

Office of IQAC

Internal Assessment Method under Flexibility and Pattern Change

AY 2024-25 (ODD Semester) (P2BL)

Name of the Faculty Member Name of the course / course code

Department / Year / Semester / Section Course Category with Regulation : Dr. R. Thiru Murugan(KLU5229)

: Quantitative and Qualitative Techniques for Business Research/ 222MBA5106

: MBA/First/First : IC- P- /2021

Course Category with Regula Name of Facilitator

: Dr. Vikash Shinde/ Mr. S J Kabilan

S. No	As per regulation 2021		Proposed change in Assessment			
1.	Sessional Exam I	17.5%	Sessional Exam I	25%		
2.	Sessional Exam II	17.5%	Instrument Design and Field Survey Report	15%		
3.	Open ended Assignments	15%	Data Analysis and Interpretation Presentation	15%		
4.			Project Report Submission	15%		
	Total	50%	Total	70%		
End Semester Examination						
5.	End Semester Examination	50%	End Semester Practical Exam	30%		
	Total	50%	Total	30%		

Name of the Faculty Member

: Ms U Rajeswari(KLU4877)

: Accounting for management/ 222MBA5101

Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator

: Theory - Core 2021 : Dr Bhavesh Patel/ Mr S J Kabilan

: Business Administration /I/ I/ A

S. No	As per regulation 2021		Proposed change in Assessme	ent			
1.	Sessional Examination – I	17.5%	Sessional exam I	15%			
2.	Sessional Exam II	17.5%	Mini Project - Financial analysis	25%			
3.	Open ended assignment	15%	Swayam courses, group discussion report writing on workshop	10%			
	Total	50%	Total	50%			
	End Semester Examination						
4.	Semester End Theory Examination	50%	Semester End Theory Examination	25%			
5.			Report- Finding financial model of a company and refining creating a strategy to solve problems + viva voce	25%			
	Total	50%	Total	50%			

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category Name of Facilitator

- : Mrs. Lakshmi Mohan(KLU4656)
- : Strategic Financial Management/213CPA3410
- : Commerce/IV/B. Com PA
- : Elective (R 2021)/Theory
- : Dr Bhavesh Patel /Dr. M. Raja

S. No	As per regulation 2021		Proposed change in Assessme	nt				
1.	Sessional Exam I	17.5%	Sessional Exam II	10%				
2.	Sessional Exam II	17.5%	Open Ended Assessment (Swayam Course and Quiz)	10%				
3.	Open Ended Assignment	15%	Project Review I	15%				
4.			Project Review II	15%				
	Total	50%	Total	50%				
	End Semester Examination							
5.	Semester End Theory Examination	50%	Semester End Theory Examination	25%				
6.			Project Viva Voce and Project Outcomes	25%				
	Total	50%	Total	50%				

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Matheswaran M(KLU2476)

: 211MAT1301 / Linear Algebra and Calculus

: B.Tech. All / I / I /

: IC-T

: Prof. Shivani Agrawal /Dr. M. Raja

S. No	As per regulation 2021		Proposed change in Assessme	nt			
1.	Sessional Examination – I	17.5%	Poster Presentation	10%			
2.	Sessional Exam II	17.5%	Sessional Exam	20%			
3.	Mid Semester Practical	10%	Practical Exam (MATLAB Grader)	20%			
4.	Regular Laboratory Performance	5%					
	Total	50%	Total	50%			
End Semester Examination							
5.	Semester End Theory Examination	35%	End Semester Theory Examination	30%			
6.	SemesterEndPracticalExamination	15%	Project Final Review	20%			
	Total	50%	Total	50%			

Name of the Faculty Member Name of the course / course code

Department / Year / Semester / Section Course Category with regulation

- : Dr. Angshuman Chattopadhyay(KLU5185)
- : Introduction to Engineering Visualization /211MEC1201
- : FME / 2024-24/ODD
- : Foundation Course (Integrated course with
- Practical and X-Component)
- : Dr Vikas Shinde /Dr.Ebenezar Arul Samuvel

Name of Facilitator

S. No	As per regulation 2021		Proposed change in Assessme	ent
1.	Mid-Semester Practical	20%	Quiz & Weekly text	10%
		2070	(Evaluation of theory)	
2.	Sessional Examination		Mid-Semester Lab Practical	20%
		20%	(Dimensioning & Projections in	
			ONSHAPE)	
3.	Open-ended group task/Project/et.,	10%	Case Study I	20%
4.	Regular laboratory performance	20%	Case Study II	20%
	Total	70%	Total	70%
	End Sem	ester Exa	mination	
5.	Evaluation of the problem/Project	20%	Final Project Review - (P2BL	30%
			Application – Completion of	
			Design in ONSHAPE of final	
			solution to P2BL problem	
	Comprehensive viva-voce on	10%		
	course			
	Total	30%	Total	30%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation 2021 Name of Facilitator : Dr. S. Gowthaman(KLU1971)

- :211MEC1201
- : FE / I / I
- : Practical /

: Dr Vikas Shinde /Dr. Ebenezar Arul Samuvel

S. No	As per regulation 2021	Proposed change in Assessme	ent				
1.	Mid-Semester Practical 200		Quiz & Weekly text	10%			
		2070	(Evaluation of theory)				
2.	Sessional Examination		Mid-Semester Lab Practical	20%			
		20%	(Dimensioning & Projections in				
			ONSHAPE)				
3.	Open-endedgroup task/Project/et.,	10%	Case Study I	20%			
4.	Regular laboratory performance	20%	Case Study II	20%			
	Total	70%	Total	70%			
End Semester Examination							
5.	Evaluation of the problem/Project	20%	Final Project Review - (P2BL	30%			
6.	Comprehensive viva-voce on	10%	Design in ONSHAPE of final				
	course		solution to P2BL problem				
7.	Total	30%	Total	30%			

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator

- : Dr. S. Jeevitha (KLU3088)
- : 224MDS3116/Internet of Things
- : CS&IT/II/III/M.Sc CS & M.Sc DS
- : IC-T/R-2021
- : Prof Sandeep Kate/Dr.Jenyfal Sampson

S. No	As per regulation 2021		Proposed change in Assessment	
1.	Sessional Examination – I	17.5%	Sessional exam - I	20%
2.	Sessional Exam II	17.5%	Project/Review-I (Formulation on problem statement)	10%
3.	Mid Semester Practical	10%	QuizandProject/Review-II(DevelopmenofAlgorithmst Results)	10%
4.	Regular Laboratory Performance	5%	Project/Review-III (Report submission and assessment based Competitions/Publications)	10%
	Total	50%	Total	50%
	End Sei	mester E	xamination	
5.	Semester End Theory Examinatio n	35%	End Semester Theory Examination	35%
6.	Semester End Practical Examination	15%	Project/Viva (Presentation)	15%
	Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : K. Bavani [KLU3333]

: 213CSE4309 / IT DATA SECURITY

- : CSE/III/V/S25
- : IC-T

: Dr Ambuj Kumar/Dr. Jenyfal Samson

S. No	As per regulation 2021				Proposed change in Assessme	ent	
1.	Sessional Examination – I			17.5	Sessional Examination – I	7.5%	
2.	Sessional Exam II			17.5	Quiz	7.5%	
3.	Mid Semester Practical			10	Project Review I	10%	
4.	Regular Laboratory Performance			5	Project Review II	20%	
5.					Regular Laboratory Performance	5%	
			Total	50%	Total	50%	
End Semester Examination							
6.	Semester Examination	End	Theory	35%	End Semester Theory Examination	35%	
7.	Semester Examination	End	Practical	15%	Project Final Review	15%	

Total	50%	Total	50%
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Name of the Faculty Member Name of the course / course code

Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Dr. P. Anitha [KLU4790]

: Operating Systems (Via P2BL Mode) /

212CSE3303

: CSE/III/V/S5

: Program Core Course IC - T 2021 Regulation

: Dr Ambuj Kumar/Dr. G. Ebenezer Arul

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S. No	As per regulation 2021				Proposed change in Assessme	ent
1.	Sessional Exa	mination	– I	17.5%	Quiz	5%
2.	Sessional Exa	ım II		17.5%	Sessional Examination II	10%
3.	Mid Semester	Practical		10%	Experiment Based Evaluation	5%
4.	Regular Laboratory Performance			5%	Regular Laboratory Performance	5%
5.					Solution Based Evaluation (SBE)	20%
6.					Research Article Based Evaluation	5%
			Total	50%	Total	50%
			End Sem	ester Ex	amination	
7.	Semester Examination	End	Theory	35%	End Semester Theory Examination	35%
8.	Semester	End	Practical	15%	Semester End	150/
	Examination				Practical Examination	13%0
			Total	50%	Total	50%

