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Chemistry OBE PROCESS

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1. Course- Program outcome Matrix: The Program Outcomes are developed through the curriculum (curricular/co-curricular extra-curricular activities). The program outcomes are attained through course implementation. As an educator, one must know, **"to which POs his/her course in contributing?"**. So that one can design the learning experiences, select teaching methods and design the tool for assessment. Hence, establishing the Course-PO matrix is an essential step in the OBE. The course-program outcomes matrix indicates the correlation between the courses and program outcomes. The CO-PO matrix is the map of the list of **courses contributing to the development of respective Pos.**

The Template is provided in the table below

Sr. No	Course Title	PSO-A	PSO-B	PSO-C	PSO-D	PSO-E	PSO-F	PSO-G	PSO-H
1.	Paper IX: Physical Chemistry	✓	✓	✓	✓	✓	✓	✓	✓
2.	Paper X: Inorganic Chemistry	✓	✓		✓	✓	✓	✓	✓
3.	Paper No. XI: Organic Chemistry	✓	✓	✓	✓	✓	✓	✓	✓
4.	Paper XII : Industrial Chemistry	✓	✓		✓	✓	✓	✓	✓
5.	Paper XIII: Physical Chemistry	✓	✓	✓	✓	✓	✓	✓	✓
6.	Paper XIV: Inorganic Chemistry	✓	✓		✓	✓	✓	✓	✓
7.	Paper XV: Organic Chemistry	✓	✓	✓	✓	✓	✓	✓	✓
8.	Paper XIV: Analytical Chemistry	✓	✓	✓	✓	✓	✓	✓	✓
9.	Chemistry Practical	✓	✓	✓	✓	✓	✓	✓	✓



2. Course Outcomes (for all courses):

The course outcomes are the statement that describes the knowledge & abilities developed in the student by the end of course (subject) teaching. The focus is on development of abilities rather than mere content. There can be 5 to 7 course outcomes of any course. These are to be written in the specific terms and not in general. The list of Course Outcomes is the part of **Annexure-C** attached herewith.

3. Set Target levels for Attainment of Course Outcomes:

The course outcome attainment is assessed in order to track the graduates' performance w.r.t target level of performance. The CO-PO attainment is the tool used for continuous improvement in the graduates' abilities through appropriate learning & teaching strategies. In order to assess students' performance with respect to abilities (at the end of course teaching/by the end of program) the course outcome attainment are measured/calculated. In order to calculate the program outcome attainment, the course outcome attainment is calculated. Prior to that, the course-program outcome mapping is done.

4. Set Target level for Attainment of Program Outcomes:

The program outcome attainment is assessed in order to track the graduates' performance w.r.t target level of performance. The CO-PO attainment is the tool used for continuous improvement in the graduates' abilities through appropriate learning & teaching strategies. In order to assess student's performance with respect to abilities (at the end of course teaching/by the end of program) the course outcome attainment and program outcome attainment is measured/calculated. The program outcome attainment is governed by curricular, co-curricular and extra-curricular activities including the stakeholders' participation. The direct method and indirect method is adopted to calculate the PO attainment. **The direct method implies the attainment by course outcomes contributing to respective program outcomes. And indirect method is the satisfaction/feed-back survey of stakeholders.** In order to calculate the program outcome attainment, the course outcome attainment is calculated. Prior to that, the course-program outcome mapping is done. The set target level is the set benchmark to ensure continuous improvements in the learners/ graduates' performance.

5. Course Attainment Levels:

- a) CO attainment is defined/set at three levels;
- b) The CO attainment is based on end term examination assessment and internal assessment;
- c) The Co attainment is defined at three levels in ascending order
 - i. e.g. For end term and internal examination;



Sr. No	Level	CO Attainments
1.	Level-1:	30% students scored more than class average
2.	Level-2:	40% students score more than class average
3.	Level-3	50% students score more than class average

. The target level is set (e.g. Level-2). It indicates that, **the current target is level-2; 40% of students score more than class average.** The CO attainment is measured and the results are obtained. Based on the results of attainment, the corrective measures/remedial action are taken.

e. CO Attainment= 80% (Attainment level in end term examination) + 20% (Attainment level in internal examination)

6. Program attainment Level:

a. PO attainment is defined at five levels in ascending order;

b. **The PO attainment is based on the average attainment level of corresponding courses (Direct Method) and feed-back survey (Indirect method);**

c. The PO attainment levels are defined/set as stated below;

Sr. No	Level	PO Attainments
1.	Level-1:	Poor: Greater than 0.5 and less than 1.0 (0.5>1)
2.	Level-2:	Average: 1.0 to 1.5
3.	Level-3	Good: 3: 1.5 to 2.0
4.	Level-4	Very Good: 2.0 to 2.5
5.	Level-5	Excellent: 2.5 to 3.0

d. The PO attainment target level is set/defined (say, Level-4). It implies that, the department is aiming at minimum level-4 (very good) in the performance of abilities by the graduates. Based upon the results of attainment, the remedial measures are taken;

e. PO Attainment= 80% (Average attainment level by direct method) + 20% (Average attainment level by indirect method).



