



## **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 the course (subject) teaching. The focus is on the development of abilities rather than mere content. There can be 5 to 7-course outcomes of any course. These are to be written in specific terms and not in general. The list of Course Outcomes is **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. 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 the program) the course outcome attainment is 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. 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 the program) the course outcome attainment and program outcome attainment are 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 are adopted to calculate the PO attainment. **The direct method implies the attainment by course outcomes contributing to respective program outcomes. An indirect method is the satisfaction/feedback 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% of students scored more than the class average
3.	Level-3	50% of students score more than the 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 the class average.** The CO attainment is measured and the results are obtained. Based on the results of attainment, corrective measures/remedial action is 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. [REDACTED]

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.	<b>Level-3</b>	<b>Good: 3: 1.5 to 2.0</b>
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 a 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-E1 Mathematical Physics**

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

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

<b>Paper IX: Mathematical and Statistical Physics</b>		
<b>Average Marks in External examination:</b>	<b>16</b>	
<b>% Students score more than 16 is =7</b>	<b>58</b>	<b>Level: 3</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is =8</b>	<b>67</b>	<b>Level: 3</b>
<b>A(CO) Paper IX: Mathematical and Statistical Physics</b>		
	<b>80% (3) +20</b>	
	<b>= (3)</b>	
	<b>= 2.4+0.6</b>	
	<b>= 3</b>	

<b>Paper X: Quantum Mechanics</b>		
<b>Average Marks in External examination:</b>	<b>16</b>	
<b>% Students score more than 16 is = 3</b>	<b>25</b>	<b>Level: 1</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is = 8</b>	<b>67</b>	<b>Level: 3</b>
<b>A(CO) Paper X: Quantum Mechanics</b>		
	<b>80% (1) +20</b>	
	<b>= (3)</b>	
	<b>= 0.8+0.6</b>	
	<b>= 1.4</b>	

<b>Paper No. XI: Classical Mechanics</b>		
<b>Average Marks in External examination:</b>	<b>20</b>	
<b>% Students score more than 20 is =7</b>	<b>58</b>	<b>Level: 3</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is =8</b>	<b>67</b>	<b>Level: 3</b>
<b>A(CO)Paper No. XI: Classical Mechanics</b>		
	<b>= 80% (3) +20 (3)</b>	
	<b>= 2.4+0.6</b>	
	<b>= 3</b>	

<b>Paper XII : Atomic and Molecular Spectra, Astronomy and Astrophysics</b>		
<b>Average Marks in External examination:</b>	<b>18</b>	
<b>% Students score more than 18 is = 6</b>	<b>50</b>	<b>Level: 3</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is =9</b>	<b>75</b>	<b>Level: 3</b>
<b>A(CO) Atomic and Molecular Spectra, Astronomy and Astrophysics</b>		
	=	<b>80% (3) +20 (3)</b>
	=	<b>2.4+0.6</b>
	=	<b>3</b>

<b>Paper XIII: Nuclear and Particle Physics</b>		
<b>Average Marks in External examination:</b>	<b>18</b>	
<b>% Students score more than 18 is =6</b>	<b>50</b>	<b>Level: 3</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is =7</b>	<b>58</b>	<b>Level: 3</b>
<b>A(CO) Paper XIII: Nuclear and Particle Physics</b>		
	=	<b>80% (3) +20 (3)</b>
	=	<b>2.4+0.6</b>
	=	<b>3</b>

<b>Paper XIV: Energy Studies and Materials Science</b>		
<b>Average Marks in External examination:</b>	<b>18</b>	
<b>% Students score more than 18 is = 7</b>	<b>58</b>	<b>Level: 3</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is = 6</b>	<b>50</b>	<b>Level: 3</b>
<b>A(CO) Paper XIV: Energy Studies and Materials Science</b>		
	=	<b>80% (3) +20 (3)</b>
	=	<b>2.4+0.6</b>
	=	<b>3</b>

<b>Paper XV: Electrodynamics and Electromagnetic Waves</b>		
<b>Average Marks in External examination:</b>	<b>19</b>	
<b>% Students score more than 19 is =8</b>	<b>67</b>	<b>Level: 3</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is =7</b>	<b>58</b>	<b>Level: 3</b>
<b>A(CO) Paper XV: Electrodynamics and Electromagnetic Waves</b>		
	=	<b>80% (3) +20 (3)</b>
	=	<b>2.4+0.6</b>
	=	<b>3</b>

<b>Paper XVI: Solid State Physics</b>		
<b>Average Marks in External examination:</b>	<b>18</b>	
<b>% Students score more than 18 is=7</b>	<b>58</b>	<b>Level: 3</b>
<b>Average Marks in Internal examination</b>	<b>9</b>	
<b>% Students score more than 9 is =7</b>	<b>58</b>	<b>Level: 3</b>
<b>A(CO) Paper XVI: Solid State Physics</b>		
	=	<b>80% (3) +20 (3)</b>
	=	<b>2.4+0.6</b>
	=	<b>3</b>