Name of the Faculty Member : Dr. N. Subbulakshmi[KLU5035] (NSICSE), Dr. S. AriffaBegum [KLU5038] (SABCSE), Dr.V. Sathya Narayanan [KLU5064] (VSNCSE),

Rajeshwary Nair (KLU5226)

Name of the course / course code: 213CSE2301/Predictive AnalyticsDepartment / Year / Semester / Section:CSE/ II Year/ III Sem/ S1, S2, S7 & S16Course Category with Regulation2021Name of Facilitator: Dr Ambuj Kumar/ Dr. R. Raja Subramanian

S.No As per regulation 2021 **Proposed change in Assessment** 1. Sessional Examination – I 17.5% Quiz 5% 2. Data Analysis and Solution Sessional Exam II 17.5% 12.5% Development 3. 10% Sessional Examination - II 17.5% Mid Semester Practical 4. 5% 10% **Regular Laboratory Performance** Mid Semester Practical 5% 5. Regular Lab Performance 50% Total 50% Total **End Semester Examination** 35% End 6. Semester End Theory Theory 35% Semester Examination Examination 7. End Semester Practical 15% **Project Final Review** 15% Examination Total 50% 50% Total

Name of the Faculty Member

: Dr. R. Sumathi [KLU1277] and Ms. R. Syed Ali Fathima[KLU4737]

: 212CSE3301/Design and Analysis of Algorithm

Name of the course / course code

Department / Year / Semester / Section: CSE/III/V/S3 and S29

Course Category with Regulation : IC-T/R-2021 c

Name of Facilitator

: Dr. Ankush Kumar /Dr. R. Rajasubramanian

S. No	As p	er regula	ation 2021	-	Proposed change in Assessme	ent
1.	Sessional Exar	nination -	- I	17.5%	Quiz	5%
2.	Sessional Exa	m II		17.5%	Sessional Examination - II	17.5%
3.	Mid Semester I	Practical		10%	Midsemester Practical	10%
4.	Regular Labor	atory Per	formance	5%	Algorithmic solution development (SBE)	12.5%
5.					Regular Lab Performance	5%
			Total	50%	Total	50%
			End Sem	ester Ex	amination	
6.	Semester Examination	End	Theory	35%	End Semester Theory Examination	35%
7.	Semester Examination	End	Practical	15%	SemesterEndPracticalExamination	15%
			Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator

- : N R Sathiskumar [KLU5034]
- : 213CSE3301/Deep Learning
- : CSE/III/V/Slot 4 S15 & Slot 5 S20
- : IC-T/R-2021
- : Dr. Ankush Kumar/ Dr.Ebenezer

S. No	As per regulation 2021		Proposed change in Assessmen	t
1.	Sessional Examination – I	17.5%	Sessional exam I	10%
2.	Sessional Exam II	17.5%	Quiz	5%
3.	Mid Semester Practical	10%	P2BL based evaluation (Review-I)	10%
4.	Regular Laboratory Performance	5%	P2BL based evaluation (Review – II)	20%
5.			Regular laboratory performance	5%
	Total	50%	Total	50%
	End Ser	nester E	xamination	
6.	SemesterEndTheoryExamination	35%	End Semester theory Examination	35%
7.	SemesterEndPracticalExamination	15%	Project Review	15%
	Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Mr. K. Venkatesh [KLU5161]

:213CSE4307 - Digital Forensics

- : CSE / III / V / S23, S24, S25
- : ICT / P2BL

: Dr. Ankush Kumar Dr. R. Raja Subramanian

S. No	As per regulation	on 2021	-	Proposed change in Assessme	ent
1.	Sessional Exam I		17.5%	Sessional Exam-I	12.5%
2.	Sessional Exam II		17.5%	Quiz	7.5%
3.	Mid Semester Practical		10%	Case Study-Based Evaluation	10%
4.	Regular Laboratory Perfo	rmance	5%	Experiment Based Evaluation	10%
5.				Evaluation by Industry Persons	10%
				Project	
		Total	50%	Total	50%
	End Semester			amination	
6.	Semester End	Theory	35%	Semester End Theory Examination	35%
	Examination				
7.	Semester End	Practical	15%	Final Review (Problem Solution	15%
	Examination			Review)	
		Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Dr.T.Manikumar (TMRCSE) [KLU5162]

: 212CSE2303 – Software Engineering

- : CSE / III / V / Slot3-S9
- : ICT ,2021
- : Dr. Ankush Kumar/Dr. R. Raja Subramanian

S. No	As per regulation 2021		Proposed change in Assessment		
1.	Sessional Examination –	Ι	17.5%	Sessional Examination - I	12.5%
2.	Sessional Exam II		17.5%	Quiz	7.5%
3.	Mid Semester Practical		10%	Case study based assessment	10%
4.	Regular Laboratory Perfo	ormance	5%	Experiment based evaluation	10%
5.				Evaluation by Expert Persons Project solutions	10%
		Total	50%	Total	50%
		End Sem	ester Ex	amination	
6.	Semester End Examination	Theory	35%	End Semester Theory Examination	35%
7.	Semester End Examination	Practical	15%	Project Final Review	15%
		Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code

Department / Year / Semester / Section Course Category with Regulation Name of Facilitator

: Mrs. S. Amutha [KLU4715] : 213CSE3303/Natural Language Processing

Techniques

: CSE/ IIIYear/ V/1

: IC-T,2021

: Dr. Shashikant Kokane /Dr. R. Raja

Subramanian

S. No	As per regulation 2021		Proposed change in Assessme	ent
1.	Sessional Examination – I	17.5%	Sessional Examination-I	15%
2.	Sessional Exam II	17.5%	Quiz	5%
3.	Mid Semester Practical	10%	Case study Evaluation	10%
4.	Regular Laboratory Performance	5%	Regular Laboratory Performance	5 %
5.			Model performance Assessment	15%
	Tota	l 50%	Total	50%
	End Se	nester Ex	amination	
6.	Semester End Theory Examination	35%	Final project Review	15%
7.	Semester End Practica Examination	1 15%	End Semester Theory Examination	35%
	Tota	l 50%	Total	50%

Name of the Faculty Member Name of the course / course code : Mrs. J. Benita [KLU5070]

Department / Year / Semester / Section Course Category with regulation Name of Facilitator

: Natural Language Processing (P2BL)/213CSE3303

- : CSE/III/V/S19
- : IC T

: Dr. Shashikant Kokane /Dr. Jenyfel Samson

S. No	As per regulation 2021		Proposed change in Assessment	
1.	Sessional Exam I	17.5%	Sessional Examination-I	15%
2.	Sessional Exam II	17.5%	Quiz	5%
3.	Mid semester Practical	10%	Case study Evaluation	10%
4.	Regular laboratory Performance	5%	Regular Laboratory Performance	5 %
5.			Model performance Assessment	15%
	Total	50%	Total	50%
	End Sem	ester Exan	nination	
6.	EndExaminationSemester Theory	35%	Final project Review	35%
7.	End Examination Semester (Practical)	15%	End Theory Semester Examination	15%
l	Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator

- : Dr. K. Indhumathi [KLU4834]
- : JAVA Programming / 212BCA2303
- : BCA/ II/ III/A
- : IC-T