7. The Results of CO Attainment: The Results of CO Attainment is provided in Annexure-B

FOR EXAMPLE COURSE CODE/TITLE: Paper IX: DSE- E5 Inorganic Chemistry

e.g. For end-term and internal examination;

- i. Level-1: 30% students scored more than class average
- ii. Level-2: 40% students score more than class average;
- iii. Level-3: 50% students score more than class average

Paper IX: Physical Chemistry		
Average Marks in External examination:	19	
% Students score more than 19 is =29	47%	Level: 2
Average Marks in Internal examination	7	
% Students score more than 7 is =41	66%	Level: 3
A(CO) Paper IX: Physical Chemistry		
=	80% (2) +20 %(3)	
	= 1.6+0.6	
	= 2.2	

Paper No. X: Inorganic Chemistry		
Average Marks in External examination:	25	
% Students score more than 25 is =30	48%	Level: 2
Average Marks in Internal examination	8	
% Students score more than 8 is =28	45%	Level: 2
A(CO)Paper No. X: Inorganic Chemistry		
=	80% (2) +20% (2)	
	= 1.6+0.4	
	= 2	

Paper XI : Organic Chemistry		
Average Marks in External examination:	19	
% Students score more than 19 is = 34	55%	Level: 3
Average Marks in Internal examination	7	
% Students score more than 7 is = 35	56%	Level: 3
A(CO) Paper No. XI: Organic Chemistry		
=	80% (3) +20% (3)	
	= 2.4+0.6	
	= 3	
Paper XII : Industrial Chemistry		
Average Marks in External examination:	23	
% Students score more than 23 is =32	52%	Level: 3
Average Marks in Internal examination	7	



% Students score more than 7 is = 40	65%	Level: 3
A(CO) Paper No. XII : Industrial Chemistry		
	=	80% (3) +20% (3)
	=	2.4+0.6
	=	3

Paper XIII: Physical Chemistry		
Average Marks in External examination:		26
% Students score more than 26 is =32		52% Level: 3
Average Marks in Internal examination		7
% Students score more than 7 is =35		56% Level: 3
A(CO) Paper XIII: Physical Chemistry		
	=	80% (3) +20% (3)
	=	2.4+0.6
	=	3

Paper XIV: Inorganic Chemistry		
Average Marks in External examination:		29
% Students score more than 29 is = 43		69% Level: 3
Average Marks in Internal examination		7
% Students score more than 7 is = 39		63% Level: 3
A(CO) Paper XIV: Inorganic Chemistry		
	=	80% (3) +20% (3)
	=	2.4+0.6
	=	3

Paper XV: Organic Chemistry		
Average Marks in External examination:		23
% Students score more than 23 is =32		52% Level: 3
Average Marks in Internal examination		7
% Students score more than 7 is =34		55% Level: 3
A(CO) Paper XV: Organic Chemistry		
	=	80% (3) +20% (3)
	=	2.4+0.6
	=	3

Paper XVI : Analytical Chemistry		
Average Marks in External examination:		28
% Students score more than 28 is =37		60% Level: 3
Average Marks in Internal examination		7
% Students score more than 7 is = 42		68% Level: 3
A(CO) Paper XIV: Analytical Chemistry		
	=	80% (3) +20% (3)



$$= 2.4+0.6$$

$$= 3$$

Chemistry Practical		
Average Marks in External examination:	175	
% Students score more than 175 is = 34	55%	Level: 3
A(CO) Paper : Chemistry Practical		
	= 100%(3)	
	= 3	
	= 3	

Hence, the attainment level is Level-3 and the set target level is Level-2 and therefore the CO is Fully attained.

Table No. 1.0: CO Attainment Level

Course Title	Target Attainment Level	Course Attainment Value	Fully Attained/ Not Attained	Remedial Measures
Paper IX:Physical Chemistry	2	2.2	Fully Attained	
Paper X:Inorganic Chemistry	2	2	Fully Attained	
Paper XI:Organic Chemistry	2	3	Fully Attained	
Paper XII:Industrial Chemistry	2	3	Fully Attained	
Paper XIII:Physical Chemistry	2	3	Fully Attained	
PaperXIV:Inorganic Chemistry	2	3	Fully Attained	
Paper XV:Organic Chemistry	2	3	Fully Attained	
Paper XVI:Analytical Chemistry	2	3	Fully Attained	
Chemistry Practical	2	3	Fully Attained	

8. The Results of PO Attainment:

The Results of PO attainment are provided in Annexure-B

FOR EXAMPLE: PO NO.: a (Note: Refer to point No. 11 above which describes the attainment level and set target attainment level).



