

2.6.2(1) Methodology for CO-PO
Attainment for all Programmes



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 Cheeryal (V), Keesara (M), Medchal-Malkajgiri Dist, Telangana State- 501301.

The process for CO-PO attainment of the following academic batches-B.Pharm

(From R17 onwards)

Note: The following CO-PO assessment methods are followed for all theory and practical courses of 2017-2021; 2018-2022; 2019-2023 and 2020-2024

I: CO attainment

All faculty members will prepare the average CO attainment percentage for their respective courses using the following methodology

- The evaluation of course outcome is based on the internal and external examination assessment.

The internal examination consists of mid examinations, assignments, practical mid examinations, seminars and project internal evaluation. The university external examination consists of Theory exam, practical exams and project viva voce.

The following procedure is used for CO attainment calculation:

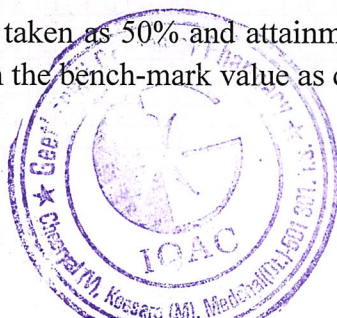
CO Attainment based on University exam (CU)

For every theory course, 40% is taken as the bench-mark value. Number of students scoring more than the bench-mark value in each subject is used to compute the attainment level as defined below:

% of students \geq bench mark	Attainment level
60	1
70	2
80	3

CO Attainment based on internal exam (CI)

Bench-mark value in each subject is taken as 50% and attainment is computed based on the number of students scoring more than the bench-mark value as defined below:



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% students >=bench mark	Attainment level
60	1
70	2
80	3

3. Overall CO attainment:

80% weight age is given to University examination and 20% weightage to Internal examinations.

$$\text{Overall CO attainment} = 0.8 * \text{CU} + 0.2 * \text{CI}$$

Table 1:

GEETHANJALI COLLEGE OF PHARMACY																																							
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Programme: B.Pharmacy			Internal Exam-I															Internal Exam-II				Obj	Assignment		JNTU														
Batch: 2017-21			CO1					CO2					CO3					CO4					CO5					10 M	10 M	5 M	5 M	Grade							
Course Code: POC-I(THEORY)C211			8.5M					9.5M					6M					6					9.5																
Year: II	Sem: I	CO Max Marks																																					
Section: "B"			Q No		Q1, 4A (7.5M+2M)					2A, 2B, 4B(7.5M+2M)					Q3(5M+1)					1a, 1b (5M+1)					Q2A, 2B, 4A (7.5M+2)					3A, 3B, 4B(7.5M+2)					OBJ I	OBJ II	ASS I	ASS II	100
S.No	HT No	Name	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	
1			2	8.5	23.529	6	9.5	63.158	1	6	16.67	5	6	83.33	50	2	9.5	21.05	4	9.5	42.11	8	5																
2			8.5	8.5	100	4.5	9.5	47.368	1	6	16.67	6	6	100.00	58.333	7	9.5	73.68	2	9.5	21.05	9	7																
3			4	8.5	47.053	8.5	9.5	89.474	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	7	9.5	73.68	6.5	5																
4			4.5	8.5	52.941	9.5	9.5	100	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	6	5																
5			6	8.5	70.588	2	9.5	21.053	5	6	83.33	1	6	16.67	50	8.5	9.5	89.47	4.5	9.5	47.37	6	4																
6			4	8.5	47.053	7	9.5	73.684	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	6	4																
7			6	8.5	70.588	7	9.5	73.684	1	6	16.67	1	6	16.67	16.667	9	9.5	94.74	4.5	9.5	47.37	6	4.5																
8			7	8.5	82.353	15	9.5	15.789	5	6	83.33	6	6	100.00	91.667	4.5	9.5	47.37	7	9.5	73.68	6.5	4																
9			7	8.5	82.353	15	9.5	15.789	6	6	100.00	6	6	100.00	100	4.5	9.5	47.37	4.5	9.5	47.37	6.5	5																
10			7	8.5	82.353	6.5	9.5	68.421	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	6.5	4																
11			7	8.5	82.353	6	9.5	63.158	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	7	9.5	73.68	6	5																
12			7	8.5	82.353	6	9.5	63.158	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	6	7																
13			3	8.5	35.294	5	9.5	52.632	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	4	9.5	42.11	6	4																
14			5	8.5	58.824	6	9.5	63.158	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	6	3																
15			6	8.5	70.588	15	9.5	15.789	5	6	83.33	1	6	16.67	50	6.5	9.5	68.42	4.5	9.5	47.37	6.5	4																
16			7	8.5	82.353	6	9.5	63.158	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	6	5																
17			7	8.5	82.353	6	9.5	63.158	1	6	16.67	1	6	16.67	16.667	8	9.5	84.21	4.5	9.5	47.37	6	4.5																
18			7	8.5	82.353	15	9.5	15.789	4	6	66.67	5	6	83.33	75	5	9.5	52.63	2	9.5	21.05	7.5	6																
19			5	8.5	58.824	6	9.5	63.158	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	6	9.5	63.16	5	4																
20			6	8.5	70.588	6	9.5	63.158	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	3.5	9.5	36.84	5	5																
21			4	8.5	47.053	4	9.5	42.105	15	6	25.00	1	6	16.67	20.833	5	9.5	52.63	2	9.5	21.05	5.5	5																
22			6	8.5	70.588	15	9.5	15.789	4	6	66.67	1	6	16.67	41.667	6	9.5	63.16	5.5	9.5	57.89	6.5	6.5																
23			8	8.5	94.118	4	9.5	42.105	1	6	16.67	1	6	16.67	16.667	8	9.5	84.21	4	9.5	42.11	7	6																
24			5	8.5	58.824	15	9.5	15.789	7	6	116.67	1	6	16.67	66.667	8	9.5	84.21	4	9.5	42.11	6.5	6																
25			4.5	8.5	52.941	2	9.5	21.053	4	6	16.67	1	6	16.67	16.667	6	9.5	63.16	3	9.5	31.58	5.5	7																
26			6	8.5	70.588	2	9.5	21.053	1	6	66.67	1	6	16.67	41.667	7	9.5	73.68	4.5	9.5	47.37	6	7.5																
27			6	8.5	70.588	2	9.5	21.053	5	6	83.33	1	6	16.67	50	8	9.5	84.21	4.5	9.5	47.37	7	8																



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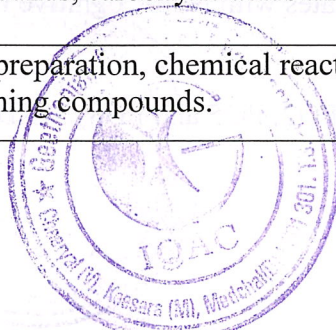
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1. Fill Table 1 with CO no, course outcome and course outcomes knowledge level (CKL) of a particular course.
2. In **Table 2&3**, Fill CKL values and PKL values in respective columns.
3. In **Table 2**, Subtract CKL value(c) – PKL value(p) (Values of 0, 1 and 2 are considered as STRONG, 3,4 are considered as MEDIUM, and 5 is considered as LOW correlation).
4. Don't consider the sign value (+ or -). In case, if a course correlates with Non-Cognitive PO correlation can be S, M and L depending on the course.
5. Based on the value, correlation value taken as Strong (S), Medium (M) or Low (L) and fill the **Table 3**.
6. Then Fill **Table 4** with respective numerical values by considering Strong (S=3), Medium (M=2) and Low (L=1).
7. Calculate the sum of average of each CO contributing to PO and report in **Table 4. (B)**
8. All the faculty has to prepare the following tables for each course and submit to the respective batch in charges.

Table 1: Course Outcome of selected course

COURSE OUTCOMES: At the end of the course, the student will be able to		
CO. No.	COURSE OUTCOME	Course Outcomes Knowledge Level (CKL)
C16.1	Explain the structure and activity of organic molecules, aliphatic hydrocarbons, alkenes and alkynes.	K2
C16.2	Explain about aromatic hydrocarbons and halogenatedarenes.	K2
C16.3	Summarize the nomenclature, preparation, characteristic reaction mechanisms of aliphatic halogen compounds alcohols, ethers and phenols.	K2
C16.4	Summarize the nomenclature, preparation, characteristic reaction mechanisms of carbonyl compounds, carboxylic acids and their derivatives.	K2
C16.5	Summarize the nomenclature, preparation, chemical reactivity and applications of nitrogen containing compounds.	K2



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Table 2: CO attainment of selected course

Course code	Course name	Course outcomes	CO attainment from Internal exam assessment			CO attainment from University examination			CO Attainment (Internal+ University exam) A + B
			CO Attainment (%)	CO Attainment level (a)	A - Internal Exam attainment level (0.20*a)	CO Attainment (%)	CO Attainment level (b)	B - University Examinations attainment level (0.80*b)	
		CO1							
		CO2							
		CO3							
		CO4							
		CO5							
Overall CO attainment									

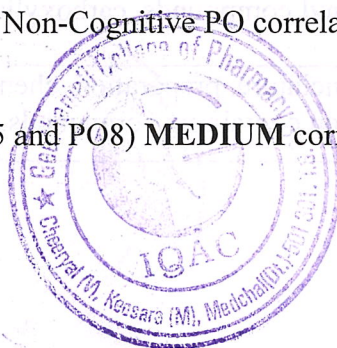
Note: 80% weight age to University examination and 20% weight age to Internal exams the attainment calculations will be (80% of University level) + (20% of Internal level)

II. PO attainment

- Step 1: For each Program Outcome the highest possible Blooms Knowledge level is assigned (PKL). For each course, course outcomes are drafted along with knowledge levels (CKL).
- Step 2: Course articulation matrix $M(c, p)$ is defined as absolute value of the difference between $CKL(c) - PKL(p)$.

$$M(c, p) = CKL \text{ value}(c) - PKL \text{ value}(p)$$

- Values of 0, 1 and 2 are considered as STRONG, 3,4 are considered as MEDIUM, and 5 is considered as LOW correlation.
- Based on the value, correlation value taken as Strong (S), Medium (M) or Low (L).
- In case, if a course correlates with Non-Cognitive PO correlation can be S, M and L depending on the course.
- For Non-cognitive POs (PO2, PO5 and PO8) **MEDIUM** correlation is suggested.



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Table 3: Course Articulation Matrix of selected course

CKL (C16.1) – PKL (PO4) = -3
 Defined COs KL is less than the
 Expected PO KL
 S: {-1}, M: {-2, -3}, L: {-4, -5}

	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PKL		2	M	4	5	M	2	2	M	3	5	3
C16.1	2	S		S	M		S	S		S	M	S
C16.2	2	S		S	M		S	S		S	M	S
C16.3	2	S		S	M		S	S		S	M	S
C16.4	2	S		S	M		S	S		S	M	S
C16.5	2	S		S	M		S	S		S	M	S

CKL (C16.1) – PKL(PO1) = 0
 Defined COs KL is equal to
 Expected PO KL

CKL – Course outcome Knowledge level



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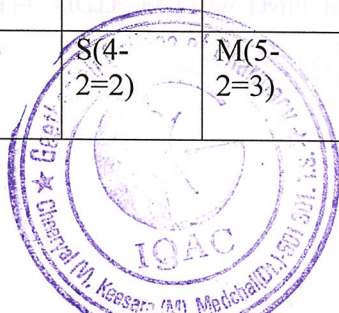
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Table 2: Course articulation matrix of selected course

CO	CKL ↓	PO1 (COG)	PO2 (NON-COG)	PO3 (COG)	PO4 (COG)	PO5 (NON-COG)	PO6 (COG)	PO7 (COG) & (NON-COG)	PO8 (NON-COG)	PO9 (COG)	PO10 (COG) & (NON-COG)	PO11 (COG)
PKL	→	K2	--	K4, K5	K5, K6	--	K2	K2(COG)	--	K3, K4, K5	K5 (COG)	K3
C16.1	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.2	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.3	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.4	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.5	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)



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PKL – Program outcome Knowledge Level

PKL is expected by NBA

CKL is based on course outcome defined and approved by the Course Coordinator and Program Advisory Board



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Table 4: Course Articulation Matrix (CO-PO Matrix) with numeric values

	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	From table 3 S, M & L are replaced by values i.e S=3, M=2& L=1
PKL		2	M	4	5	M	2	2	M	3	5	
C16.1	2	3		3	2		3	3		3	2	3
C16.2	2	3		3	2		3	3		3	2	3
C16.3	2	3		3	2		3	3		3	2	3
C16.4	2	3		3	2		3	3		3	2	3
C16.5	2	3		3	2		3	3		3	2	3
C16 Average...(B)		3		3	2		3	3		3	2	3



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CO	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C14	Average	3	2	2	2	1	3	3	2	2.6	2	3-(B)

Course Name	Course code	CO-PO Correlation Matrix											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
B.PHARMACY FIRST YEAR/I SEM													
DISPENSING AND GENERAL PHARMACY	C14	9	6	6	6	3	9	9	6	7.8	6	9..A*B	

Batch in charge have to calculate direct attainment POs by following method.

The direct attainment of POs for all courses is determined by calculating weighted average using the following equation =

Average of {(A*B) of all courses}

Average correlation values of CO-PO matrix (B) of all courses

- From Direct PO attainment 80% weightage is taken.



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Step 3: Programme articulation matrix

Programme articulation matrix of all courses of academic batch is prepared by taking average correlation value of CO-PO matrix of respective course (Batch In charge has to prepare Programme articulation matrix of all courses of academic batch)

Table 5: Programme articulation matrix

Year/Sem	Course Name	Course Code	CO-PO Correlation value										
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11

Step 4: Direct attainment of POs

In Programme articulation matrix, Class average attainment level of respective course (A) is multiplied by Average correlation value of CO-PO matrix of respective course (B). The same method is adopted for all courses. It is explained in the following steps.

Example:

S. No.	Course name	Course code	No. of Students appeared	No of Students Passed	% of students \geq bench mark	Attainment level
1.	DISPENSING AND GENERAL PHARMACY	C14	87	78	90	3—(A)

% of students who have secured greater than or equal to the fixed bench mark (40%) in university examination is taken as Class average attainment level of respective course (A).



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Table 7: In direct attainment of POs

Academic batch	Total Students	Survey Details	Total No of Surveys	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
		PES												
Indirect attainment level														
		AS												
Indirect attainment level														
		ES												
Indirect attainment level														

Step 6: Overall PO attainment

From Direct PO attainment 80% weightage is taken. From indirect PO attainment 20 % weightage is taken which comprises of 10% of Programme exit survey; 5% Alumni survey and 5% of Employer survey. Overall weighted PO attainment is calculated by combining direct and indirect attainment levels.

Overall PO attainment= (Direct attainment level*0.8) + (PES attainment level*0.1+AS attainment level*0.05+ES attainment level*0.05)



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Table 6: Direct attainment of POs

Course Name	Course Code	(A*B) of courses										
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Average of {(A*B) of all courses}												
Average correlation values of CO-PO matrix (B) of all courses												
DIRECT ATTAINMENT												
DIRECT ATTAINMENT (80%)												

Step 5: Indirect attainment of POs of all courses

Indirect attainment of POs is calculated by Programme exit survey, Alumni survey and Employer survey. From indirect PO attainment 20 % Weightage is taken which comprises of 10% of Programme exit survey, 05% Alumni survey and 05% Employer survey.



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Table 9: Over all PO attainment

PO	ELOA	ALOA
PO1		
PO2		
PO3		
PO4		
PO5		
PO6		
PO7		
PO8		
PO9		
PO10		
PO11		



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Table 8: Over all PO attainment

Page No. _____

PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
DIRECT ATTAINMENT (80%)											
PROG EXIT SURVEY (10%)											
EMPLOYER SURVEY (05%)											
ALUMNI SURVEY (05%)											
OVERALL PO ATTAINMENT											

Step 7: Evaluation of POs

Expected level of attainment (ELOA) for Programme outcomes is analyzed and decided by PAB based on previous academic batches results and attainments. Actual level of attainment (ALO) for Programme outcomes is reported.



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CO-PO attainment for Pharm D & Pharm D (PB) Programme (2014-2020; 2015-2021; 2016-2022)

I: Average CO attainment

All faculty members will prepare the average CO attainment percentage for their respective courses using the following formula:

$$\text{A. Average CO attainment} = \frac{\text{No. of students passed}}{\text{No. of students appeared}} \times 100$$

Overall CO attainment Level

A. Attainment Level – 1: $\leq 60\%$ of students getting more than 50% marks out of relevant maximum marks

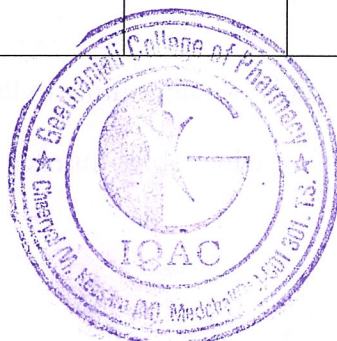
B. Attainment Level – 2: 61-80% of students getting more than 50% marks out of relevant maximum marks

C. Attainment Level – 3: 81-100% of students getting more than 50% marks out of relevant maximum marks.

Bench mark 40% set to calculate average co attainment to assess students passed in first attempt only

Sample average CO attainment of selected course

S. No.	Code	Course	No. of Students appeared	No of Students Passed	Average Outcomes Attainment	Course	Course Outcomes Attainment Level
1.	C16	Pharmaceutical organic chemistry-I	87	75	86		3—(A)