: Prof. Charusheela Pandit/ Dr. G. Ebenezer arul samuvel

S. No	As per regulation 2021		Proposed change in Assessment	t
1.	Sessional Examination – I	17.5	Sessional Exam I	10%
2.	Sessional Exam II	17.5	Review I (Problem Identification)	8%
3.	Mid Semester Practical	10	Review II (RequirementGathering, Analysis & Design)	10%
4.	Regular Laboratory Performance	5	Review III (Development & Customization)	10%
5.			Review IV (Testing & Feedback collection)	7%
6.			Review V (Final Presentation & Product Deployment)	5%
	Total	50%	Total	50%
	End Sem	ester E	xamination	
7.	Semester End Theory Examination	35%	Semester End Practical Examination	15%
8.	Semester End Practical Examination	15%	Semester End Theory Examination	35%
	Total	50%	Total	50%
Name of the Faculty Member: Dr. D. Premraja [KLU1447]Name of the course / course code: 212INT3302/Data Science and DataVisualization				·
Depai	rtment / Year / Semester / Section	: IT / II	I / V / D	
Cours	e Category with Regulation	: IC - T &	& R 2021(P2BL Scheme)	
Name	of Facilitator	: Prof. (Charusheela Pandit/ Dr. Jenyfal Sampsor	1
S. No	As per regulation 2021		Proposed change in Assessment	t
1.	Sessional Examination – I	17.5%	Sessional Exam I	10%
2.	Sessional Exam II	17.5%	Problem identification, collection, Cleaning am Pre-processing	10%
3.	Mid Semester Practical	10%	Problem solving and critical thinking	15%
4.	Regular Laboratory Performance	5%	Data Analysis and Model building	15%
5.			Technical Documentation	10%
6.			Participation in competitions	10%
	Total	50%	Total	70%
	End Sem	$\frac{\text{ester Ex}}{250}$	amination	
/.	Examination End Theory	33%	Model Deployment	10%
8.	SemesterEndPracticalExamination	15%	Industry Person evaluation	20%
	Total	50%	Total	30%

Name of the Faculty Member Name of the course / course code

Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Mrs.S.Reshni [KLU5160]

- : 213CSE3303 / Natural Language Processing Techniques
- : CSE/III/V/S12
- : IC-T

: Dr. Shashikant Kokane/Dr.M.Raja

S. No	As per regulation 202	1	Proposed change in Assessme	ent
1.	Sessional Examination – I	17.5%	Sessional Examination-I	15%
2.	Sessional Exam II	17.5%	Quiz	5%
3.	Mid Semester Practical	10%	Case study Evaluation	10%
4.	Regular Laboratory Performance	5%	Regular Laboratory Performance	5 %
5.			Model performance Assessment	15%
	Tot	al 50%	Total	50%
	End Se	emester Ex	amination	
6.	Semester End Theor Examination	y 35%	Final project Review	35%
7.	Semester End Practic Examination	al 15%	End Semester Theory Examination	15%
	Tot	al 50%	Total	50%

Name of the Faculty Member: Mr.S.Kailasam [KLU1332] Name of the course / course code: 213INT2313/Mobile Application Development Department / Year / Semester / Section: IT / III / V / A, D, E Course Category with Regulation: ICT & R 2021(P2BL Scheme) Name of Facilitator: Dr Vikas Shinde/ Dr.K.Vijayakumar

S. No	As per regulation 2021		Proposed change in Assessment	
1.	Sessional Examination – I	17.5%	Sessional Exam I	10%
2.			Code Review Sessions	10%
3.	Sessional Exam II	17.5%	Participation in Hackathon	15%
4.	Mid Semester Practical	10%	User Experience (UX) Assessment	15%
5.	Regular Laboratory Performance	5%	Technical Documentation and Codebase management	10%
6.			Participation in Pitch competition	10%
	Total	50%	Total	70%
	End Sem	ester Ex	amination	
7.	Semester End Theory Examination	35%	App store Deployment	10%
8.	SemesterEndPracticalExamination	15%	Industry Panel evaluation	20%
	Total	50%	Total	30%

Name of The Faculty Member: Meenakshy R V [KLU5353] Name of The Course/Course Code: Forensic Psychology/213FRS4106 Department/Year/Semester/Section: Forensic Science/ 5th/ III year Course Category With Regulation: Program core- Regulation 2021 Name of Facilitator: Dr Ambuj Kumar/ Mr. S J Kabilan

S. No	As per regulation 2021		Proposed change in As	sessme	ent
1.	Sessional Exam I	17.5%	Sessional Exam - I		7%
2.	Sessional Exam II	17.5%	Problem Identification		5%
3.	Open ended Assignments	15%	Design		5%
			Field Work		20%
			Report		8%
			Presentation		5%
	Total	50%		Total	50%
	End Semester Examination				
4.	End Semester Examination	50%	End Semester Examination		50%
	Total	50%		Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with regulation Name of Facilitator : Mr. I. Muthuselvam [KLU5149]

: Mathematical Biology/213MAT2102

: All/II& IV/ III&VII/A

: Discipline Specific Elective Course - 2021

: Prof. Shivani Agrawal/Dr Jenyfal Samson

S. No	As per regulation 2021		Proposed change in Assessm	nent	
1.	Sessional Exam I	17.5%	Problem identification & Data	10%	
			Collection		
2.	Sessional Exam II	17.5%	Mathematical design (Review I)	10%	
			Mathematical Analysis(Review II)	15%	
3.	Assignment	15%	Report Writing	10%	
			Sessional Exam II	20%	
	Total	50%	Total	65%	
	End Semester Examination				
4.	Semester End	50%	Semester End Theory Examination	35%	
	Theory Examination				
	Total	50%	Total	35%	

Name of the Faculty Member: Dr. M. S. Revathy [KLU1931]Name of the course / course code: Energy Physics / 212PHY2102Department / Year / Semester / Section : Physics/III/V/A&UECourse Category with regulation: Theory (R 2021)Name of Facilitator: Dr. Vikas Shinde/Dr. K. Raja

S. No	As per regulation 2021		Proposed change in Assessment	
1.	Sessional Exam I	17.5%	Quiz	5%
2.	Sessional Exam II	17.5%	Case Study	10%
3.	Open ended Assignment	15%	Sessional Exam	15%
4.			P2BL Problem	20%
	Total	50%	Total	50%
	End Ser	mester Ex	amination	
6.	End Semester Examination	50%	End Semester Theory Examination	30%
			P2BL Final Review	20%
	Total	50%	Total	50%

Name of the Faculty Member	: Mr. J. Sarathkumar Sebestin [KLU2009]
Name of the course / course code	: Analysis of Aircraft
structures/212AER3312 Department / Year /	Semester / Section : III/V/A
Course Category with regulation	: IC – T (R-2021)
Name of Facilitator	: Dr. Vikas Shinde/Dr. Jenyfal Sampson (P2BL
Scheme)	

S. No	As per regulation 2021	-	Proposed change in Assessme	nt
1.	Sessional Exam I	17.5%	Sessional Exam II	10%
2.	Sessional Exam II	17.5%	Experiment based Evaluation	15%
3.	Mid Semester Practical	10%	Field Report/ Case	20%
			Studies	
4.	Regular Laboratory Performance	5%	Regular Laboratory Performance	5%
	Total	50%	Total	50%
	End S	Semester	Examination	
5.	End Semester Examination	35%	End Semester Examination	35%
6.	End Semester Examination	15%	End Semester Examination	15%
	(Practical)		(Practical)	
7.	Total	50%	Total	50%

Name of the Faculty Member: P. Ramkumar [KLU1205]Name of the course / course code: 213AER3101 - Heat TransferDepartment / Year / Semester / Section: Aero / 3rd year / 5th Sem. / ACourse Category with Regulation: Theory & R 2021Name of Facilitator: Prof. Akash Bidwaik/Dr. G. Ebenezer arul samuvel (P2BL Scheme)

S. No	As per regulation 2021	Proposed change in Assessme	ent	
1.	Sessional Exam I	17.5%	Sessional Exam I	15%
2.	Sessional Exam II	17.5%	Sessional Exam II	15%
3.	Open ended Assignments	15%	Design & Fabrication of setup and report	20%
	Total	50%	Total	50%
End Semester Ex			mination	
4.	End Semester Examination	50%	End Semester Examination	50%
	Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category Name of the Mentor/Facilitator : H Raja : Dr. M. Sivasubramanian[KLU 1125]

: Heat and Mass Transfer/ 212MEC2318

: Mechanical Engineering / VI / VII

: Integrated Course – Theory (R2021)

: Prof. Akash Bidwaik/Dr. Jenyfal Sampson / Dr. M.