PO Attainment= 80% (Average attainment level by direct method) + 20% (Average attainment level by indirect method).

(PSO-A) = 80% (2+2+3+3+3+3+3+3+3)/09 + 20% (3+2+3+3+3+3+3+3)/8=80% (2.78) + 20% (2.875) =2.224 + 0.575 =2.799 i.e. Level-5. The Target Level is Level-3.

Hence, PO is attained

(PSO-B= 80% (2+2+3+3+3+3+3+3+3)/09 + 20% (3+2+3+3+3+3+3+3)/8=80% (2.78) + 20% (2.875) =2.224 + 0.575 =2.799 i.e. Level-5. The Target Level is Level-3.

(PSO-C) = 80% (2+3+3+3+3+3)/06 + 20% (3+3+3+3+3)/5=80% (2.83) + 20% (3) =2.264 + 0.6 = 2.864 i.e. Level-5. The Target Level is Level-3.

(PSO-D) = 80% (2+2+3+3+3+3+3+3+3)/09 + 20% (3+2+3+3+3+3+3+3)/8=80% (2.78) + 20% (2.875) =2.224 + 0.575 =2.799 i.e. Level-5. The Target Level is Level-3.

(PSO-E) = 80% (2+2+3+3+3+3+3+3+3)/09 + 20% (3+2+3+3+3+3+3+3)/8=80% (2.78) + 20% (2.875) =2.224 + 0.575 =2.799 i.e. Level-5. The Target Level is Level-3.

(PSO-F) = 80% (2+2+3+3+3+3+3+3+3)/09 + 20% (3+2+3+3+3+3+3+3)/8=80% (2.78) + 20% (2.875) =2.224 + 0.575 =2.799 i.e. Level-5. The Target Level is Level-3.

(PSO-G) = 80% (2+2+3+3+3+3+3+3+3)/09 + 20% (3+2+3+3+3+3+3+3)/8=80% (2.78) + 20% (2.875) =2.224 + 0.575 =2.799 i.e. Level-5. The Target Level is Level-3.

(PSO-H = 80% (2+2+3+3+3+3+3+3+3)/09 + 20% (3+2+3+3+3+3+3+3)/8=80% (2.78) + 20% (2.875) =2.224 + 0.575 =2.799 i.e. Level-5. The Target Level is Level-3.

Table No. 2.0 PO Attainment Level

PO/PSO Number	Target Attainment Level	PO/PSOs Attainment		Fully Attained/ Not Attained	Remedial Measures
		Level	Value		
PSO-A	3	5	2.799	Fully Attained	
PSO-B	3	5	2.799	Fully Attained	
PSO-C	3	5	2.864	Fully Attained	
PSO-D	3	5	2.799	Fully Attained	
PSO-E	3	5	2.799	Fully Attained	
PSO-F	3	5	2.799	Fully Attained	
PSO-G	3	5	2.799	Fully Attained	
PSO-H	3	5	2.799	Fully Attained	

9. Planned Actions for Course Attainment:


The courses for which the level attained is less than Level-2, the remedial measures will be taken in plan way that includes, tutorial, assignments, field work and remedial coaching.

10.Planned Actions for Program Outcome Attainment:


Not Applicable.

ANNEXURE-B RESULTS OF CO-PO ATTAINMENT

Sr. No	Course Title	PSO-A	PSO-B	PSO-C	PSO-D	PSO-E	PSO-F	PSO-G	PSO-H
1.	Paper IX:Physical Chemistry	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
2.	Paper X:Inorganic Chemistry	2	2		2	2	2	2	2
3.	Paper XI:Organic Chemistry	3	3	3	3	3	3	3	3
4.	Paper XII:Industrial Chemistry	3	3		3	3	3	3	3
5.	Paper XIII:Physical Chemistry	3	3	3	3	3	3	3	3
6.	PaperXIV:Inorganic Chemistry	3	3		3	3	3	3	3
7.	Paper XV:Organic Chemistry	3	3	3	3	3	3	3	3
8.	Paper XVI:Analytical Chemistry	3	3	3	3	3	3	3	3
9.	Chemistry Practical	3	3	3	3	3	3	3	3
Average		2.8	2.8	2.87	2.8	2.8	2.8	2.8	2.8


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