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II. PO attainment

- **Step 1:** For each Programme Outcome the highest possible Blooms Knowledge level is assigned (PKL). For each course, course outcomes are drafted along with knowledge levels (CKL).
- **Step 2:** Course articulation matrix $M(c, p)$ is defined as absolute value of the difference between $CKL(c) - PKL(p)$.

$$M(c, p) = CKL \text{ value}(c) - PKL \text{ value}(p)$$

- Values of 0, 1 and 2 are considered as STRONG, 3,4 are considered as MEDIUM, and 5 is considered as LOW correlation.
- Based on the value, correlation value taken as Strong (S), Medium (M) or Low (L).
- In case, if a course correlates with Non-Cognitive PO correlation can be S, M and L depending on the course.
- For Non-cognitive POs (PO2, PO5 and PO8) **MEDIUM** correlation is suggested.

1. Fill Table 1 with CO no, course outcome and course outcomes knowledge level (CKL) of a particular course.

2. In **Table 2&3**, Fill CKL values and PKL values in respective columns.

3. In **Table 2**, Subtract $CKL \text{ value}(c) - PKL \text{ value}(p)$ (Values of 0, 1 and 2 are considered as STRONG, 3,4 are considered as MEDIUM, and 5 is considered as LOW correlation).

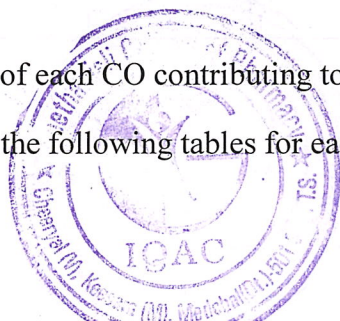
4. Don't consider the sign value (+ or -). In case, if a course correlates with Non-Cognitive PO, correlation can be S, M and L depending on the course.

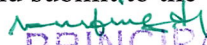
5. Based on the value, correlation value taken as Strong (S), Medium (M) or Low (L) and fill the **Table 3**.

6. Then Fill **Table 4** with respective numerical values by considering Strong (S=3), Medium (M=2) and Low (L=1).

7. Calculate the sum of average of each CO contributing to PO and report in **Table 4. (B)**

8. All the faculty has to prepare the following tables for each course and submit to the respective batch in charges.




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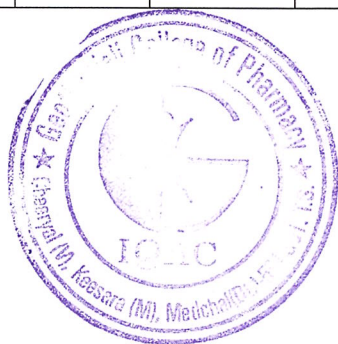
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Table 2: Course articulation matrix of selected course

CO	CKL	PO1 (COG)	PO2 (NON-COG)	PO3 (COG)	PO4 (COG)	PO5 (NON-COG)	PO6 (COG)	PO7 (COG) & (NON-COG)	PO8 (NON- COG)	PO9 (COG)	PO10 (COG) & (NON-COG)	PO11 (COG)
PKL	↓ →	K2	--	K4, K5	K5, K6	--	K2	K2(COG)	--	K3, K4, K5	K5 (COG)	K3
C16.1	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.2	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.3	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.4	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.5	K2	S(2-2=0)	--	S(4-2=2)	M(5-2=3)	--	S(2-2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)



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8. All the faculty has to prepare the following tables for each course and submit to the respective batch in charges.

Table 1: Course Outcome of selected course

COURSE OUTCOMES: At the end of the course, the student will be able to		
CO.No.	COURSE OUTCOME	Course Outcomes Knowledge Level (CKL)
C16.1	Explain the structure and activity of organic molecules, aliphatic hydrocarbons, alkenes and alkynes.	K2
C16.2	Explain about aromatic hydrocarbons and halogenatedarenes.	K2
C16.3	Summarize the nomenclature, preparation, characteristic reaction mechanisms of aliphatic halogen compounds alcohols, ethers and phenols.	K2
C16.4	Summarize the nomenclature, preparation, characteristic reaction mechanisms of carbonyl compounds, carboxylic acids and their derivatives.	K2
C16.5	Summarize the nomenclature, preparation, chemical reactivity and applications of nitrogen containing compounds.	K2



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CKL – Course outcome Knowledge level

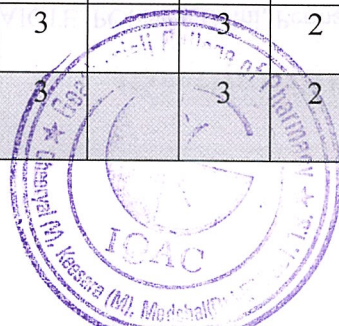
PKL – Programme outcome Knowledge Level

PKL is expected by NBA

CKL is based on course outcome defined and approved by the Course Coordinator and Program Advisory Board

Table 4: Course Articulation Matrix (CO-PO Matrix) with numeric values

	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
PKL		2	M	4	5	M	2	2	M	3	5	From table 3 S.M&L are replaced by values i. e S=3, M=2& L=1
C16.1	2	3		3	2		3	3		3	2	
C16.2	2	3		3	2		3	3		3	2	3
C16.3	2	3		3	2		3	3		3	2	3
C16.4	2	3		3	2		3	3		3	2	3
C16.5	2	3		3	2		3	3		3	2	3
C16 AVG (B)		3		3	2		3	3		3	2	3



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Table 3: Course Articulation Matrix of selected course

CKL (C16.1) – PKL (PO4) = -3
 Defined COs KL is less than the
 Expected PO KL
 S: {-1}, M: {-2, -3}, L: {-4, -5}

	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PKL		2	M	4	5	M	2	2	M	3	5	3
C16.1	2	S		S	M		S	S		S	M	S
C16.2	2	S		S	M		S	S		S	M	S
C16.3	2	S		S	M		S	S		S	M	S
C16.4	2	S		S	M		S	S		S	M	S
C16.5	2	S		S	M		S	S		S	M	S

