and Board edited by TWR Dean TAPPIPress.2004

Formative Assessment for Theory	
Assessment Occasion/type	Marks
InternalAssessmentTest1	10
InternalAssessmentTest2	10
Quiz/Assignment/Small Project	10
Seminar	10
Total	40 Marks
<i>Formative Assessment as per guidelines.</i>	

B.Sc. Pulp and paper Semester–VI

INTERNSHIP

Internship:

A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations for 2 credits. Internships involve working with local/outside industry, local governments (such as panchayats, municipalities) or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning

Note:

1. 1 credit internship is equal to 30hrs on field experience.
2. Internship shall be Discipline Specific of 45-60 hours (2 credits) with duration 1-2 weeks.
3. Internship may be full-time/part-time (full-time during last 1-2 weeks before closure of the semester or weekly 4 hrs in the academic session for 13-14 weeks). College shall decide the suitable method for programme wise but not subject wise.
4. Internship mentor/supervisor shall avail work allotment during 6th semester for a maximum of 20 hours.
5. The student should submit the final internship report (45-60 hours of Internship) to the mentor for completion of the internship.
6. Method of evaluation: Presentations/Report submission/Activity etc.

INTERNSHIP

Course Title: Mill visit

Course code: 086BSP091

Type of Course	Theory /Practical	Credits	Instruction hour per week	Total No.of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative assessment Marks	Total Marks
Internship	Practical	02	04	60hrs.	3hrs.	50	0	50

Course Outcomes (COs):At the end of the course students will be able to:

CO 1: Gain knowledge of working in various sections of mill or organisation

CO 2: Get knowledge of operation and control of machineries, offices, laboratories or equipments

CO 3: Understand basics of safety at mill/ working site

CO 4: Learn basics of report writing and presentation

Sl. No	Title:Mill visit	60hrs/Sem
1	Visit to raw material storage and handling section	
2	Visit to chipper house	
3	Visit to pulp mill	
4	Visit to washing and screening section	
5	Visit to bleach plant	
6	Visit to refining section	
7	Visit to stock preparation	
8	Visit to Paper machine wet end	
9	Visit to press section	
10	Visit to drying section	
11	Visit to converting section	
12	Visit to finishing house	
13	Visit to Power house	
14	Visit to chemical recovery	
15	Report writing and power point presentation demonstration	

Note: After each mill visit students will submit report which will be evaluated at the time of practical examination

Instruction to the Examiners

1. Report submitted by student will be evaluated at the time of practical examination
2. Performance report given by guide will be considered as IA marks
3. Viva will be conducted on all sections visited by the students
4. Topics for PowerPoint presentation will be given by internal examiners in consultation with external examiners two days early

Formative Assessment for Practical	
Assessment Occasion/type	Marks
Report Evaluation	20
Performance report/Review reports given by guide	10
Oral/Viva	10
Power Point presentation on given topic	10
Total	50 Marks
<i>Formative Assessment as per guidelines.</i>	

UG programme: 2023-24

GENERAL PATTERN OF THEORY QUESTION COURSE FOR DSCC/ OEC

(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10 marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total : 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed