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Criteria 2- Teaching Learning and Evaluation

Key Indicator 2.6 Student Performance and Learning Outcomes

Metric No. 2.6.2 Attainment of POs and COs are evaluated

Academic Year 2021-22

Sr. No.	Name of Department
1	English
2	Hindi
3	Marathi
4	History
5	Political Science
6	Psychology
7	Sociology
8	Economics
9	Geography
10	Physical Education
11	Chemistry
12	Physics
13	Botany
14	Zoology
15	Mathematics
16	Statistics
17	Commerce

Shikshan Prasarak Sanstha's
Padmabhushan Vasantraodada Patil Mahavidyalaya, Kavathe Mahankal

DEPARTMENT OF ENGLISH

Academic Year: 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision

To empower students in the rural drought-prone area of western Maharashtra through the study of English language and literature, fostering critical thinking, creativity, and communication skills that will enable them to thrive in a rapidly changing world.

Mission

1. To provide high-quality education in English language and literature to students in the rural drought-prone area of western Maharashtra, equipping them with the skills and knowledge necessary for personal and professional success.

2. To cultivate a love for literature, language, and creative expression among students, encouraging them to explore diverse cultural perspectives and develop their own unique voices.

3. To foster a supportive and inclusive learning environment that values diversity, promotes collaboration, and celebrates the rich heritage of the region.

4. To prepare students to be effective communicators, critical thinkers, and lifelong learners who can adapt to the demands of the 21st century globalized world.

5. To engage with the local community and leverage resources to create opportunities for students to apply their English language skills in real-world contexts, contributing to the socio-economic development of the region.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Programme Outcomes (PO) B.A.

After completion of BA Programme student will be able to,

PO 1: Get insights into the socio-economic and political issues at local to global.

PO 2: Good employability Skills as per the current need of society to compete in the competitive world.

PO 3: Capable for addressing complex social and environmental issues from a problem oriented interdisciplinary perspective and also assess the its impact on the environment and society.

PO 4: To foster the practice of creative writing and studies in applied language skills.

Programme Specific Outcome (PSO)

PSO 1: After completion of the B.A. in English, students will communicate in English effectively which will be helpful to improve professional and social ethics.

PSO 2: Students will be confident at Listening, Speaking, Reading, and Writing skills.

PSO 3: Students will be a good reader of the literature and it will make them to study the different cultures through the literature.

PSO 4: Literature will change their attitude towards the personal and social life and it will be helpful to make them sensible person and responsible citizen.

Course Outcomes (CO)

Course 1: Modern Indian Writing in English Translation I

After successfully completing this course students will be able to:

CO 1.1: Understand the translated modern Indian Literature in English

CO 1.2: Study the short story as a form of Literature.

Course 2: Modern Indian Writing in English Translation II

After successfully completing this course students will be able to:

CO 2.1: Develop the literary competence among them.

CO 2.2: Study the poetry as a form of literature.

Course 3: Literature and Cinema I

After successfully completing this course students will be able to:

CO 3.1: Understand the film and its relationship to literature.

CO 3.2: Develop the critical approaches to engage with film adaptation.

Course 4: Partition Literature I

After successfully completing this course students will be able to:

CO 4.1: Create an awareness of partition scenario among them.

CO 4.2: Elaborate on the impact of partition on society.

Course 5: Literature and Cinema II

After successfully completing this course students will be able to:

CO 5.1: Acquire film literacy through working knowledge of basic film technology.

CO 5.2: Understand the issues and practices of cinematic adaptation.

Course 6: Partition Literature II

After successfully completing this course students will be able to:

CO 6.1: Understand the partition literature through short stories.

CO 6.2: Explain the hidden human dimensions of the partition.

Course 7: Introduction to Literary Criticism-I

After successfully completing this course students will be able to:

CO 7.1: Understand the major trends in criticism

CO 7.2: Interpret critical concepts.

Course 8: English Poetry-I

After successfully completing this course students will be able to:

CO 8.1: Trace the development of English Poetry from the days of Shakespeare to the contemporary India.

CO 8.2: Appreciate and Analyse poems properly.

Course 9: English Drama-I

After successfully completing this course students will be able to:

CO 9.1: Understand the different forms of Drama.

CO 9.2: Relate the drama to their ideological or Socio-political context.

Course 10: English Novel- I

After successfully completing this course students will be able to:

CO 10.1: Understand the different forms of Novel.

CO 10.2: Relate the Novel to their ideological or Socio-political context.

Course 11: Language and Linguistics-I

After successfully completing this course students will be able to:

CO 11.1 Understand the concept of communication

CO 11.2: Get knowledge of verities of the English Language.

Course 12: Introduction to Literary Criticism-II

After successfully completing this course students will be able to:

CO 12.1: Study the original contribution to literary criticism.

CO 12.2: Understand the meaning and appreciate the poems Critically.

Course 13: English Poetry-II

After successfully completing this course students will be able to:

CO 13.1: Understand the poetry gives intellectual, moral and linguistic pleasures.

CO 13.2: Get knowledge of poetry various cultures and traditions.

Course 14: English Drama-II

After successfully completing this course students will be able to:

CO 14.1: Improve their creative and imaginative faculties through the reading of drama.

CO 14.2: Know about various aspects of the drama.

Course 15: English Novel- II

After successfully completing this course students will be able to:

CO 15.1: Improve their creative and imaginative faculties through the reading of novel.

CO 15.2: Know about various aspects of the Novel.

Course 16: Language and Linguistics-II

After successfully completing this course students will be able to:

CO 16.1: Know the different levels of study of the English Language.

CO 16.2: Understand the Basic Units of Grammar.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	1	3	2	1	2	3	3
CO 1.2	2	1	3	3	1	2	2	3

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	1	3	2	1	2	3	3
CO 1.2	2	1	3	3	1	2	2	3
CO 2.1	1	2	1	3	2	2	3	3
CO 2.2	2	1	2	3	1	2	3	3
CO 3.1	3	1	3	1	2	2	3	3
CO 3.2	**3**	**2**	**3**	**2**	**2**	**2**	**3**	3
CO 4.1	3	0	3	2	2	1	3	3
CO 4.2	3	1	3	1	2	1	2	3
CO 5.1	0	3	1	2	1	1	1	2
CO 5.2	0	3	2	1	3	1	3	3
CO 5.3	3	0	3	2	2	2	3	3
CO 5.4	3	0	3	2	3	2	3	3
CO 6.1	1	1	2	3	2	1	3	3
CO 6.2	2	2	3	2	2	2	2	3
CO 7.1	3	1	2	2	1	1	2	3

CO 7.2	2	2	3	1	2	2	3	3
CO 8.1	3	2	2	2	1	2	3	3
CO 8.2	3	2	3	1	3	2	3	3
CO 9.1	3	2	2	2	1	2	3	3
CO 9.2	3	2	3	1	3	2	3	2
CO 10.1	2	3	2	3	2	3	2	3
CO 10.2	1	3	2	2	1	2	1	3
CO 10.3	1	1	2	3	2	1	2	3
CO 10.4	1	1	2	2	2	1	2	2
CO 11.1	2	3	3	1	3	1	3	3
CO 11.2	3	3	3	1	3	0	3	3
CO 12.1	2	3	1	2	3	2	3	3
CO 12.2	3	2	3	3	2	2	3	3
CO 13.1	2	3	1	2	3	2	3	3
CO 13.2	3	2	3	3	2	2	3	3
CO 14.1	2	3	3	3	2	3	2	3
CO 14.2	1	3	2	3	2	3	3	3
CO 15.1	2	1	3	2	1	2	3	3
CO 15.2	2	1	3	3	1	2	2	3
CO 16.1	1	2	1	3	2	2	3	3
CO 16.2	2	1	2	3	1	2	3	3

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	1	3	2	1	2	3	3
CO 1.2	2	1	3	3	1	2	2	3
Average ($X_{1,.,l}$)	2	1	3	2.5	1	2	2.5	3

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 16 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2	1	3	2.5	1	2	2.5	3
C_2	Course_2	1.5	1.5	1.5	3	1.5	2	3	3
C_3	Course_3	3	1.5	3	1.5	2	2	3	3
C_4	Course_4	3	0.5	3	1.5	2	1	2.5	3
C_5	Course_5	0	3	1.5	1.5	2	1	2	2.5
C_6	Course_6	3	0	3	2	2.5	2	3	3
C_7	Course_7	1.5	1.5	2.5	2.5	2	1.5	2.5	3
C_8	Course_8	2.5	1.5	2.5	1.5	1.5	1.5	2.5	3
C_9	Course_9	3	2	2.5	1.5	2	2	3	3
C_{10}	Course_10	3	2	2.5	1.5	2	2	3	2.5
C_{11}	Course_11	1.5	3	2	2.5	1.5	2.5	1.5	3
C_{12}	Course_12	1	1	2	2.5	2	1	2	2.5
C_{13}	Course_13	2.5	3	3	1	3	0.5	3	3
C_{14}	Course_14	2.5	2.5	2	2.5	2.5	2	3	3
C_{15}	Course_15	2.5	2.5	2	2.5	2.5	2	3	3
C_{16}	Course_16	1.5	3	2.5	3	2	3	2.5	3

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a program:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}$, $CO_{i,2}$, … , $CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as$X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$Here k be the number of outcome in the average course taken,

Attainment of COs:

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weight age to external assessment .

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (Very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	4	Very Good	Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	3	Good	Not Attained
C_6	Course_6	3	Good	Not Attained
C_7	Course_7	3	Good	Not Attained
C_8	Course_8	3	Good	Not Attained

C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	4	Very Good	Attained
C_{11}	Course_11	3	Good	Not Attained
C_{12}	Course_12	3	Good	Not Attained
C_{13}	Course_13	3	Good	Not Attained
C_{14}	Course_14	4	Very Good	Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	3	Good	Not Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	2	6
C_2	Course_2	3	1.5	4.5
C_3	Course_3	4	3	12
C_4	Course_4	4	3	12
C_5	Course_5	3	0	0
C_6	Course_6	3	3	9
C_7	Course_7	3	1.5	4.5
C_8	Course_8	3	2.5	7.5
C_9	Course_9	4	3	12
C_{10}	Course_10	4	3	12
C_{11}	Course_11	3	1.5	4.5
C_{12}	Course_12	3	1	3
C_{13}	Course_13	3	2.5	7.5
C_{14}	Course_14	4	2.5	10
C_{15}	Course_15	4	2.5	10
C_{16}	Course_16	3	1.5	4.5
Sum		54		119
$DALP_1 = 119/54$			2.2037	

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	2	1	3	2.5	1	2	2.5	3
2	3	1.5	1.5	1.5	3	1.5	2	3	3
3	4	3	1.5	3	1.5	2	2	3	3
4	4	3	0.5	3	1.5	2	1	2.5	3
5	3	0	3	1.5	1.5	2	1	2	2.5
6	3	3	0	3	2	2.5	2	3	3
7	3	1.5	1.5	2.5	2.5	2	1.5	2.5	3
8	3	2.5	1.5	2.5	1.5	1.5	1.5	2.5	3
9	4	3	2	2.5	1.5	2	2	3	3
10	4	3	2	2.5	1.5	2	2	3	2.5
11	3	1.5	3	2	2.5	1.5	2.5	1.5	3
12	3	1	1	2	2.5	2	1	2	2.5
13	3	2.5	3	3	1	3	0.5	3	3
14	4	2.5	2.5	2	2.5	2.5	2	3	3
15	4	2.5	2.5	2	2.5	2.5	2	3	3
16	3	1.5	3	2.5	3	2	3	2.5	3
Sum	54	34	29.5	38.5	33	32	28	42	46.5

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	6	3	9	7.5	3	6	7.5	9
2	4.5	4.5	4.5	9	4.5	6	9	9
3	12	6	12	6	8	8	12	12
4	12	2	12	6	8	4	10	12
5	0	9	4.5	4.5	6	3	6	7.5
6	9	0	9	6	7.5	6	9	9
7	4.5	4.5	7.5	7.5	6	4.5	7.5	9
8	7.5	4.5	7.5	4.5	4.5	4.5	7.5	9
9	12	8	10	6	8	8	12	12
10	12	8	10	6	8	8	12	10
11	4.5	9	6	7.5	4.5	7.5	4.5	9
12	3	3	6	7.5	6	3	6	7.5
13	7.5	9	9	3	9	1.5	9	9
14	10	10	8	10	10	8	12	12
15	10	10	8	10	10	8	12	12
16	4.5	9	7.5	9	6	9	7.5	9
Sum	119	99.5	130.5	110	109	95	143.5	157
$DALP_l$	2.2037	1.8426	2.4167	2.037	2.0185	1.7593	2.6574	2.9074

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimum level 4 (Very good) in the performance of abilities of students.

Shikshan Prasarak Sanstha's

Padmabhushan Vasantraodad Patil Mahavidyalaya,Kavathe Mahankal

Department of Hindi

Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their

Attainment Step 1: Defining the Vision and Mission of the Department.

Vision : 1.विद्यार्थीयों के गुणात्मक उन्नति पर ध्यान केंद्रित करना।
2.सामाजिक मानवीय मूल्यों की रक्षा करना।
3.हिंदी विषय के प्रति विद्यार्थीयों में रुचि निर्माण करना।
4.राष्ट्रीय एकता में बढ़ोत्तरी करना ।

Mission : 1.साहित्य आस्वादन तथा मूल्यांकन क्षमता को निर्माण करना।

2.हिंदी भाषा एवं साहित्य को समकालीन परिपेक्ष्य के साथ जोड़ देना।

3.छात्रों को भाषिक कौशल्य द्वारा रोजगारन्मुख निर्माण करना।

4.नैतिक मूल्य, राष्ट्रीय मूल्य एवं उत्तरदायित्व के प्रति आस्था निर्माण करना।

5.छात्रों की विचार क्षमता तथा कल्पनाशीलता का विकास करना।

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program Outcomes: B.A.

After completion of B. A. program Students will be able to,
PO1: छात्रों को हिंदी के विभिन्न विधाओं के माध्यम से साहित्यकारों की रचनाओं का ज्ञान प्राप्त हुआ ।
PO2: विद्यार्थियों को हिंदी भाषा की रूचि बढ़ गई ।
PO3: विद्यार्थी का लेखन कौशल विकसित हुआ ।
PO4: विद्यार्थियों को भाषा के विविध बोलियों का ज्ञान अवगत हुआ ।

Program Specific Outcomes: B.A. Hindi

After completion of graduation in B. A. Hindi students will be able to,
PSO1: छात्रों को रचनाकारों के विधाओं के माध्यमसे उनकी जानकारी प्राप्त हुई ।
PSO2: सामाजिक, सांस्कृतिक, राजनीतिक और साहित्य की जानकारी विद्यार्थियों को प्राप्त हुई।
PSO3: हिंदी की विभिन्न विधाओं के ज्ञान से छात्र के लेखन की रूचि बढ़ गई ।
PSO4: हिंदी के पाठ्यक्रम का अध्ययन करने के बाद विद्यार्थियों की वैचारिक और संशोधन दृष्टि प्राप्त हुई ।

Course Outcomes

B.A.I Sem.- I हिंदी कविता पेपर – I

Course Outcomes : After successful completion of this course, the students will be able to:

CO1 : आधुनिक हिंदी के प्रतिनिधि कविताओं की जानकारी प्राप्त हुई।

CO2 : पद्यात्मक रचना के प्रति रुचि बढ़ गई।

B.A.I Sem.- II हिंदी गद्य साहित्य पेपर –II

Course Outcomes : After successful completion of this course, the students will be able to:

CO3: हिंदी के प्रतिनिधि गद्य रचनाकारों का परिचय हुआ।

CO4: निबंध, एकांकी,व्यंग्य तथा कहानी आदि विधाओं के माध्यम से विद्यार्थीयों की भावात्मक विकास हुआ।

B.A.II Sem.- III: अस्मितामूलक विमर्श और हिंदी गद्य साहित्य पेपर – III

Course Outcomes : After successful completion of this course, the students will be able to:

CO5: कथा साहित्य का स्वरूप, तत्व एवं प्रकारों की जानकारी प्राप्त हुई।

CO6: कथा और कथेत्तर साहित्य को वर्तमान प्रासंगिकता के साथ अवगत किया।

B.A.II Sem.- III हिंदी संत काव्य तथा राष्ट्रीय काव्यधारा पेपर – IV

Course Outcomes : After successful completion of this course, the students will be able to:

CO7: मध्यकालीन संत कवियों तथा आधुनिक हिंदी कविता की जानकारी प्राप्त हुई।

CO8: विद्यार्थियों में नैतिक मूल्य, राष्ट्रीय मूल्य एवं उत्तरदायित्व के प्रति आस्था निर्माण हुई।

B.A.II Sem.- IV: हिंदी में रोजगार के अवसर पेपर – V

Course Outcomes : After successful completion of this course, the students will be able to:

CO9 : हिंदी में रोजगार के अवसरों की जानकारी प्राप्त हुई।

CO10: विद्यार्थि रोजगार से आत्मनिर्भर होंगे।

B.A. II Sem.- अस्मितामूलक विमर्श और हिंदी पद्य साहित्य पेपर – VI

Course Outcomes : After successful completion of this course, the students will be able to:

CO11: ममता कालिया की व्यक्तित्व एवं कृतित्व की जानकारी प्राप्त हुई।

CO12: कितने प्रश्न करो खंडकाव्य को आज के समकालीन परिप्रेक्ष्य में अवगत कराया।

CO13 : कितने प्रश्न करो खंडकाव्य के कथानक की जानकारी प्राप्त हुई।

B.A. III Sem.-V विधा विशेष का अध्ययन- (पेपर- 7) DSE- E 6

Course Outcomes : After successful completion of this course, the students will be able to:

CO14: नाटककार कुसुम कुमार के साहित्य से छात्र परिचित हुए।

CO15: दिल्ली ऊंचा सुनती है नाटक को समकालीन परिप्रेक्ष्य में अवगत कराया।

CO16 : नाटककार कुसुम कुमार के विचारधारा की जानकारी मिली।

B.A. III Sem.-V साहित्यशास्त्र (पेपर- 8) DSE – E 7

Course Outcomes : After successful completion of this course, the students will be able to:

CO17: साहित्य की काव्य तत्वों की जानकारी मिली।

CO18: साहित्य निर्मिती प्रक्रिया से अवगत कराया।

CO19: अलंकारों की जानकारी प्राप्त हुई।

B.A. III Sem.-V हिंदी साहित्य का इतिहास (पेपर- 9) DSE – E 8

Course Outcomes : After successful completion of this course, the students will be able to:

CO20: आदिकालीन और भक्तिकालीन विभिन्न परिस्थितियों की जानकारी मिली।

CO21: आदिकालीन तथा भक्तिकालीन प्रमुख संत कवियों के रचनाओं से अवगत हुए।

B.A.III Sem.- V प्रयोजनमूलक हिंदी(पेपर-10) DSE – E 9

Course Outcomes : After successful completion of this course, the students will be able to:

CO22: छात्रों को पारिभाषिक शब्दावली और इलेक्ट्रॉनिक माध्यमों का परिचय हुआ।

CO23: रोजगार परक हिंदी भाषा की उपयोगिता से अवगत हुए।

B.A. III Sem-V भाषा विज्ञान और हिंदी भाषा (पेपर- 11) DSE – E 10

Course Outcomes : After successful completion of this course, the students will be able to:

CO24: भाषा के विविध रूपों का तथा मानक वर्तनी और व्याकरण से अवगत हुए।

CO25: हिंदी भाषा और हिंदी लिपि की जानकारी मिली।

B.A. III Sem-VI विधा विशेष का अध्ययन (पेपर- 12) DSE - E 131

Course Outcomes : After successful completion of this course, the students will be able to:

CO26: चंद्रकांता के व्यक्तित्व एवं कृतित्व का परिचय हुआ।

CO27 :अंतिम साक्ष्य उपन्यास को समकालीन परिप्रेक्ष्य में प्रस्तुत किया।

CO28: उपन्यास की तात्विक स्वरूप की जानकारी मिली।

B.A. III Sem-VI साहित्यशास्त्र और हिंदी आलोचना (पेपर- 13) DSE – E 132

Course Outcomes: After successful completion of this course, the students will be able to:

CO29: साहित्यशास्त्र के अंगो का परिचय हुआ।

CO30: आलोचना के गुण और विशेषताओं की जानकारी मिली।

CO31: काव्यशास्त्र को लेकर भारतीय चिंतन का परिचय प्राप्त करते हैं।

B.A. III Sem-VI हिंदी साहित्य का इतिहास (पेपर- 14) DSE – E 133

Course Outcomes: After successful completion of this course, the students will be able to:

CO32: रीतिकाल और आधुनिक काल के परिस्थिति और नामकरण की जानकारी मिली।

CO33: युग प्रवर्तक साहित्यकार और गद्य साहित्य से अवगत हुए।

CO34: हिंदी के गद्य के विभिन्न विधाओं और रीतिकालीन साहित्य से परिचित हुए हैं।

B.A.III SEM-VI प्रयोजनमूलक हिंदी (पेपर-15) DSE– E 134

Course Outcomes: After successful completion of this course, the students will be able to:

CO35: पारिभाषिक शब्दावली तथा जनसंचार माध्यमों का परिचय हुआ।

CO36: अनुवाद के विविध अंगो की जानकारी मिली।

CO37: समकालीन समय में अनुवाद की उपयोगिता को अवगत कराया।

B.A. III SEM-VI भाषा विज्ञान और हिंदी भाषाI (पेपर- 16) DSE – E 135

Course Outcomes: After successful completion of this course, the students will be able to:

CO38: भाषा की वैज्ञानिकता से परिचित हुए।

CO39: भाषा विज्ञान के प्रधान अंगों की जानकारी मिली।

CO40: भाषा की शुद्धता के प्रति विद्यार्थी जागृत हुए।

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtainoverall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrix for a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	2	1	3	2	3	3
CO 1.2	3	2	2	0	2	2	2	3

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	2	1	3	2	3	3
CO 1.2	3	2	2	0	2	2	2	3
CO 2.1	3	2	2	1	3	2	3	3
CO 2.2	2	2	2	0	2	2	2	3
CO 3.1	3	2	2	2	3	2	3	3
CO 3.2	**2**	**2**	**1**	**1**	**3**	**2**	**2**	**3**
CO 4.1	3	2	2	2	3	3	3	3
CO 4.2	3	2	2	1	2	2	2	3
CO 5.1	2	2	2	1	2	1	2	3

CO 5.2	1	2	3	0	1	2	2	3
CO 5.3	3	2	2	2	3	3	3	3
CO 5.4	2	2	3	1	2	2	2	3
CO 6.1	3	2	2	1	3	3	3	3
CO 6.2	2	2	2	1	2	2	2	3
CO 7.1	2	2	3	1	1	2	3	3
CO 7.2	1	2	2	0	1	2	2	3
CO 8.1	3	2	2	1	2	3	3	3
CO 8.2	3	2	2	1	2	2	3	3
CO 9.1	2	2	2	2	1	2	3	3
CO 9.2	1	2	2	2	0	1	2	3
CO 10.1	1	2	3	3	1	2	3	3
CO 10.2	1	2	2	3	0	2	2	3
CO 10.3	3	2	2	1	3	2	3	3
CO 10.4	2	2	2	1	2	3	2	3
CO 11.1	2	2	3	1	1	2	3	3
CO 11.2	2	2	2	1	1	2	3	3
CO 12.1	3	2	2	2	3	3	3	3
CO 12.2	3	2	2	1	2	3	2	3
CO 13.1	1	3	2	2	1	2	3	3
CO 13.2	1	2	3	1	1	2	3	3
CO 14.1	1	2	2	3	1	2	3	3
CO 14.2	1	2	2	3	0	2	3	3
CO 15.1	3	2	2	1	3	2	3	3
CO 15.2	3	2	2	0	2	2	2	3
CO 16.1	3	2	2	1	3	2	3	3
CO 16.2	2	2	2	0	2	2	2	3

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program ArticulationMatrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	2	1	3	2	3	3
CO 1.2	3	2	2	0	2	2	2	3
Average(X1, . , *l*)	**3**	**2**	**2**	**0.5**	**2.5**	**2**	**2.5**	**3**

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 16 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	Xi, ., 1	Xi, ., 2	Xi, ., 3	Xi, ., 4	Xi, ., 5	Xi, ., 6	Xi, ., 7	Xi, ., 8
C_1	Course_1	3	2	2	0.5	2.5	2	2.5	3
C_2	Course_2	2.5	2	2	0.5	2.5	2	2.5	3
C_3	Course_3	2.5	2	1.5	1.5	3	2	2.5	3
C_4	Course_4	3	2	2	1.5	2.5	2.5	2.5	3
C_5	Course_5	1.5	2	2.5	0.5	1.5	1.5	2	3
C_6	Course_6	2.5	2	2.5	1.5	2.5	2.5	2.5	3
C_7	Course_7	2.5	2	2	1	2.5	2.5	2.5	3

C_8	Course_8	1.5	2	2.5	0.5	1	2	2.5	3
C_9	Course_9	3	2	2	1	2	2.5	3	3
C_{10}	Course_10	1.5	2	2	2	0.5	1.5	2.5	3
C_{11}	Course_11	1	2	2.5	3	0.5	2	2.5	3
C_{12}	Course_12	2.5	2	2	1	2.5	2.5	2.5	3
C_{13}	Course_13	2	2	2.5	1	1	2	3	3
C_{14}	Course_14	3	2	2	1.5	2.5	3	2.5	3
C_{15}	Course_15	1	2.5	2.5	1.5	1	2	3	3
C_{16}	Course_16	1	2	2	3	0.5	2	3	3

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is definedand the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a program:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n_1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n_2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n_1}, PSO_1, PSO_2, \dots, PSO_{n_2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}$, $CO_{i,2}, \dots, CO_{i,k}$, i = 1,2, … , m. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, i = 1,2, … , m, j = 1,2, … , k, l = 1,2, … , n. Then, the overall CO levels with PO's & PSO's of course C_i is computed as

$X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$Here k be the number of outcome in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method **Level 2**: Average of student marks belongs to the class 20% - 40% for that assessment method**Level 3**: Average of student marks belongs to the class 40% - 60% for that assessment method**Level 4**: Average of student marks belongs to the class 60% - 80% for that assessment method**Level 5**: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weight age to external assessment .

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	4	Very Good	Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	3	Good	Not Attained
C_5	Course_5	4	Very Good	Attained
C_6	Course_6	5	Excellent	Attained
C_7	Course_7	3	Good	Not Attained
C_8	Course_8	3	Good	Not Attained
C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	4	Very Good	Attained
C_{11}	Course_11	5	Excellent	Attained
C_{12}	Course_12	5	Excellent	Attained
C_{13}	Course_13	3	Good	Not Attained
C_{14}	Course_14	3	Good	Not Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	4	Very Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,\ ,\ ,\ l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level ofeach PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	X_i, ., 1	ALC_i* X_i, ., 1
C_1	Course_1	4	3	12
C_2	Course_2	3	2.5	7.5
C_3	Course_3	3	2.5	7.5
C_4	Course_4	3	3	9
C_5	Course_5	4	1.5	6
C_6	Course_6	5	2.5	12.5
C_7	Course_7	3	2.5	7.5
C_8	Course_8	3	1.5	4.5
C_9	Course_9	4	3	12
C_{10}	Course_10	4	1.5	6
C_{11}	Course_11	5	1	5
C_{12}	Course_12	5	2.5	12.5
C_{13}	Course_13	3	2	6
C_{14}	Course_14	3	3	9
C_{15}	Course_15	4	1	4
C_{16}	Course_16	4	1	4
				125
Sum		60		
$DALP_{1=}125/60$			2.08333	

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	X_i, ., 1	X_i, ., 2	X_i, ., 3	X_i, ., 4	X_i, ., 5	X_i, ., 6	X_i, ., 7	X_i, ., 8
1	4	3	2	2	0.5	2.5	2	2.5	3
2	3	2.5	2	2	0.5	2.5	2	2.5	3
3	3	2.5	2	1.5	1.5	3	2	2.5	3
4	3	3	2	2	1.5	2.5	2.5	2.5	3
5	4	1.5	2	2.5	0.5	1.5	1.5	2	3
6	5	2.5	2	2.5	1.5	2.5	2.5	2.5	3
7	3	2.5	2	2	1	2.5	2.5	2.5	3
8	3	1.5	2	2.5	0.5	1	2	2.5	3

9	4	3	2	2	1	2	2.5	3	3
10	4	1.5	2	2	2	0.5	1.5	2.5	3
11	5	1	2	2.5	3	0.5	2	2.5	3
12	5	2.5	2	2	1	2.5	2.5	2.5	3
13	3	2	2	2.5	1	1	2	3	3
14	3	3	2	2	1.5	2.5	3	2.5	3
15	4	1	2.5	2.5	1.5	1	2	3	3
16	4	1	2	2	3	0.5	2	3	3
Sum	60	34	32.5	34.5	21.5	28.5	34.5	41.5	48

Sr. No.	ALC_i* Xi, ., 1	ALCi *Xi, ., 2	ALCi *Xi, ., 3	ALCi *Xi, ., 4	ALCi *Xi, ., 5	ALCi *Xi, ., 6	ALCi *Xi, ., 7	ALCi *Xi, ., 8
1	12	8	8	2	10	8	10	12
2	7.5	6	6	1.5	7.5	6	7.5	9
3	7.5	6	4.5	4.5	9	6	7.5	9
4	9	6	6	4.5	7.5	7.5	7.5	9
5	6	8	10	2	6	6	8	12
6	12.5	10	12.5	7.5	12.5	12.5	12.5	15
7	7.5	6	6	3	7.5	7.5	7.5	9
8	4.5	6	7.5	1.5	3	6	7.5	9
9	12	8	8	4	8	10	12	12
10	6	8	8	8	2	6	10	12
11	5	10	12.5	15	2.5	10	12.5	15
12	12.5	10	10	5	12.5	12.5	12.5	15
13	6	6	7.5	3	3	6	9	9
14	9	6	6	4.5	7.5	9	7.5	9
15	4	10	10	6	4	8	12	12
16	4	8	8	12	2	8	12	12
Sum	125	122	130.5	84	104.5	129	155.5	180
$DALP_l$	2.08333	2.03333	2.175	1.4	1.74167	2.15	2.59167	3

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq$

2.5,Level 5: Excellent – if 2.5 < ALC_i

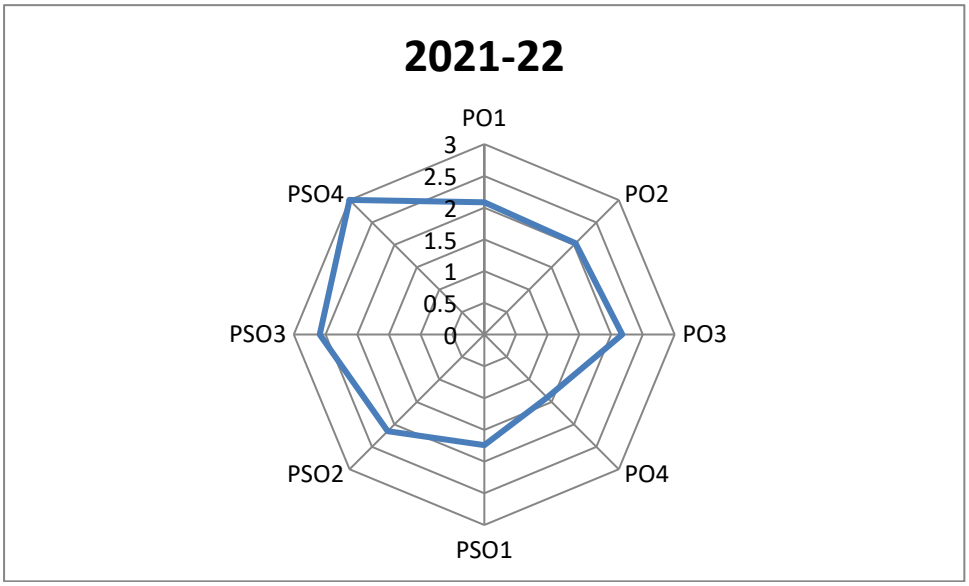
≤ 3.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimumlevel 4 (very good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	2.083333	Very Good	Attained
PO2	2.033333	Very Good	Attained
PO3	2.175	Very Good	Attained
PO4	1.4	Average	Not Attained
PSO1	1.741667	Good	Not Attained
PSO2	2.15	Very Good	Attained
PSO3	2.591667	Very Good	Attained
PSO4	3	Excellent	Attained

P_l attainment target level say, 4, indicates that, the department is aiming minimum level-4(very good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-4 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

Shikshan Prasarak Sanstha's

Padmabhushan Pasantraodada Patil Mahavidyalaya,Kavathe Mahankal

DEPARTMENT OF MARATHI

Academic Year 2021-22

Vision :

मराठी भाषेचा सखोल आणि सर्वांगीण अभ्यास करून विद्यार्थ्यांना मराठी साहित्य संस्कृती आणि परंपरेची समृद्ध माहिती प्रदान करणे. विद्यार्थ्यांना मराठी भाषेच्या माध्यमातून वैचारिक सांस्कृतिक आणि सामाजिक प्रगती साधण्यास प्रोत्साहित करणे.

Mission :

1. मराठी भाषेच्या व्याकरण, साहित्य आणि इतिहासाचा सखोल अभ्यास करणे.
2. विद्यार्थ्यांच्या वाचन, लेखन, संभाषण आणि श्रवण कौशल्यांचा विकास करणे.
3. मराठी साहित्याच्या विविध प्रकारांचा (कविता, कथा, नाटक, निबंध इ.) परिचय करून देणे.
4. मराठी संस्कृती, परंपरा आणि आधुनिकतेचा संगम साधणे.
5. विद्यार्थ्यांना मराठीतील सृजनशीलता, चिंतनशीलता आणि सांस्कृतिक अभिमान निर्माण करणे.
6. मराठी भाषेच्या अभ्यासातून सामाजिक, सांस्कृतिक आणि नैतिक मूल्यांचे संवर्धन करणे.
7. विद्यार्थ्यांना मराठी भाषेच्या माध्यमातून वैयक्तिक आणि सामाजिक समस्यांचे समाधान शोधण्यास प्रोत्साहित करणे.

Program Outcomes (PO's).

After completion of graduate in B. A students will be able to :

Po 1: लेखन, वाचन ,श्रवण ,भाषण, आकलन कौशल्य विकसित झाली.

Po 2 : विद्यार्थ्यांचा शब्दसंग्रह समृद्ध होऊन सर्जनशील लेखनाला चालना मिळाली.

Po 3 : विद्यार्थ्यांचा व्यक्तीमत्त्व विकास झाला.

Po 4 : विद्यार्थ्यांमध्ये मातृभाषा ,राष्ट्रीयएकात्मता, आणि उच्च मानवी मूल्यांविषयी जाणीव निर्माण झाली.

Program specific outcomes (pso's)

After completion of graduation in B.A. Marathi students will be able to :

Pso 1 : भाषिक कौशल्य विकसित होऊन विद्यार्थ्यांचा शब्दसंग्रह समृद्ध झाला.

Pso 2 : प्राचीन वांङ्मयापासून आधुनिक वांङ्मयापर्यंतचे विविध साहित्य प्रकार,प्रवाह, लेखक ,कवी यांची ओळख झाली.

Pso 3 : सामाजिक ,सांस्कृतिक ,साहित्यिक जाण येऊन सर्जनशील लेखनाला चालना मिळाली.

Pso 4 : आंतरजालावरील लेखनपद्धती समजून घेऊन प्रसारमाध्यमातील अर्थार्जनाच्या संधी आणि उद्योग व सेवा क्षेत्रात मराठी भाषेद्वारे अर्थार्जनप्राप्ती संदर्भातील ज्ञान संपादन करता आले.

Course outcomes (Co's)

Course : 1) - आवश्यक अनुषंगिक निवड (CGE - 1): मराठी "शब्दसंहिता" - अ.

Co1 : विद्यार्थ्यांची मराठी भाषा आणि साहित्यविषयी अभिरुची विकसित झाली.

Co2 : मराठी साहित्य परंपरा, लेखक, कवी यांचा परिचय झाला.

Course : 2) - आवश्यक अनुषंगिक निवड (CGE -2): मराठी "शब्दसंहिता" - ब.

Co3 : विद्यार्थ्याचा व्यक्तिमत्व विकास घडून विविध स्पर्धा परीक्षांची तयारी करता आली.

Co4 : निबंध लेखनाच्या माध्यमातून भाषा उपयोजनाची कौशल्य विकसित करता आली.

Course : 3) - विद्याशाखीय विशेष गाभा (DSC-A1): मराठी "अक्षरबंध". - १.

Co5 : भास्कर चंदनशिव यांच्या निवडक कथांचे आकलन करता आले.

Co6 : चित्रपट माध्यमाविषयी ज्ञान संपादन करता आले.

Course :4) - विद्याशाखीय विशेष गाभा (DSC-A13) : मराठी "अक्षरबंध". - २.

Co7 : लोकनाथ यशवंत यांच्या निवडक कवितेचे आकलन करता आले.

Co8 : वृत्तपत्रीय लेखनातील बातमी, अग्रलेख, वाचकांचा पत्रव्यवहार ,नाटक /चित्रपट परीक्षण याविषयी ज्ञान संपादन करता आले.

Course : 5) - विद्याशाखीय विशेष गाभा (DSC-C1) :

" काय डेंजर वारा सुटलाय..!" (नाटक) :मराठी भाषिक कौशल्य.- ३.

Co9 : नाटक या वांङ्मय प्रकाराचे आकलन होऊन नाट्याभ्यासाद्वारे प्रयोगरुप नाटक व नाट्यक्षेत्रातील ज्ञान संपादन करता आले.

Co10 : विद्यार्थ्यांमध्ये संवाद लेखन कौशल्य विकसित झाली.

Course : 6) - विद्याशाखीय विशेष गाभा (DSC- C2):

" काव्यगंध " :मराठी भाषिक कौशल्य - ४

Co11 : मराठी काव्यपरंपरा व प्रवाहांची ओळख करून घेता आली.

Co 12 : प्रात्यक्षिकाद्वारे काव्यलेखन कौशल्ये विकसित झाली.

Course : 7) - विद्याशाखीय विशेष गाभा (DSC- C25)

"माती, पंख आणि आकाश " (आत्मचरित्र): मराठी भाषिक कौशल्य.

Co13 : आत्मचरित्र या वांङ्मय प्रकाराची ओळख करून आत्मवृत्तपर लेखन कौशल्ये विकसित करता आली.

Co14 : आत्मचरित्रकाराच्या व्यक्तिमत्वाची जडणघडण आणि त्याचा समकाल समजून घेता आला; तसेच वेगवेगळ्या भारतीय प्रांतातील व परदेशातील जीवनदर्शन समजून घेता आले.

Course : 8) - विद्याशाखीय विशेष गाभा (DSC- C25)

"जुगाड " (कादंबरी): मराठी भाषिक कौशल्ये.

Co15 : कादंबरी वांङ्मय प्रकाराची ओळख झाली व कादंबरी लेखनाचे स्वरूप व विशेष यांचे ज्ञान झाले.

Co 16 : व्रत्तांतलेखनाची कौशल्ये विकसित झाली.

Course : 9) -विद्याशाखीय विशेष निवड (DSE- E1)

"साहित्यविचार" - VII.

Co17 : पौर्वात्य, पाश्चात्य व आधुनिक भारतीय साहित्यशास्त्राचे स्वरूप समजले आणि साहित्याची निर्मितीप्रक्रिया व त्याचे स्वरूप याविषयी आकलन झाले.

Co18 : ललित व ललितेतर साहित्याचे स्वरूप साहित्याचे प्रयोजन आणि भाषेतील अलंकार समजून घेता आले.

Course : 10) - विद्याशाखीय विशेष निवड (DSE-E2)

"मराठी भाषा व भाषाविज्ञान"- VIII.

Co19 : भाषोत्पत्ती संबंधित ज्ञान भाषाविज्ञानाचा परिचय व भाषाविज्ञान आणि मराठी भाषा यांचा सहसंबंध जाणून घेता आला.

Co20 : मराठी भाषेविषयी विद्यार्थ्यांची आवड विकसित होऊन स्वनविचार,रुपविचार व वाक्यविचारांचा परिचय झाला.

Course : 11) - विद्याशाखीय विशेष निवड (DSE- E3)

"मध्ययुगीन मराठी वांङ्मयाचा इतीहास (प्रारंभ ते इ.स.१५००)" – IX

Co21 : मध्ययुगीन मराठी वांङ्मयाचे स्वरूप , वैशिष्ट्यांसह स्थूल परिचय होऊन कालिक भेद लक्षात आले.

Co22 : मध्ययुगीन मराठी वांङ्मयातील महत्त्वाचे ग्रंथकार आणि ग्रंथ यांचा स्थूल परिचय होऊन मध्ययुगीन मराठी वांङ्मयाच्या गद्य, पद्य रचनेचे विशेष लक्षात आले.

Course : 12) - विद्याशाखीय विशेष निवड (DSE- E4)

"मराठी भाषा व अर्थार्जनाच्या संधी"- X.

Co23 : सर्जनशील लेखन प्रक्रिया समजून वैचारिक लेखनाचे स्वरूप व वैशिष्ट्ये याविषयी ज्ञान प्राप्त झाले.

Co24 : शोधनिबंध व प्रकल्पलेखन कौशल्ये विकसित होऊन आंतरजालावरील मराठी लेखनपद्धतीविषयी ज्ञान संपादन झाले.

Course :13) -विद्याशाखीय विशेष निवड(DSE-E5)

“वांङ्मय प्रवाहाचे अध्ययन :मध्ययुगीन” (दृष्टांतपाठ: निवडक दृष्टांत (संपा.) - XI.

Co25 : मध्ययुगीन महाराष्ट्र व महानुभावी वांङ्मयाची प्रेरणा व स्वरूप समजून घेतले.

Co26 : महानुभावीय ग्रंथकार केसोबास यांचा परिचय झाला व दृष्टांतपाठातील आशयस्वरूप,अभिव्यक्तीविशेष आणि भाषिक वैभवाचे ज्ञान मिळाले.

Course :14) - विद्याशाखीय विशेष निवड (DSE- E126)

"साहित्यविचार" - XII.

Co27 : शब्दशक्ती, रसविचार, काव्यानंदमिमांसा व साहित्याची भाषा याविषयी ज्ञान प्राप्त झाले.

Co28 : भाषेतील छंद व वृत्ते यांचा परिचय झाला.

Course : 15) - विद्याशाखीय विशेष निवड (DSE - E127)

"मराठी भाषा व भाषाविज्ञान" -XIII.

Co29 : मराठी भाषेची वर्णव्यवस्था समजून घेऊन ध्वनि व अर्थ परिवर्तनाची कारणे व प्रकार यांची माहिती मिळाली.

Co30 : प्रमाणभाषा व बोलीभाषेचे स्वरूप विशेष समजून घेता आले.

Course : 16) - विद्याशाखीय विशेष निवड (DSE - E128)

"मध्ययुगीन मराठी वांङ्मयाचा इतिहास (इ.स.१५०० ते इ.स. १८००)" -XIV.

Co31 : मध्ययुगीन मराठी वांङ्मयातील पंडित कवी व त्यांची रचना याविषयी ज्ञान प्राप्त झाले.

Co32 : बखरवांङ्मय आणि शाहिरीवांङ्मयाचे स्वरूप विशेष यांचे ज्ञान प्राप्त झाले.

Course : 17) -विद्याशाखीय विशेष निवड (DSE- E129)

" मराठी भाषा व अर्थार्जनाच्या संधी" -XV.

Co33 : प्रसारमाध्यमातील अर्थार्जनाच्या संधी , मुद्रितशोधनाची पद्धत आणि भाषिक कौशल्य यांचा परिचय झाला.

Co34 : स्पर्धा परीक्षांमध्ये मराठी भाषा विषयाचे महत्त्व समजून; उद्योग व सेवा क्षेत्रात मराठी भाषेद्वारे अर्थार्जनप्राप्ती संदर्भात ज्ञान संपादन केले.

Course : 18) - विद्याशाखीय विशेष निवड (DSE - E130)

“वांङ्मय प्रकाराचे अध्ययन: ललित गद्य” (व्यक्तिचित्रे) : " मुलखावेगळी माणसं".(संपा)

Co35 : ललित गद्य वांङ्मयप्रकाराचे स्वरूप आणि व्यक्तिचित्र संकल्पना व स्वरूप समजून घेतले.

Co36 : 'मुलखावेगळी माणसं' मधील शैक्षणिक, सामाजिक ,संस्कृतीक,राजकीय पर्यावरण व कौटुंबिक भावविश्व तसेच ; ग्रामीण व उपेक्षितांच्या जीवनाचे आकलन झाले.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is establishedbetween CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's andPO's/ PSO's,1 beinglow,2 beingmedian and 3beinghigh.

Forexample,supposeProgramXYZ(say)has4PO's&4PSO's.Then,coursearticulationmatrixforacourse– 1 (say) with two CO'sis asfollows.

CO's–PO's &PSO'smappingmatrix(1-low,2-medium,3-high,0-Nocorrelation)

CO's	PO's/PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1.1	2	2	1	2	2	1	1	0
CO1.2	1	2	1	2	2	0	2	1

In the same way we have course articulation matrices for all courses in that Program.

CO's–PO's &PSO'smappingmatrix(1-low,2-medium,3-high,0-Nocorrelation)

CO's	PO's/PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1.1	2	2	1	2	2	1	1	0
CO1.2	1	2	1	2	2	0	2	1
CO2.1	2	2	1	2	2	1	1	0
CO2.2	2	2	2	2	2	0	1	2
CO3.1	1	2	2	2	2	0	1	2
CO3.2	**3**	**2**	**2**	**2**	**3**	**0**	**1**	**1**
CO4.1	2	1	1	3	2	2	2	0
CO4.2	2	1	2	2	2	0	2	0
CO5.1	2	2	2	2	2	0	2	1
CO5.2	2	2	2	2	2	1	3	0
CO6.1	2	2	1	2	2	1	2	1
CO6.2	2	1	1	2	2	0	0	2
CO7.1	2	1	2	2	2	2	2	1
CO7.2	2	2	1	2	2	0	2	1
CO8.1	1	2	2	3	2	1	0	1

CO8.2	2	3	1	3	2	0	2	1
CO9.1	2	2	1	2	2	3	2	1
CO9.2	2	2	1	2	2	3	2	1
CO10.1	3	2	2	2	3	1	1	2
CO10.2	2	2	2	2	2	1	2	3
CO11.1	1	2	1	2	1	3	2	1
CO11.2	2	2	1	2	2	3	2	1
CO12.1	2	1	1	2	2	0	1	2
CO12.2	2	2	0	2	2	1	0	2
CO13.1	1	2	0	2	2	0	0	1
CO13.2	2	2	1	2	2	2	3	1
CO14.1	2	2	1	2	2	3	2	1
CO14.2	1	1	1	2	1	3	2	1
CO15.1	2	2	1	2	2	1	1	3
CO15.2	2	2	2	2	2	0	0	3
CO16.1	2	2	2	2	2	2	3	1
CO16.2	2	2	2	2	2	0	2	1

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	1	2	2	1	1	0
CO 1.2	1	2	1	2	2	0	2	1
Average ($X_{1,.,l}$)	1.5	2	1	2	2	0.5	1.5	0.5

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 16 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	1.5	2	1	2	2	0.5	1.5	0.5
C_2	Course_2	2	2	1.5	2	2	0.5	1	1
C_3	Course_3	2	2	2	2	2.5	0	1	1.5
C_4	Course_4	2	1	1.5	2.5	2	1	2	0
C_5	Course_5	2	2	2	2	2	0.5	2.5	0.5
C_6	Course_6	2	1.5	1	2	2	0.5	1	1.5
C_7	Course_7	2	1.5	1.5	2	2	1	2	1
C_8	Course_8	1.5	2.5	1.5	3	2	0.5	1	1
C_9	Course_9	2	2	1	2	2	3	2	1
C_{10}	Course_10	2.5	2	2	2	2.5	1	1.5	2.5
C_{11}	Course_11	1.5	2	1	2	1.5	3	2	1
C_{12}	Course_12	2	1.5	0.5	2	2	0.5	0.5	2
C_{13}	Course_13	1.5	2	0.5	2	2	1	1.5	1
C_{14}	Course_14	1.5	1.5	1	2	1.5	3	2	1
C_{15}	Course_15	2	2	1.5	2	2	0.5	0.5	3
C_{16}	Course_16	2	2	2	2	2	1	2.5	1

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a program:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as

$X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weight age to external assessment .