S. No	As per regulation 2021		Proposed change in Assessment	
1.	Sessional Exam I	17.	Sessional Exam I	10%
		5%		
2.	Sessional Exam II	17.	Zeroth Review (5 Mark)	10%
		5%	Seminar (5 Mark)	
3.	Mid Semester Practical	10	Team Interaction (5 Mark)	15%
		%	Progress Review 1 (10 Mark)	
4.	Regular Laboratory Performance	5%	Demonstration (5 Mark)	15%
			Progress Review 2 (10 Mark)	
5.			Final Review by Industry	20%
			Expert (20 Mark)	
	Total	50	Total	70%
		%		
	End S	emest	er Examination	
6.	End Semester Examination (T)	35	End Semester Examination (T)	20%
		%		
7.	End Practical Examination (P)	15	End Practical Examination (P)	10%
		%		
	Total	50	Total	30%

|--|

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with regulation Name of Facilitator

- : Dr. V. Arumugaprabu [KLU1461]
- : Design of Machine Elements/212MEC3114
- : MECH/III/V
- : Theory
- : Dr. Vikas shinde/Dr Jenyfal Samson

S. No	As per regulation 202	1	Proposed change in Ass	essment
1.	Sessional Exam I	17.5%	Problem Identification	10%
2.	Sessional Exam II	17.5%	Sessional Exam II	10%
3.	Open Ended Assignments	15%	Project Report I	8%
4.			Project Report II	7%
5.			Final Project Presentation	30%
6.	Total	50%	Total	65%
	End	Semester Ex	kamination	
7.	End Semester	50%	End Semester Examination	35%
	Examination (Theory)		(Theory)	
	Total	50%	Total	35%

Name of the Faculty Member Name of the course / course code : Dr. R. Premkumar [KLU1263] : Concrete Materials And Technology / 212CIV2310, : III B.Tech/ V/ A

Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Prof. Sh

: Program Core /IC T - R2021 P2BL Course

: Prof. Shilpa Deshpande and Dr. Heena Jain/Mr. S. J. Kabilan

S. No	As per regulation 2021	Proposed change in Assessme	ent	
1.	Sessional Exam I	17.5%	Poster presentation	10%
2.	Sessional Exam II	17.5%	Sessional Exam - II	10%
3.	Mid Semester Practical	10%	Seminar	10%
4.	Regular Laboratory Performance	5%	Project Review (I, II and III)	20%
	Total	50%	Total	50%
End Semester Ex			mination	
5.	End Semester Examination (T)		End Semester Examination (T)	25%
6.	End Practical Examination (P)1.		Project	25%
	Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code : Dr. PL. Meyyappan [KLU1186] : 212CIV1107 / Construction Engineering and Management

Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Prof. Shilpa Department : III B.Tech/ V/ A

: Program Core / T - R2021 P2BL Course

Name of Facilitator : Prof. Shilpa Deshpande and Dr. Heena Jain/ Mr.S.J.Kabilan

S. No	As per regulation 2021	_	Proposed change in Assessme	ent
1.	Sessional Exam I	17.5%	Conceptual Report – 3 Nos.	10%
2.	Sessional Exam II	17.5%	Project Review assessment - I	5%
3.	Open ended Assignments	15%	Sessional Exam II	10%
			Project Review assessment - II	5%
			Field visit – 5 Nos	10%
			Poster Presentation – 2 Nos.	5%
			Project Review assessment - III	5%
	Total	50%	Total	50%
End Semester Examination			mination	
4.	End Semester Examination	50%	End Semester Examination (T)	30%
5.			Project	20%
	Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category Name of Facilitator

- : Dr. S. Sakthivel [KLU5158]
- : Sensors and Data Acquisition/ 212BME2320
- : BME/ III/V/A
- : Program core / 2021
- : Prof. Sandeep Kate/ Dr.K.Vijayakumar

S. No	As per regulation 2021		Proposed change in Assessme	ent
1.	Sessional Exam I	17.5%	Sessional Exam I	10%
2.	Sessional Exam II	17.5%	Phase – I Review	10%
3.	Mid Semester Practical	10%	Report writing on Industrial lecture	10%
4.	Regular Laboratory Performance	5%	Phase – II Review	15%
5.			Participation in Hackathon Project	25%
			expo, Idea pitch etc.,	
	Total	50%	Total	70%
	End Ser	mester Ex	amination	
6.	Semester End Theory	35%	Phase – III Review + Viva Voce	30%
	Examination			
7.	Semester End Practical	15%		
	Examination			
	Total	50%	Total	30%

Name of the Faculty Member Name of the course / course code Microcontroller

: Dr. T. Arunprasath [KLU1427]

: Microprocessor and

/212BME2318

Department / Year / Semester / Section : BME/III/V/A Course Category

: Program Core/2021

Name of Facilitator : Prof. Jasmine Hirani and Prof. Sharad Wagh/Dr. K. Vijaykumar

S. No	As p	As per regulation 2021			Proposed change in Assessme	ent
1.	Mid-Semester	Practica	1	17.5%	Sessional Exam I	10%
2.	Sessional Exa	m		17.5%	Quiz	10%
3.	Open-Ended (Group Ta	sks/Project	10%	Report Writing on Industrial	10%
					Lecture	
4.	Regular Labor	ratory Pe	rformance	5%	Phase – I Review	10%
5.					Phase II Review	10%
6.					Competition Based Assessment	20%
			Total	50%	Total	70%
			End Sem	ester Ex	amination	
7.	Semester	End	Theory	35%	Phase – III Review	30%
	Examination					
8.	Semester	End	Practical	15%		
	Examination					
			Total	30%	Total	30%

Name of the Faculty Member Name of the course / course code Learning) Department / Year / Semester / Section Course Category with Regulation Name of Facilitator

: Dr. Josephine Selle Jeyanathan [KLU958] IoT Sensors & Devices 211ECE1400 (Project-based

: ECE / II / III / B

: IC-P 21R

: Prof. Sandeep Kate/Dr. K. Vijaykumar

S. No	As per regulation 2021				Proposed change in Assessme	ent
1.	Sessional Exar	nination -	– I	17.5%	Sessional Examination – I	10%
2.	Sessional Exa	m II		17.5%	Experiment based Evaluation	20%
3.	Mid Semester I	Practical		10%	Quiz	10%
4.	Regular Laboratory Performance			5%	PBL Model design development	30%
5.						
			Total	50%	Total	70%
			End Sem	ester Ex	amination	
6.	Semester Examination	End	Theory	35%	PBL s Demonstration of solution to the problem	30%
7.	Semester Examination	End	Practical	15%		

Total	50%	Total	30%
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Name of the Faculty Members

Name of the course / course code Department / Year / Semester / Section Course Category with Regulation : Dr.Aarthi.V.P.M.B.[KLU4668] Dr.A.MuthuKumar [KLU780] :212ECE1302 / Data Communication Networks : ECE / III / V / B, D,C

: PC [IC-T] & 2021

Name of Facilitator : Prof. Jasmine Hirani and Prof. Sharad Wagh/ Dr. Vijaya Kumar

S. No	As per regulation 2021		Proposed change in Assessment	
		-		
1.	Sessional Exam I	17.5%	Sessional Examination I	15%
2.	Sessional Exam II	17.5%	Open Book Test	15%
3.	Open ended Assignments	15%	Mid Practical	20%
4.			PBL Solution (Regular	20%
			Performance)	
	Total	50%	Total	70%
End Semester Examination		mination		
5.	End Semester Examination	50%	End Semester PBL Demo with	30%
			Expected Outcomes (Project	
			Review)	
6.				
	Total	50%	Total	50%

Name of the Faculty Member : Dr. C. Jenila [KLU4666]

Name of the course / course code : Optical Networks/213ECE3331

Department / Year / Semester / Section : ECE/IV/VII

Course Category with Regulation : Program Elective/2021R

Name of Facilitator: Prof. Jasmine Hirani and Prof. Sharad Wagh/ Dr. Vijaya Kumar

S. No	As per regulation 2021		Proposed change in Assessme	ent
1.	Sessional Examination – I	17.5%	Sessional Examination – I	15%
2.	Sessional Exam II	17.5%	Sessional Examination – II	15%
3.	Mid Semester Practical	10%	Experiment based Evaluation	10%
4.	Regular Laboratory Performance	5%	PBL – Regular Performance	30%
	Total	50%	Total	70%
	End Sen	ester Ex	amination	
5.	Semester End Theory Examination	35%	PBL solution Demonstration +	30%
6.	Semester End Practical	15%	Viva Voce	5070
	Examination			
	Total	50%	Total	30%

Name of the Faculty Member Name of the course / course code

Department / Year / Semester / Section Course Category Name of Facilitator : Dr. J. Charles Pravin [KLU2123]

- : Digital Circuits and System Design /212ECE1301
- : BME/III/V/A
- : Program Core/2021/IC P
- : Prof. Jasmine Hirani and Prof. Sharad Wagh/
- Dr.Vijaya Kumar

S. No	As per regulation 2021		Proposed change in Assessment		
1.	Sessional Exam I	17.5%	Case study based evaluation	10%	
2.	Sessional Exam II	17.5%	Sessional Exam I	15%	
3.	Open-Ended Group Tasks/Project	10%	Project Internal Review I	15%	
4.	Regular Laboratory Performance	5%	Mid Semester Lab	10%	
5.			Project Internal Review II	20%	
	Total	50%	Total	70%	
	End Sem	ester Ex	amination		
6.	Semester End Theory	35%	External Project Demo	30%	
	Examinatio				
	n				
7.	Semester End Practical	15%			
	Examinatio				
	n				
	Total	50%	Total	30%	
Name o	f the Faculty Member	: Mr. S. 1	Rajendran [KLU1368]		
Name of the course / course code		: Analog Electronics/212EEE1304			
Department / Year / Semester / Section		: EEE/II/III/A			
Course	Category	: IC – T (R 2021)			
Name o	f Facilitator	: Prof. Jasmine Hirani and Prof. Sharad Wagh/			
		Dr. Vijaya Kumar			

S. No	As per regulation 2021			Proposed change in Assessment		
1.	Sessi	onal Exar	n I	17.5%	Open Book Test	10%
2.	Sessional Exa	ım II		17.5%	Sessional Exam – II (Design	15%
					Based)	
3.	Mid Semester	r Practical		10%	Phase I	10%
					Review: Simulation based Outputs	
4.	Regular Labo	ratory Per	rformance	5%	Mid Semester Lab	10%
5.					Phase 2	20%
				Review : design &		
					Circuit Hardware	
					Prototype	
6.					Competition based assessment	5%
	Total			50%	Total	70%
End Semester Examination						
7.	Semester	End	Theory	35%	External Project Demo	30%
	Examination					
8.	Semester	End	Practical	15%		
	Examination					

Total	50%	Total	30%
-			

Name of the Faculty Member Name of the course / course code Department / Year / Semester / Section Course Category with Regulation Name of Facilitator : Dr. A. Ramkumar [KLU792]

- : Special Electrical Machines / 213EEE3142
- : EEE/III/V/A
- : T 2021R
- : Prof. Swapna Manurkar/ Dr. K. Vijayakumar

S No	As ner regulation 2021	Proposed change in Assessment			
5.110	As per regulation 2021		T toposed change in Assessing	-110	
1.	Sessional Exam I	17.5%	Open book test	10%	
2.	Sessional Exam II	17.5%	Sessional Exam - II (Design	15%	
			Based)		
3.	Open ended Assignments 15%		<u>Review-I</u> : Formulation of	10%	
			proposed methodology		
			<u>Review-II</u> : Simulation based	15%	
			outputs		
			Review-III: Circuit Design &	20%	
			Competition based assessment		
	Total	50%	Total	70%	
End Semester Examination					
4.	End Semester Examination	50%	Final review	30%	
			(Hardware prototype)		
	Total	50%	Total	50%	

Name of the Faculty Member Name of the course / course code : H Department / Year / Semester / Section Course Category Name of Facilitator : Dr. A. Muthukumaran[KLU779]

: Healthcare Biotechnology/213BIT2109

: BIT/III/V

: Professional Elective (P2BL)

: Dr. Vikas Shinde / Mr. S J Kabilan

S. No	As per regulation 2021				Proposed change in Assessment	
1.	Sessional Exa	m I		17.5%	Sessional Exam I	15%
2.	Sessional Exa	m II		17.5%	Case Study Analysis	5%
3.	Open Ended Assignment			15%	Mini Project I	15%
4.					Mini Project II	15%
			Total	50%	Total	50%
			End Sem	ester Ex	amination	
5.	Semester Examination	End	Theory	35%	Experiment Based Evaluation	20%
6.	Semester Examination	End	Practical	15%	Semester End Theory Examination	30%
			Total	50%	Total	50%

Name of the Faculty Member	: Dr. J. Kanimozhi [KLU2789]
Name of the course / course code	: Bioenergy/213BIT2112
Department / Year / Semester / Section	: BIT/III/V
Course Category	: Professional Elective (P2BL Implemented)
Name of Facilitator	: Dr. Vikas Shinde / Mr. S J Kabilan

S. No	As per regulation 2021		Proposed change in Assessment			
1.	Sessional Exam I	17.5%	Sessional Exam I	15%		
2.	Sessional Exam II	17.5%	Field Report	5%		
3.	Open Ended Assignment	15%	Mini Project I	15%		
4.			Mini Project II	15%		
	Total	50%	Total	50%		
End Semester Examination						
5.	Semester End	50%	Semester End Theory	30%		
	Theory Examination		Examination			
6.			Experiment Based Evaluation	20%		
	Total	50%	Total	50%		

Name of the Faculty Member: Dr. L. Muthulakshmi [KLU2789]Name of the course / course code: EnvironmentalBiotechnology/213BIT2108 Department / Year / Semester / Section: Biotech/III &IV/V & VII/CBCS: Open Elective (R- 2021)Name of Facilitator: Dr. Vikas Shinde / Mr. S J Kabilan

S. No	As per regulation 2021				Proposed change in Assessment		ent	
1.	Sessional Exam I			17.5%	Sessional Exam I			17.5%
2.	Sessional Exar	n II		17.5%	Mini-Project	/Survey Repo	ort	20%
3.	Mid Semester Practical			10%				
4.	Regular Laboratory Performance			5%	Case studies,	/Field Report		12.5%
			Total	50%			Total	50%
			End Sem	ester Ex	amination			
5.	Semester	End	Theory	35%	Semester	End	Theory	35%
	Examination				Examination	l		
6.	Semester	End	Practical	15%	Evaluation b	y Industry Pe	erson	15%
	Examination							
			Total	50%			Total	50%

Name of the Faculty Member Name of the course / course code

Department / Year / Semester / Section Course Category Name of Facilitator

: Dr. R. Baburaj [KLU3101] : Instrumental methods of Analysis of Foods /212FTE3114 : Foodtech/IV/VII/A : TC/21R

: Dr. Vikas Shinde / Mr. S J Kabilan

S.	As per regulation 2021	Proposed change in Assessment		
No		-		
1.	Sessional Exam I	17.5%	Case Study/ Field Survey report	10%
2.	Sessional Exam II	17.5%	Quiz	10%
3.	Open Ended Assignments	15%	Sessional Exam II	15%
4.			Project Review I	15%
	Total	50%	Total	50%
	End Ser	mester Ex	xamination	
5.	Semester End Theory Examination	35%	Mini project/External Review	20%
6.	Semester End Practical Examination	15%	Semester End Theory Examination	30%
	Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code

Course Category

Name of Facilitator

: Dr. R. Rajam [KLU3215]

Department / Year / Semester / Section

: Technology of Fruits and vegitables /212FTE2306

: BIT/III/V/CBCS

- : IC T (R -2021)
- : Dr. Vikas Shinde / Mr. S J Kabilan

S. No	As per regulation 2021			Proposed change in Assessment	
1.	Sessional Exam I		17.5%	Quiz	10%
2.	Sessional Exam II		17.5%	Case Study	5%
3.	Mid Semester Prac	tical	10%	Sessional Exam II	15%
4.				Mini Project Review	15%
5.	Regular Laboratory Performance		5%	Regular Lab performance	5%
		Total	50%	Total	50%
		End Sem	ester Ex	amination	
6.	Semester En	d Theory	35%	Semester End Practical	20%
	Examination			Examination	
7.	Semester End	l Practical	15%	Semester End Theory Examination	30%
	Examination				
		Total	50%	Total	50%

Name of the Faculty Member Name of the course / course code / Year / Semester / Section Course Category with Regulation Name of Facilitator: --- : Dr. Jenyfal Sampson [KLU962]

: IoT Sensors and Devices / "211ECE1400" Department

: ECE / II / III / A & CSE / II / III / S13 (Slot 2)

: IC – P/ R2021 (PBL)

S. No	As per regulation 2021		Proposed change in Assessment			
1.	Mid-Semester Practical	20%	Project Review (Phase I)	10%		
2.	Sessional Examination	20%	Report writing of the Guest Lecture / Workshop	10%		
3.	Open-ended group task/Project/et.,	10%	Sessional Examination:25 Qns	10%		
4.	Regular laboratory performance	20%	Regular Laboratory performance	20%		
5.			Project Review (Phase II)	20%		
	Total	70%	Total	70%		
End Semester Examination						
6.	Evaluation of the problem/Project	20%	Project Review (Phase III)	20%		
7.	Comprehensive viva-voce on course	10%	Paper presentation / Project competition participation.	10%		
8.	Total	30%	Total	30%		



EXperiential and SErvice Learning – EXSEL

Preamble

EXperiential and SErvice Learning – EXSEL links the teaching, learning and research activities of the university to the community to address the specific needs of the society. EXSEL operates in two phases namely experiential core *design-build* and experiential core *design-build-operate*. Its mandatory for all the students to engage in SDG/ community (NGO, Industries) associated real time problem solving. Faculty members are clustered in chosen SDG themes and mentoring multi-disciplinary student teams.