CKL (C16.1) – PKL(PO1) = 0
 Defined COs KL is equal to
 Expected PO KL



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Course Name	Course code	CO-PO Correlation matrix										
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
B.PHARMACY FIRST YEAR/ SEM												
DISPENSING AND GENERAL PHARMACY	C14	9	6	6	6	3	9	9	6	7.8	6	9..A* B

The above values came from multiplying A with B of selected course, the following tables given for reference

S. No.	Code	Course	No. of Students appeared	No. of Students Passed	Average CO attainment	Average CO attainment level
1.	C14	DISPENSING AND GENERAL PHARMACY	87	78	90	3—(A)

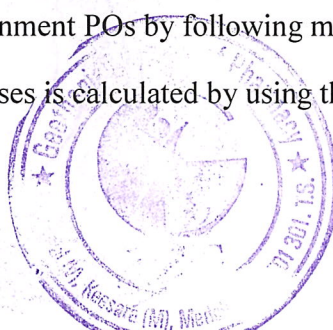
CO	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C14	Average	3	2	2	2	1	3	3	2	2.6	2	3—(B)

➤ Batch in charges have to perform the following steps progressively

Batch in charge have to calculate direct attainment POs by following method.

The direct attainment of POs for all courses is calculated by using the following equation =

Average of {(A*B) of all courses}



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From the above analysis, batch in charge has to prepare consolidated document of Programme articulation matrix of all courses of that batch.

Step 3: Programme articulation matrix

Programme articulation matrix of all courses of academic batch is prepared by taking average correlation value of CO-PO matrix of respective course (Batch In charge has to prepare Programme articulation matrix of all courses of academic batch)

Table 5: Programme articulation matrix

Year/Sem	Course Name	Course Code	CO-PO Correlation value										
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11

PO attainment has two processes,

1. Direct attainment of POs (Through COs and CO-PO correlation matrix)
2. Indirect attainment of POs (Through Programme Exit Survey, Alumni Survey and Employer Survey).

Step 4: Direct attainment of POs

In Programme articulation matrix, Average CO attainment level of respective course (A) is multiplied by Average correlation value of CO-PO matrix of respective course (B). The same method is adopted for all courses. It is explained in the following steps.




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Batch	Total Students	Survey Details	Total No of Surveys	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
		PES												
Indirect attainment level														
		AS												
Indirect attainment level														
		ES												
Indirect attainment level														



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Average correlation values of CO-PO matrix (B) of all courses

From Direct PO attainment 80% weightage is taken.

Course Name	Course Code	Average CO attainment level (A)	(A*B) of courses											
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
Average of {(A*B) of all courses}														
Average correlation values of CO-PO matrix (B) of all courses														
DIRECT ATTAINMENT														
DIRECT ATTAINMENT (80%)														

Step 5: Indirect attainment of POs of all courses

Indirect attainment of POs is calculated by Programme exit survey, Alumni survey and Employer survey. From indirect PO attainment 20% weightage is taken which comprises of 10% of Programme exit survey, 05% Alumni survey and 05% Employer survey.



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Step 6: Overall PO attainment

From Direct PO attainment 80% weightage is taken. From indirect PO attainment 20 % weightage is taken which comprises of 10% of Programme exit survey; 5% Alumni survey and 5% of Employer survey. Overall weighted PO attainment is calculated by combining direct and indirect attainment levels.

Overall PO attainment = (Direct attainment level*0.8) + (PES attainment level*0.1+AS attainment level*0.05+ES attainment level*0.05)

Overall PO attainment

PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
DIRECT ATTAINMENT (80%)											
PROG EXIT SURVEY (10%)											
EMPLOYER SURVEY (05%)											
ALUMNI SURVEY (05%)											
OVERALL PO ATTAINMENT											



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Step 7: Evaluation of POs

Expected level of attainment (**ELOA**) for Programme outcomes is analyzed and decided by PAB based on previous academic batches results and attainments. Actual level of attainment (**ALOA**) for Programme outcomes is reported.

PO	ELOA	ALOA
PO1		
PO2		
PO3		
PO4		
PO5		
PO6		
PO7		
PO8		
PO9		
PO10		
PO11		



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The process for CO-PO attainment of the following academic batches- M.Pharmacy

(From R17 onwards)

Note: The following CO-PO assessment methods are followed for all theory and practical courses of M. Pharmacy (From 17 onwards)

I: CO attainment

All faculty members will prepare the average CO attainment percentage for their respective courses using the following methodology

- The evaluation of course outcome is based on the internal and external examination assessment.

The internal examination consists of mid examinations, assignments, practical mid examinations, seminars and project internal evaluation. The university external examination consists of Theory exam, practical exams and project viva voce.

The following procedure is used for CO attainment calculation:

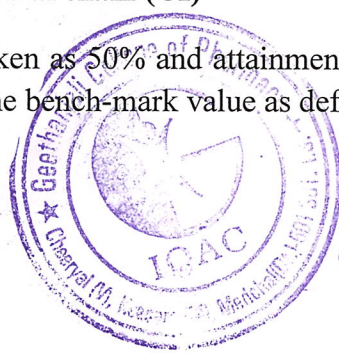
CO Attainment based on University exam (CU)

For every theory course, 40% is taken as the bench-mark value. Number of students scoring more than the bench-mark value in each subject is used to compute the attainment level as defined below:

% of students \geq bench mark	Attainment level
60	1
70	2
80	3

CO Attainment based on internal exam (CI)

Bench-mark value in each subject is taken as 50% and attainment is computed based on the number of students scoring more than the bench-mark value as defined below:



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% students >=bench mark	Attainment level
60	1
70	2
80	3

3. Overall CO attainment:

80% weightage is given to University examination and 20% weightage to Internalexaminations.

$$\text{Overall CO attainment} = 0.8 * \text{CU} + 0.2 * \text{CI}$$

Table 1:

GEETHANJALI COLLEGE OF PHARMACY																							
Cheeryal (V), Keesara (M), Medchal (D)-501301																							
Programme: M.Pharmacy			Internal Exam-I (Subjective)			Internal Exam-II (Subjective)			Internal Exam-I (Subjective)			Internal Exam-II (Subjective)			Average of Internal I & II			JNTUH	JNTUH				
Batch: 2017-18			CO1			CO2			CO3			CO4			CO5			25 M	Grade	Percentage			
Course/Code: POC-I(THEORY)C21			8.5M			9.5M			6			9.5			9.5			AVG	100	100			
Year: I	Sem: I	CO Max Marks	Q No																				
S.No	HT No	Name	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	Max Mar	%	Obt. Mar	%	
1			2	8.5	23.529	6	9.5	63.58	1	6	16.67	5	6	83.33	50	2	9.5	21.05	4	9.5	42.11	0	
2			8.5	8.5	100	4.5	9.5	47.368	1	6	16.67	6	6	100.00	58.333	7	9.5	73.68	2	9.5	21.05	0	
3			4	8.5	47.059	8.5	9.5	89.474	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	7	9.5	73.68	0	
4			4.5	8.5	52.341	3.5	9.5	30	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	0	
5			6	8.5	70.588	2	9.5	21.053	5	6	83.33	1	6	16.67	50	8.5	9.5	89.47	4.5	9.5	47.37	0	
6			4	8.5	47.059	7	9.5	73.684	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	0	
7			6	8.5	70.588	7	9.5	73.684	1	6	16.67	1	6	16.67	16.667	9	9.5	94.74	4.5	9.5	47.37	0	
8			7	8.5	82.353	15	9.5	15.789	5	6	83.33	6	6	100.00	31.667	4.5	9.5	47.37	7	9.5	73.68	0	
9			7	8.5	82.353	15	9.5	15.789	6	6	100.00	6	6	100.00	10	4.5	9.5	47.37	4.5	9.5	47.37	0	
10			7	8.5	82.353	6.5	9.5	68.421	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	0	
11			7	8.5	82.353	6	9.5	63.58	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	7	9.5	73.68	0	
12			7	8.5	82.353	6	9.5	63.58	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	0	
13			3	8.5	35.294	5	9.5	52.632	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	4	9.5	42.11	0	
14			5	8.5	59.604	6	9.5	63.58	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	0	
15			6	8.5	70.588	15	9.5	15.789	5	6	83.33	1	6	16.67	50	6.5	9.5	68.42	4.5	9.5	47.37	0	
16			7	8.5	82.353	6	9.5	63.58	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	4.5	9.5	47.37	0	
17			7	8.5	82.353	6	9.5	63.58	1	6	16.67	1	6	16.67	16.667	8	9.5	84.21	4.5	9.5	47.37	0	
18			7	8.5	82.353	15	9.5	15.789	4	6	66.67	5	6	83.33	7.5	9.5	52.63	2	9.5	21.05	0		
19			5	8.5	59.604	6	9.5	63.58	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	6	9.5	63.16	0	
20			6	8.5	70.588	6	9.5	63.58	1	6	16.67	1	6	16.67	16.667	8.5	9.5	89.47	3.5	9.5	36.84	0	
21			4	8.5	47.059	4	9.5	42.105	15	6	25.00	1	6	16.67	20.833	5	9.5	52.63	2	9.5	21.05	0	
22			6	8.5	70.588	15	9.5	15.789	4	6	66.67	1	6	16.67	41.667	6	9.5	63.16	5.5	9.5	57.89	0	
23			6	8.5	94.18	4	9.5	42.105	1	6	16.67	1	6	16.67	16.667	8	9.5	84.21	4	9.5	42.11	0	
24			5	8.5	59.604	15	9.5	15.789	7	6	116.67	1	6	16.67	66.667	8	9.5	84.21	4	9.5	42.11	0	
25			4.5	8.5	52.341	2	9.5	21.053	1	6	16.67	1	6	16.67	16.667	6	9.5	63.16	3	9.5	31.58	0	
26			6	8.5	70.588	2	9.5	21.053	4	6	66.67	1	6	16.67	41.667	7	9.5	73.68	4.5	9.5	47.37	0	
27			6	8.5	70.588	2	9.5	21.053	5	6	83.33	1	6	16.67	50	8	9.5	84.21	4.5	9.5	47.37	0	
28			15	8.5	17.647	7	9.5	73.684	4	6	66.67	1	6	16.67	41.667	8.5	9.5	89.47	4.5	9.5	47.37	0	
29			15	8.5	17.647	5.5	9.5	57.895	4	6	66.67	1	6	16.67	41.667	7	9.5	73.68	4.5	9.5	47.37	0	
30			3	8.5	35.294	4	9.5	42.105	5	6	83.33	1	6	16.67	50	6.5	9.5	68.42	5.5	9.5	57.89	0	
31			8	8.5	94.18	2.5	9.5	26.316	1	6	16.67	1	6	16.67	16.667	7	9.5	73.68	6	9.5	63.16	0	



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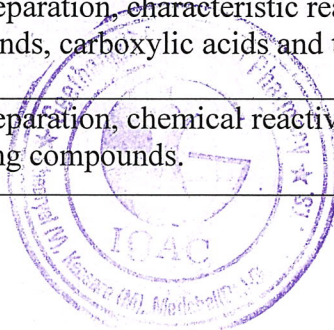
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1. Fill Table 1 with CO no, course outcome and course outcomes knowledge level (CKL) of a particular course.
2. In **Table 2&3**, Fill CKL values and PKL values in respective columns.
3. In **Table 2**, Subtract CKL value(c) – PKL value(p) (Values of 0, 1 and 2 are considered as STRONG, 3,4 are considered as MEDIUM, and 5 is considered as LOW correlation).
4. Don't consider the sign value (+ or -). In case, if a course correlates with Non-Cognitive PO correlation can be S, M and L depending on the course.
5. Based on the value, correlation value taken as Strong (S), Medium (M) or Low (L) and fill the **Table 3**.
6. Then Fill **Table 4** with respective numerical values by considering Strong (S=3), Medium (M=2) and Low (L=1).
7. Calculate the sum of average of each CO contributing to PO and report in **Table 4. (B)**
8. All the faculty has to prepare the following tables for each course and submit to the respective batch in charges.