<b>Physics Practical</b>		
<b>Average Marks in External examination:</b>	<b>148</b>	
<b>% Students score more than 148 is =6</b>	<b>50</b>	<b>Level: 3</b>

**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	Course Attainment		Fully Attained/ Not Attained	Remedial Measures
	Level	Value	level		
Paper IX: Mathematical and Statistical Physics	2	3	3	Fully Attained	
Paper X: Quantum Mechanics	2	1.4	1	Not Attained	Extra lectures are taken
Paper No. XI: Classical Mechanics	2	3	3	Fully Attained	
Paper XII: Atomic and Molecular Spectra, Astronomy and Astrophysics	2	3	3	Fully Attained	
Paper XIII: Nuclear and Particle Physics	2	3	3	Fully Attained	
Paper XIV: Energy Studies and Materials Science	2	3	3	Fully Attained	
Paper XV: Electrodynamics and Electromagnetic Waves	2	3	3	Fully Attained	
Paper XVI: Solid State Physics	2	3	3	Fully Attained	
Physics Practical	2	3	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% (3+1+3+3+3+3+3+3+3)/09 + 20% (3+3+3+3+3+3+3+3)/8 = 80% (2.78) + 20% (3) = 2.22+0.6=2.82 i.e. Level-5. The Target Level is Level-3.

Hence, PO is attained

$$(PSO-B) = 80\% (3+1+3+3+3+3+3)/07 + 20\% (3+3+3+3+3+3+3+3)/9 = 80\% (2.9) + 20\% (3) = 2.3+0.6=2.9 \text{ i.e. Level-5. The Target Level is Level-3.}$$

$$(PSO-C) = 80\% (3+1+3+3+3+3+3+3+3)/09 + 20\% (3+3+3+3+3+3+3+3)/8 = 80\% (2.71) + 20\% (3) = 2.17+0.6=2.77 \text{ i.e. Level-5. The Target Level is Level-3.}$$

$$(PSO-D) = 80\% (1+3+3+3+3)/05 + 20\% (3+3+3+3+3)/5 = 80\% (2.6) + 20\% (3) = 2.08+0.6=2.68 \text{ i.e. Level-5. The Target Level is Level-3.}$$

$$(PSO-E) = 80\% (1+3+3+3+3+3+3)/07 + 20\% (3+3+3+3+3+3+3)/7 = 80\% (2.71) + 20\% (3) = 2.17+0.6=2.77 \text{ i.e. Level-5. The Target Level is Level-3.}$$

$$(PSO-F) = 80\% (3+3+3+3+3+3)/06 + 20\% (3+3+3+3+3+3)/6 = 80\% (3) + 20\% (3) = 3 \text{ i.e. Level-5. The Target Level is Level-3.}$$

$$(PSO-G) = 80\% (3+1+3+3+3+3+3+3+3)/09 + 20\% (3+3+3+3+3+3+3+3)/8 = 80\% (2.78) + 20\% (3) = 2.22+0.6=2.82 \text{ i.e. Level-5. The Target Level is Level-3.}$$

$$(PSO-H) = 80\% (3+1+3+3+3+3+3+3+3)/09 + 20\% (3+3+3+3+3+3+3+3)/8 = 80\% (2.78) + 20\% (3) = 2.22+0.6=2.82 \text{ i.e. Level-5. The Target Level is Level-3}$$

Table No. 2.0 PO Attainment Level

PO/PSO Number	Target Attainment	PO/PSOs Attainment		Fully Attained/ Not Attained	Remedial Measures
	Level	Value	Level		
PSO-A	3	2.82	5	Fully Attained	
PSO-B	3	2.77	5	Fully Attained	
PSO-C	3	2.82	5	Fully Attained	
PSO-D	3	2.68	5	Fully Attained	
PSO-E	3	2.77	5	Fully Attained	
PSO-F	3	3	5	Fully Attained	
PSO-G	3	2.82	5	Fully Attained	
PSO-H	3	2.82	5	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 a plan way that includes, tutorials, 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: Mathematical and Statistical Physics	3	3	3				3	3
2.	Paper X: Quantum Mechanics	1	1	1	1	1		1	1
3.	Paper No. XI: Classical Mechanics	3		3	3	3		3	3
4.	Paper XII : Atomic and Molecular Spectra, Astronomy and Astrophysics	3	3	3			3	3	3
5.	Paper XIII: Nuclear and Particle Physics	3		3		3	3	3	3
6.	Paper XIV:Energy Studies and Materials Science	3	3	3		3	3	3	3
7.	Paper XV: Electrodynamics and Electromagnetic Waves	3	3	3	3	3	3	3	3
8.	Paper XVI: Solid-State Physics	3	3	3	3	3	3	3	3
9.	Physics Practical	3	3	3	3	3	3	3	3
Average		2.78	2.71	2.78	2.6	2.71	3	2.78	2.78

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