In experiential core *design-build*, teams will understand the problem statement chosen, by the detailed study/ survey on existing product and by developing the conceptual design .

In experiential core *design-build-operate*, teams will develop detailed design of all the components used in the conceptual design and develop the product, which may be deployed to be operational to get the first-hand feedback from the end user.

Digital notes: All the members in the team are expected to note their findings and learnings individually in the digital notes

Scope

This document is applicable to all the students, Faculty members, Community involved in the EXSEL.

Stages of EXSEL

The following stages are involved in the complete cycle of any product

- 1. Problem Formulation
- 2. Survey on existing product (Product Analysis)
- 3. Product Requirement and specifications
- 4. Conceptual Design
- 5. Detailed design
- 6. Prototype/ Product development

Whenever a new problem statements from the identified SDGs

- Climate Change (SDG 13)
- Clean Energy (SDG 7)
- Food Security and Nutrition (SDG 2)
- Sustainable Agriculture (SDG 2)
- Wellbeing for all at all ages (SDG 3)

or community (NGO / Industry) are floated or identified it should be started from the problem formulation stage. Existing problem statement will move to the next stages along





with the existing students and the new students team. Always there will be provision of scope creep based on the feedback received from the various stakeholders.

New students team joining in the existing problem statements should spend minimum 2/3 weeks in studying the existing product in the market / detailed study of the solution developed as of now to the existing problem.

Figure 1 Different Stages







Section 1- Problem Formulation

In the overall scope of the EXSEL the problem statements are evolved through the following three categories

- SDG's Theme (Based on the theme allotted faculty floating the broad problem statement)
- NGO's (Based on the visit and interaction of the faculty members and the students with the NGO)
- Industries (Based on the requirement of the industries or international partners problem statements are framed)

SDG themes

Out of the 17 Sustainable goals identified and announced by the United Nations, the following four SDGs as five themes are identified, based on the infrastructure, faculty expertise and the programme offered

- Climate Change(SDG 13)
- Clean Energy(SDG 7)
- Food Security and Nutrition (SDG 2)
- Sustainable Agriculture (SDG 2)
- Wellbeing for all at all ages (SDG 3)

Need Analysis

A student team should analyse the broad problem statement given by the faculty members (in any one of the abovementioned themes) / identified based on the interaction with NGO/ industry/ international partner and conduct the need assessment for narrowing down the problem statement.

Problem identification and Definition

The faculty team and the students team discuss together to narrow down the problem definition with the preliminary objective of the problem statements.

Apart from problem identification and definition. as it is a multidisciplinary team from different programme and different year students are expected to interact each other and understand the technical strengths of each member and develop the interpersonal skills.





Confirmation of problem statement by University/ NGO/ Industry or University Partner

The defined problem statement for the development of the new or existing product must be approved by the team of expert members from the university and the Community involved (applicable for NGO/ Industry/ International universities) to ensure the quality of the product.

Documentation

This part ought to have a succinct explanation that responds to inquiries like:

- Why are you working on the project (i.e., what is the driving force behind it?)
- Innovation: How does your design is better than the solutions that are currently available
- Other than your consumer, who else will your project impact?
- Sustainability: what are all the positive impact to the environment
- Social Impact: How your design/ solution will impact in people's live
- Scalability: Feasible of your design to go to market at scale
- Economy/ Cost effective: How the design/ solution is cost effective from the exiting solutions
- Universal design/ Solution : Whether your design/ solution is universal irrespective of age, gender, physical condition, countries etc
- Who is vested in the project's success in a significant way?
- What results can be expected from the project?
- What are the requirements for the project to be a success

Survey on Existing product (Product analysis)

This phase is to emphasis the students' team to be aware of the existing products/ solutions already available in the market which is relevant to the Problem statement they selected. Students are expected to do the analysis which covers the both technical and nontechnical parameters as represented below





PRODUCT ANALYSIS – PARAMETERS TO CONSIDER



Features and Limitations of the existing products

Students are expected to study and understood the features and limitations of the existing product in the above technical and nontechnical parameters. Minimum five parameters need to be analysed in depth. (Minimum three existing solutions)

Constraints of the products

The constraints in the existing product need to be analysed (by interacting with the end user, studying the reviews of users or product feedback) in the above technical and non-technical parameters

Merits of the existing products:

The wow factor or merits of the existing product need to be analysed

Scope for improvement or new development

Based on the detailed analysis of the features, limitations and constraints of the existing product, students' team may propose / come out with the improvement in the existing product or development of a new product. Students team may list out the list of improvements possible in different parameters and in consultation with the faculty guide optimal solution proposed may be frozen as the objectives/ outcomes of the Design project





Matrix representing the Merits and demerits of the product has to be prepared

Product Name	Merits	Merit	Scope of	Scope of
			Improvement/	Improvement/
			Demerits	Demerits
Product 1				
Product 2				
Product 3				
Product 4				
Product 5				

Functional Requirements

Functional requirements in the concept development process of a design project refer to the specific capabilities, features, and functionalities that the design solution must possess to meet the needs of users and address the problem or challenge at hand. These requirements focus on the practical aspects of the design and define what the design should be able to do. Here are some key considerations for defining functional requirements during the concept development process:

User Needs: Identify the core needs and expectations of the target users. What problems or challenges should the design solution address? Consider factors such as usability, ease of interaction, accessibility, and user satisfaction.

Use Cases: Define the different scenarios or situations in which the product will be used. This helps identify the specific tasks, actions, or interactions that the design should support. For each use case, determine the required functionalities and features.

Task Analysis: Analyze the tasks and activities that users will perform using the project. Break down these tasks into smaller steps and identify the functionality needed to support each step. Consider factors such as input/output requirements, data processing, and information flow.

Functional Scope: Determine the boundaries and scope of the design solution. What functionalities will be included, and what will be excluded? Consider the project constraints, technological limitations, and available resources.

Integration Requirements: If the design needs to integrate with other systems, platforms, or technologies, define the integration requirements. Identify the necessary interfaces, protocols, or compatibility criteria that need to be met.

Performance Metrics: Specify the desired performance metrics and benchmarks for the design. For example, if it's a software application, consider factors such as response time, loading speed, processing capacity, or data storage requirements.





Safety and Security: Identify any safety or security requirements that need to be considered in the design. This may include data protection, user privacy, compliance with regulations, or physical safety considerations.

Scalability and Flexibility: Consider the future scalability and flexibility of the design solution. Will it be able to accommodate potential growth or changes in user needs? Define any scalability or flexibility requirements that should be met.

Constraints and Trade-offs: Recognize the limitations and trade-offs that may need to be made. Consider factors such as budget, time constraints, technical feasibility, and resource availability. Balance the desired functionalities with the practical constraints of the project.

It's important to involve stakeholders, users, and technical experts during the process of defining functional requirements. This helps ensure that the requirements are comprehensive, realistic, and aligned with the project goals and user needs. The functional requirements serve as a foundation for the subsequent design and development phases, guiding the creation of prototypes, wireframes, and ultimately the final product or solution.

Output: Requirements document

Requirement name, what the requirement is, including units (measurable), how do we know it is achieved, where did it come from or the source of the requirement (e.g. user input)

3 Concept Design Phase

3.1 Brainstorming

Define Discuss the Problem: Clearly articulate the design problem you are trying to address. This helps focus the brainstorming session and ensures everyone is on the same page. As the team consists of diverse group of individuals with different backgrounds, perspectives, and expertise related to the design project. This variety can lead to more innovative and unique ideas.

Generate Ideas: Begin the brainstorming session by encouraging participants to generate as many ideas as possible. Encourage them to think freely and avoid self-censorship. Quantity is more important than quality at this stage.