Table 1: Course Outcome of selected course

COURSE OUTCOMES: At the end of the course, the student will be able to		
CO. No.	COURSE OUTCOME	Course Outcomes Knowledge Level (CKL)
C16.1	Explain the structure and activity of organic molecules, aliphatic hydrocarbons, alkenes and alkynes.	K2
C16.2	Explain about aromatic hydrocarbons and halogenated arenes.	K2
C16.3	Summarize the nomenclature, preparation, characteristic reaction mechanisms of aliphatic halogen compounds alcohols, ethers and phenols.	K2
C16.4	Summarize the nomenclature, preparation, characteristic reaction mechanisms of carbonyl compounds, carboxylic acids and their derivatives.	K2
C16.5	Summarize the nomenclature, preparation, chemical reactivity and applications of nitrogen containing compounds.	K2



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Table 2: CO attainment of selected course

Course code	Course name	Course outcomes	CO attainment from Internal exam assessment			CO attainment from University examination			CO Attainment (Internal+ University exam) A + B
			CO Attainment (%)	CO Attainment level (a)	A - Internal Exam attainment level (0.20*a)	CO Attainment (%)	CO Attainment level (b)	B - University Examinations attainment level (0.80*b)	
		CO1							
		CO2							
		CO3							
		CO4							
		CO5							
Overall CO attainment									

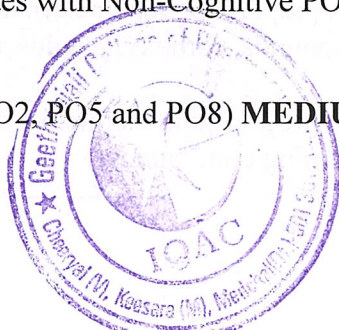
Note: 80% weightage to University examination and 20% weightage to Internal exams the attainment calculations will be (80% of University level) + (20% of Internal level).

II. PO attainment

- Step1: For each Programme Outcome the highest possible Blooms Knowledge level is assigned (PKL). For each course, course outcomes are drafted along with knowledge levels (CKL).
- Step 2: Course articulation matrix $M(c, p)$ is defined as absolute value of the difference between $CKL(c) - PKL(p)$.

$$M(c, p) = CKL \text{ value}(c) - PKL \text{ value}(p)$$

- Values of 0, 1 and 2 are considered as STRONG, 3,4 are considered as MEDIUM, and 5 is considered as LOW correlation.
- Based on the value, correlation value taken as Strong (S), Medium (M) or Low (L).
- In case, if a course correlates with Non-Cognitive PO correlation can be S, M and L depending on the course.
- For Non-cognitive POs (PO2, PO5 and PO8) **MEDIUM** correlation is suggested.



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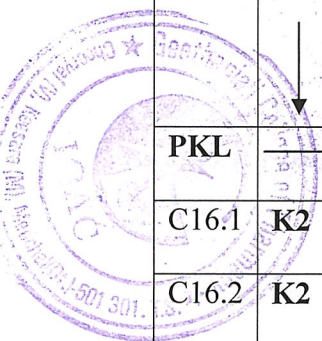
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Table 2: Course articulation matrix of selected course

CO	CKL	PO1 (COG)	PO2 (NON- COG)	PO3 (COG)	PO4 (COG)	PO5 (NON- COG)	PO6 (COG)	PO7 (COG) & (NON- COG)	PO8 (NON- COG)	PO9 (COG)	PO10 (COG) & (NON- COG)	PO11 (COG)
	↓											
PKL	→	K2	--	K4, K5	K5, K6	--	K2	K2(COG)	--	K3,K4,K5	K5 (COG)	K3
C16.1	K2	S(2- 2=0)	--	S(4- 2=2)	M(5- 2=3)	--	S(2- 2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.2	K2	S(2- 2=0)	--	S(4- 2=2)	M(5- 2=3)	--	S(2- 2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.3	K2	S(2- 2=0)	--	S(4- 2=2)	M(5- 2=3)	--	S(2- 2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.4	K2	S(2- 2=0)	--	S(4- 2=2)	M(5- 2=3)	--	S(2- 2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)
C16.5	K2	S(2- 2=0)	--	S(4- 2=2)	M(5- 2=3)	--	S(2- 2=0)	S(2-2=0)	--	S(3-2=1)	M(5-2=3)	S(3-2=1)



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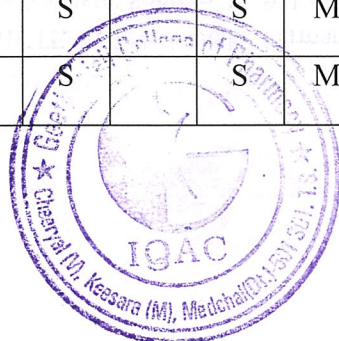
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Table 3: Course Articulation Matrix of selected course

CKL (C16.1) – PKL (PO4) = -3
 Defined COs KL is less than the
 Expected PO KL
 S: {-1}, M: {-2, -3}, L: {-4, -5}

	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
PKL		2	M	4	5	M	2	2	M	3	5	3
C16.1	2	S		S	M		S	S		S	M	S
C16.2	2	S		S	M		S	S		S	M	S
C16.3	2	S		S	M		S	S		S	M	S
C16.4	2	S		S	M		S	S		S	M	S
C16.5	2	S		S	M		S	S		S	M	S

CKL (C16.1) – PKL(PO1) = 0
 Defined COs KL is equal to
 Expected PO KL



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CKL – Course outcome Knowledge level