Use Visualization Techniques: Utilize visual aids such as sketches, diagrams, or mood boards to help stimulate ideas and create a shared understanding of concepts.

Organize and Cluster Ideas: Review all the generated ideas and group them into clusters or categories based on their similarities or themes. This organization helps identify patterns and relationships between ideas.





Evaluate and Prioritize: Once you have a collection of ideas, evaluate them based on their feasibility, relevance, and alignment with the project goals. Prioritize the most promising ideas that you want to explore further.

Document and Capture Ideas: This can be done through notes, visual recordings, or a digital collaboration tool like Microsoft OneNote. Make sure all the ideas are recorded accurately.

Narrowing ideas: Create a decision matrix that evaluates the final ideas with the requirements for final concept selection. Compare at least five ideas in the decision matrix. Requirements should be weighted based on their importance.

Follow Up: After the brainstorming session, review the captured ideas, select the most viable ones, and create an action plan to move forward with the design project. Assign responsibilities and set deadlines for further development and implementation.

Products of this stage:

Brainstormed list of ideas (minimum number?)

To create a decision matrix, we will evaluate five ideas based on specific requirements and assign weights to each requirement based on their importance. Here's an example of a decision matrix comparing five ideas (Idea A, Idea B, Idea C, Idea D, and Idea E) against three requirements (Requirement 1, Requirement 2, and Requirement 3) with respective weights:

Ideas	Requirement 1 (Weight: 4)	Requirement2(Weight: 5)	Requirement 3 (Weight: 3)
Idea A			
Idea B			
Idea C			
Idea D			
Idea E			

Now, let's fill in the matrix by assigning scores to each idea based on how well they meet the requirements. The scoring can be based on a scale of 1 to 5, with 1 being the lowest and 5 being the highest.

Ideas	Requirement 1 (Weight: 4)	Requirement 2 (Weight: 5)	Requirement 3 (Weight: 3)
Idea A	4	3	5
Idea B	3	4	2
Idea C	5	5	4
Idea D	2	3	4
Idea E	4	4	3





Once the scores are assigned, we can calculate the weighted scores for each idea by multiplying the score with the corresponding weight.

Ideas	Requirement 1 (Weight: 4)	Requirement 2 (Weight: 5)	Requirement 3 (Weight: 3)	Weighted Score
Idea A	4	3	5	46
Idea B	3	4	2	38
Idea C	5	5	4	67
Idea D	2	3	4	35
Idea E	4	4	3	45

Finally, we can compare the weighted scores to determine the best idea based on the given requirements. In this example, Idea C has the highest weighted score of 67, indicating that it performs the best according to the specified requirements.

Please note that this is just an example, and the actual requirements, weights, and scores should be tailored to your specific project and criteria.

Clarification 2

The requirements listed below are for illustrative purposes only. In an actual project, it is important to collaborate with stakeholders, including end-users, domain experts, and project managers, to gather and refine the requirements to ensure they align with the project's goals and constraints.

Requirement 1: Response Time

Description: The system should have a response time of less than 100 milliseconds.

Unit: Milliseconds (ms)

Verification: Response time will be measured and tested using appropriate tools or benchmarks during system testing phase.

Source: Derived from user input and industry best practices.

Requirement 2: Power Consumption

Description: The system should consume less than 5 watts of power during normal operation.

Unit: Watts (W)

Verification: Power consumption will be measured using power monitoring equipment during system testing phase.





Source: Derived from efficiency goals and specifications provided by the project stakeholders.

Requirement 3: Memory Usage

Description: The system should use no more than 128 megabytes (MB) of memory for data storage and program execution.

Unit: Megabytes (MB)

Verification: Memory usage will be measured during system testing phase using appropriate monitoring tools or profiling techniques.

Source: Derived from hardware limitations and performance expectations provided by the project stakeholders.

Requirement 4: Reliability

Description: The system should have a mean time between failures (MTBF) of at least 10,000 hours.

Unit: Hours

Verification: Reliability testing will be conducted over an extended period to simulate real-world conditions and measure failure occurrences.

Source: Derived from reliability goals and industry standards for similar systems.

Requirement 5: User Interface Responsiveness

Description: The user interface of the system should respond to user inputs within 500 milliseconds.

Unit: Milliseconds (ms)

Verification: User interface response time will be measured and tested using appropriate tools or user feedback during system testing phase.

Source: Derived from user input and usability studies conducted with potential end-users.

Rubrics:

1	2	3	4	5
Idea lacks	Limited	Idea shows	Idea	Idea is highly
originality and	originality with	moderate	demonstrates	original, unique,
have minimal	some potential	originality and	good originality	and have a
impact.	impact.	can have	and have a	transformative
		noticeable	significant	impact.
		impact.	impact.	

1. Originality and Impact:





2. Innovation and Uniqueness:

1	2	3	4	5
Lack of	Some attempts	Idea shows	Idea	Idea exhibits
innovative	at innovation,	moderate	demonstrates	exceptional
thinking; idea is	but idea lack	levels of	good levels of	innovation and
unoriginal and	uniqueness.	innovation and	innovation and	provide truly
conventional.		offer some	incorporate	unique and
		unique	unique	novel
		elements.	elements.	approach.

3. Feasibility of Ideas:

1	2	3	4	5
Idea lacks	Limited	Idea is	Idea	Idea is highly
practicality and	consideration	moderately	demonstrates	feasible, with a
feasibility;	of practicality;	feasible, with	good feasibility;	strong focus on
unlikely to be	some ideas may	a mix of	most are	practicality and
implemented.	be difficult to	practical and	practical and	implementation
	implement.	less practical	implementable	
		concepts		

4. Problem Understanding:

1	2	3	4	5
Limited	Some	Adequate	Good	Deep
understanding	understanding,	understanding	understanding	understanding
of the problem	but concepts do	of the problem,	of the problem,	of the problem,
or challenge.	not address the	with concepts	with concepts	with concepts
	core problem	partially	directly	effectively
	effectively.	addressing the	addressing the	addressing the
		core issue.	core issue.	core issue.

5. Adaptability to Real Problem:

1	2	3	4	5
Idea lacks	Some relevance	Moderate	Good relevance	Excellent
relevance or fail	to the real	relevance to the	to the real	relevance to the
to address the	problem, but	real problem,	problem, with	real problem,
specific real	the concepts	with concepts	concepts	with concepts
problem	need further	addressing key	addressing	directly
effectively.	refinement.	aspects.	most critical	addressing all
			aspects.	critical aspects.

6. Product Development Planning:





1	2	3	4	5
Lack of clear	Limited product	Adequate	Well-developed	Comprehensive
product	development	product	product	product
development	planning; some	development	development	development
plan; no	stages or	planning; key	plan; all	plan;
consideration	processes are	stages and	essential stages	well-defined
of key	missing or	processes are	and processes	stages,
development	poorly defined.	defined but	are defined	processes, and
stages.		may lack detail.	with	milestones with
			reasonable	thorough detail.
			detail.	

Decision matrix with final ideas compared to requirements.

Concept recommendation

3.2 Analyse and Synthesize the Concept

In the concept development phase of a design project, analysis and synthesis play critical roles in shaping and refining ideas to create viable concepts. Here's how analysis and synthesis are applied in this phase:

Analysis

- Problem Analysis
- User Research
- Competitive Analysis
- Contextual Analysis

Problem Analysis: Start by thoroughly understanding the problem or design challenge. Analyse its various aspects, constraints, and requirements. Consider the needs and goals of the target users or audience.

User Research: Conduct user research to gain insights into the users' behaviors, preferences, and pain points. This analysis helps create user personas, identify user journeys, and understand their needs and expectations.

Competitive Analysis: Analyse the offerings of competitors or similar products/services in the market. Identify their strengths, weaknesses, and unique selling points. This analysis helps identify gaps and opportunities for differentiation.

Contextual Analysis: Consider the broader context in which the design will be used. Analyse the environmental, social, cultural, and technological factors that may influence the design decisions.

Synthesis:





Idea Evaluation: Evaluate the generated ideas from brainstorming session conducted earlier against the established design criteria, user needs, and project objectives. Consider factors such as feasibility, desirability, viability, and technical constraints. This evaluation helps identify the most promising ideas for further development.

Concept Development: Combine and refine the selected ideas to create coherent and meaningful concepts. Explore different variations, iterations, and combinations to develop a range of design concepts that address the identified problem and user needs.

Prototyping: Create low-fidelity prototypes or mock-ups to visualize and communicate the concepts. Prototyping allows for quick testing and iteration, helping to refine the concepts further.

Throughout the concept development phase, analysis and synthesis are iterative processes that influence each other. The analysis provides insights and data that inform the synthesis process, while synthesis helps uncover new insights and perspectives that may require further analysis. This iterative approach ensures that the concepts are grounded in research and effectively address the identified problem and user needs.

3.3 Validation and feedback

Validation and feedback are crucial aspects of the concept development phase in a design project. They help ensure that the generated concepts are viable, effective, and aligned with user needs and project goals. Validation and feedback can be incorporated into the concept development process:

User Testing: Conduct user testing to gather feedback and insights on the initial concepts. Create prototypes or mock-ups of the concepts and have users interact with them. Observe their behavior, collect their feedback, and listen to their suggestions and concerns. User testing helps identify usability issues, uncover user preferences, and validate the effectiveness of the concepts.

Iterative Refinement: Based on the feedback and insights gained from user testing, iteratively refine and improve the concepts. Incorporate the feedback into the design, addressing any usability issues or concerns raised by users. This iterative process allows for continuous improvement and ensures that the concepts are well-adapted to user needs.

Expert Reviews: Seek feedback from domain experts, such as designers, engineers, or subject matter experts relevant to the project. Present the concepts to them and gather their insights and suggestions. Their expertise can provide valuable perspectives and help identify potential improvements or considerations that may have been overlooked.

Stakeholder Feedback: Engage with project stakeholders, including NGOs, industry, and other relevant parties. Present the concepts to them and gather their feedback, ensuring that the concepts align with their expectations and requirements. Stakeholder feedback helps ensure that the concepts are on track and meet the project objectives.





Concept Evaluation Criteria: Establish evaluation criteria or metrics to assess the viability and effectiveness of the concepts. Define specific criteria that the concepts should meet, such as user satisfaction, feasibility, alignment with project goals, or technical constraints. Evaluate the concepts against these criteria to determine their strengths and weaknesses.

Concept Presentation and Review: Present the refined concepts to the project team and stakeholders for review. Clearly communicate the design rationale, user insights, and any updates made based on feedback. Encourage open discussions and gather feedback and suggestions from the team and stakeholders. This collaborative review process helps refine the concepts further and ensures buy-in from key stakeholders.

Remember that validation and feedback are ongoing processes throughout the concept development phase. It's important to be open to feedback, embrace constructive criticism, and iterate on the concepts based on the insights gained. By incorporating validation and feedback, you can refine the concepts, address any issues, and increase the chances of developing a successful and well-received design solution.

3.4 Documentation

There are various methods of documenting the concept design phase of a design project. Here are some common methods you can consider:

Written Reports: Create a comprehensive written report that provides a detailed account of the concept design phase. This can include sections such as an executive summary, project background, research findings, concept descriptions, design rationale, user feedback, and next steps. Written reports are useful for capturing in-depth information and can be easily shared with stakeholders.

Presentation Decks: Develop a visual presentation that highlights the key aspects of the concept design phase. Use slides to convey the design brief, research insights, concept descriptions, visual representations, and design rationale. Presentation decks are effective for communicating concepts in a concise and visually engaging manner during meetings or design reviews.

Posters: Create concept boards or posters that visually represent the concepts developed during the design phase. Include key visuals, sketches, descriptions, and design rationale on the boards. Concept boards are particularly useful for presenting multiple concepts side by side, allowing stakeholders to compare and evaluate them.

Digital Prototypes: Build interactive digital prototypes that showcase the concepts. These prototypes can simulate the user experience and demonstrate the functionality and flow of the design. Capture screen recordings or create interactive demos to document the concepts in action. Digital prototypes are especially effective for conveying the interactive aspects of the design.





Online Collaboration Platforms: Utilize online collaboration platforms, such as project management tools or design collaboration software, to document and track the concept design phase. These platforms allow you to create project-specific sections, upload documents, share visuals, and gather feedback in a centralized and accessible manner.

Video Documentation: Record video presentations or walkthroughs of the concept design phase. Explain the research findings, concept development process, and the rationale behind each concept. Video documentation can provide a more dynamic and engaging way of presenting the concepts and can be easily shared with stakeholders.

Choose the methods that best suit your project, team, and stakeholders' preferences. Consider combining multiple methods to provide a comprehensive and well-rounded documentation of the concept design phase. Flexibility and adaptability in your documentation approach will allow you to effectively communicate and capture the essence of the concepts developed during the design project.

Prototype/Product Development

After the completion of the detailed design, the project team has to think about developing the prototype to ensure the functionality of the final product in real-time. Prototyping is an inevitable process before any product development in mass production to ensure effectiveness. There are many factors that need to be considered with rationale to achieve a better-performing prototype with minimal deviation from the target requirement. The following section provides information about the definition, types, purpose, and factors to be considered for the prototype development of different types of problem statements.

(a) Basics of Product prototyping (i) Definition:

Prototype development is the process of replicating the working nature of the product for effective communication.

(ii) <u>Types of Prototypes</u>:

Prototypes can be used in different forms and at all stages of the design process to learn about the design or their requirements, to communicate with the user and to get information from stakeholders. Depending on the problem definition they can take many forms, like concept sketches, mathematical models, simulations, test components, and fully functional preproduction versions of the product. Prototypes can be analytical or physical, depending on the problem to be addressed. Examples of analytical prototypes include computer simulations, systems of equations encoded within a spreadsheet, and computer models of three-dimensional geometry. In general, physical prototypes have been extensively used to communicate ideas to customers. Examples of physical prototypes include models that look and feel like the product, proof-of-concept prototypes used to test an idea quickly, and experimental hardware used to validate the functionality of a product.









The above figure shows the (a) military robot physical prototypes under sand test conditions; (b) analytical prototype of robot wheel testing simulation; and (c) deployment of the robot in a real-time military operation.

(iii) Purpose of Prototypes:

Prototypes are mainly used for four purposes: learning, communication, integration, and milestones through which the functionality of the product can be improved.

Learning – The project team can understand the rationale for each activity of prototype development while performing testing and evaluation.

Communication – The designer can easily communicate with the customer based on the working model and receive specific feedback with respect to the modifications made in the previous stages.





Integration –The team members can identify and integrate the functions of various components used in the system and determine the efficiency of the outcomes and shortcomings to be addressed.

Milestone– Through this milestone prototype, the team members can provide tangible goals, demonstrate progress, and enforce the schedule. Sometimes the customer requires a prototype that demonstrates certain functions before proceeding with product development.

(b) Prototype development Process:

1. **Define the purpose of the prototype** –The specific needs and properties of the prototypes should be identified based on priority.

2. Establish the level of approximation of the prototype - The materials used, geometry, machining, boundary conditions, and loading to be applied have to be fixed.

3. **Outline an experimental plan** – To identify the suitable design of experiments for fabrication and testing through an iterative process reflecting the actual testing conditions to validate the performance of the prototype

4. **Create a schedule for procurement, construction, and testing** –To prepare the schedule for the entire prototype development process, starting from the procurement of materials, fabrication of components based on the design and specification, mechanisms, assembly, and testing.

5. **Identify the suitable technologies used for prototyping** – Based on the selection of the above parameters, the appropriate design for manufacturing has to be identified to reproduce the concept, design, and manufacturing technologies in a cost-effective manner. In this aspect, the recent developments in 3D CAD modelling, 3D printing and digital twin technologies have reduced the relative cost and time required to create and analyse prototypes.

(c) Demonstration of prototype –The project team has to demonstrate the fabricated prototype to the customer and gather information about its effectiveness and degree of approximation with respect to the expected product performance. As per the customer's suggestion, the modifications can be done at the appropriate stage to recreate the prototype.

(d) **Product development** –Based on the satisfying performance of the prototype, the project team can approach the industry for the commercialization of the product through a sustainable business model.





Associated Documents

Annexure 1: KARE Academic (B.Tech) Regulations, 2021 Annexure 2: Problem statements with intended Outcome Annexure 3: Rubrics (Zeroth, First and final) Annexure 4: Project Report Template Annexure 5: Powerpoint Template Annexure 6: List of Problem Statements with requirements

Patent review/design review

NOTE : Usage of Dervent need to be added