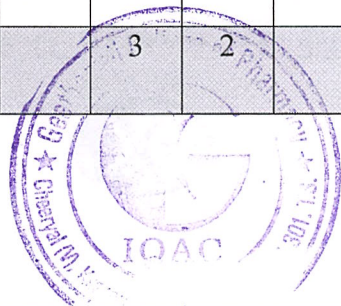
PKL – Programme outcome Knowledge Level

PKL is expected by NAAC

CKL is based on course outcome defined and approved by the Course Coordinator and Program Advisory Board

Table 4: Course Articulation Matrix (CO-PO Matrix) with numeric values

	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	From table 3 S, M &L are replaced by values i.e S=3, M=2& L=1
PKL		2	M	4	5	M	2	2	M	3	5	
C16.1	2	3		3	2		3	3		3	2	3
C16.2	2	3		3	2		3	3		3	2	3
C16.3	2	3		3	2		3	3		3	2	3
C16.4	2	3		3	2		3	3		3	2	3
C16.5	2	3		3	2		3	3		3	2	3
C16 Average...(B)		3		3	2		3	3		3	2	3



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CO	CKL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C14	Average	3	2	2	2	1	3	3	2	2.6	2	3-(B)

Course Name	Course code	CO-PO Correlation Matrix											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
B.PHARMACY FIRST YEAR/I SEM													
DISPENSING AND GENERAL PHARMACY	C14	9	6	6	6	3	9	9	6	7.8	6	9..A*B	

Batch in charge have to calculate direct attainment POs by following method.

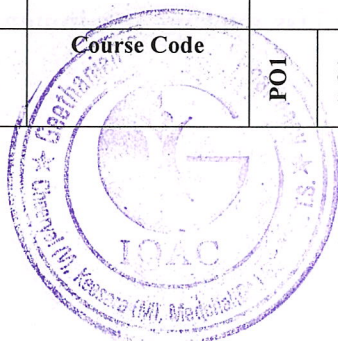
The direct attainment of POs for all courses is determined by calculating weighted average using the following equation =

$\frac{\text{Average of } \{(A*B) \text{ of all courses}\}}{\text{Average correlation values of CO-PO matrix (B) of all courses}}$

- From Direct PO attainment 80% weightage is taken.

Table 6: Direct attainment of POs

Course Name	Course Code	(A*B) of courses											
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	



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Step 3: Programme articulation matrix

Programme articulation matrix of all courses of academic batch is prepared by taking average correlation value of CO-PO matrix of respective course (Batch In charge has to prepare Programme articulation matrix of all courses of academic batch)

Table 5: Programme articulation matrix

Year/Sem	Course Name	Course Code	CO-PO Correlation value										
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11

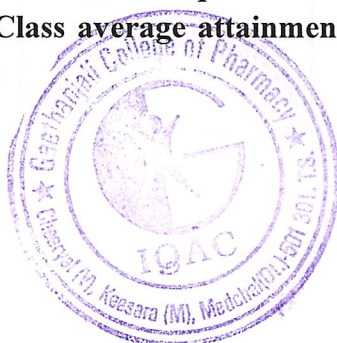
Step 4: Direct attainment of POs

In Programme articulation matrix, Class average attainment level of respective course (A) is multiplied by Average correlation value of CO-PO matrix of respective course (B). The same method is adopted for all courses. It is explained in the following steps.

Example:

S. No.	Course name	Course code	No. of Students appeared	No of Students Passed	% of students \geq bench mark	Attainment level
1.	DISPENSING AND GENERAL PHARMACY	C14	87	78	90	3—(A)

% of students who have secured greater than or equal to the fixed bench mark (40%) in university examination is taken as Class average attainment level of respective course (A).



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		ES												
Indirect attainment level														

Step 6: Overall PO attainment

From Direct PO attainment 80% weightage is taken. From indirect PO attainment 20 % weightage is taken which comprises of 10% of Programme exit survey; 5% Alumni survey and 5% of Employer survey. Overall weighted PO attainment is calculated by combining direct and indirect attainment levels.

Overall PO attainment= (Direct attainment level*0.8) + (PES attainment level*0.1+AS attainment level*0.05+ES attainment level*0.05)

Table 8: Over all PO attainment

PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
DIRECT ATTAINMENT (80%)											
PROG EXIT SURVEY (10%)											
EMPLOYER SURVEY (05%)											
ALUMNI SURVEY (05%)											
OVERALL PO ATTAINMENT											

Step 7: Evaluation of POs

Expected level of attainment (ELOA) for Programme outcomes is analyzed and decided by PAB based on previous academic batches results and attainments. Actual level of attainment (ALOA) for Programme outcomes is reported.



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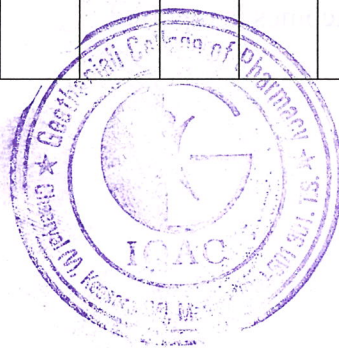
Average of {(A*B) of all courses}														
Average correlation values of CO-PO matrix (B) of all courses														
DIRECT ATTAINMENT														
DIRECT ATTAINMENT (80%)														

Step 5: Indirect attainment of POs of all courses

Indirect attainment of POs is calculated by Programme exit survey, Alumni survey and Employer survey. From indirect PO attainment 20 % Weightage is taken which comprises of 10% of Programme exit survey, 05% Alumni survey and 05% Employer survey.

Table 7: In direct attainment of POs

Academic batch	Total Students	Survey Details	Total No of Surveys	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
		PES												
Indirect attainment level														
		AS												
Indirect attainment level														



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Table 9: Over all PO attainment

PO	ELOA	ALOA
PO1		
PO2		
PO3		
PO4		
PO5		
PO6		
PO7		
PO8		
PO9		
PO10		
PO11		



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