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Good – Attained as target level that is we are aiming minimum level 3 (Good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Attained
C_2	Course_2	3	Good	Attained
C_3	Course_3	3	Good	Attained
C_4	Course_4	3	Good	Attained
C_5	Course_5	3	Good	Attained
C_6	Course_6	3	Good	Attained
C_7	Course_7	3	Good	Attained
C_8	Course_8	3	Good	Attained
C_9	Course_9	4	Very Good	Attained

C_{10}	Course_10	3	Good	Attained
C_{11}	Course_11	3	Good	Attained
C_{12}	Course_12	3	Good	Attained
C_{13}	Course_13	3	Good	Attained
C_{14}	Course_14	3	Good	Attained
C_{15}	Course_15	3	Good	Attained
C_{16}	Course_16	4	Very Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	1.5	4.5
C_2	Course_2	3	2	6
C_3	Course_3	3	2	6
C_4	Course_4	3	2	6
C_5	Course_5	3	2	6
C_6	Course_6	3	2	6
C_7	Course_7	3	2	6
C_8	Course_8	3	1.5	4.5
C_9	Course_9	4	2	8
C_{10}	Course_10	3	2.5	7.5
C_{11}	Course_11	3	1.5	4.5
C_{12}	Course_12	3	2	6
C_{13}	Course_13	3	1.5	4.5
C_{14}	Course_14	3	1.5	4.5
C_{15}	Course_15	3	2	6
C_{16}	Course_16	4	2	8
Sum		50		94
$DALP_1$			$DALP_1$=94/50	1.88

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	1.5	2	1	2	2	0.5	1.5	0.5
2	3	2	2	1.5	2	2	0.5	1	1
3	3	2	2	2	2	2.5	0	1	1.5
4	3	2	1	1.5	2.5	2	1	2	0
5	3	2	2	2	2	2	0.5	2.5	0.5
6	3	2	1.5	1	2	2	0.5	1	1.5
7	3	2	1.5	1.5	2	2	1	2	1
8	3	1.5	2.5	1.5	3	2	0.5	1	1
9	4	2	2	1	2	2	3	2	1
10	3	2.5	2	2	2	2.5	1	1.5	2.5
11	3	1.5	2	1	2	1.5	3	2	1
12	3	2	1.5	0.5	2	2	0.5	0.5	2
13	3	1.5	2	0.5	2	2	1	1.5	1
14	3	1.5	1.5	1	2	1.5	3	2	1
15	3	2	2	1.5	2	2	0.5	0.5	3
16	4	2	2	2	2	2	1	2.5	1
Sum	50	30	29.5	21.5	33.5	32	17.5	24.5	19.5

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	4.5	6	3	6	6	1.5	4.5	1.5
2	6	6	4.5	6	6	1.5	3	3
3	6	6	6	6	7.5	0	3	4.5
4	6	3	4.5	7.5	6	3	6	0
5	6	6	6	6	6	1.5	7.5	1.5
6	6	4.5	3	6	6	1.5	3	4.5
7	6	4.5	4.5	6	6	3	6	3
8	4.5	7.5	4.5	9	6	1.5	3	3
9	8	8	4	8	8	12	8	4
10	7.5	6	6	6	7.5	3	4.5	7.5
11	4.5	6	3	6	4.5	9	6	3
12	6	4.5	1.5	6	6	1.5	1.5	6
13	4.5	6	1.5	6	6	3	4.5	3
14	4.5	4.5	3	6	4.5	9	6	3
15	6	6	4.5	6	6	1.5	1.5	9
16	8	8	8	8	8	4	10	4
Sum	94	92.5	67.5	104.5	100	56.5	78	60.5
DALP ı	1.88	1.85	1.35	2.09	2	1.13	1.56	1.21

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained *DALP ı*

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

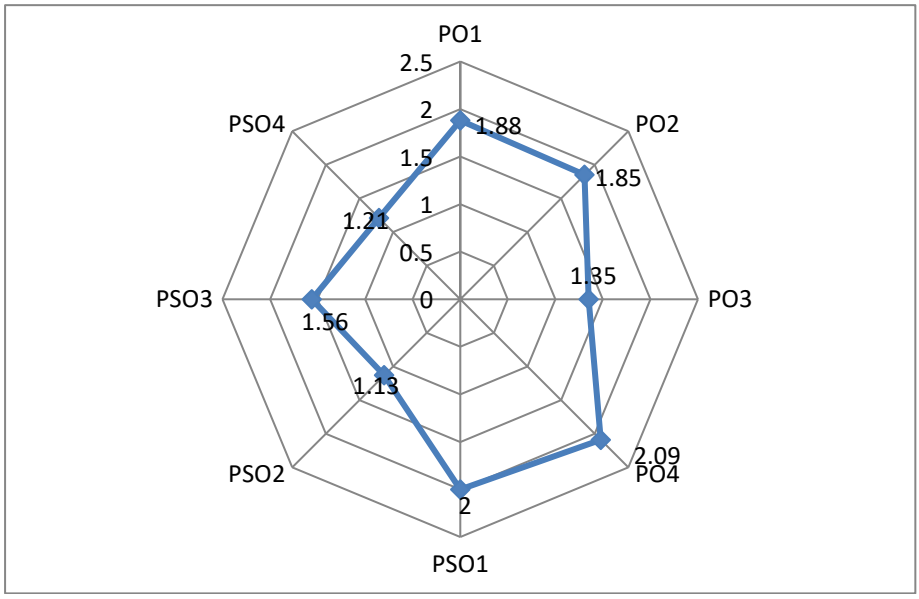
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	1.88	Good	Attained
PO2	1.85	Good	Attained
PO3	1.35	Average	Not Attained
PO4	2.09	Very Good	Attained
PSO1	2	Good	Attained
PSO2	1.13	Average	Not Attained
PSO3	1.56	Good	Attained
PSO4	1.21	Average	Not Attained

P$_l$ attainment target level say, 3, indicates that, the department is aiming minimum level-3(Good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-3 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect tothan P$_l$.

DEPARTMENT OF HISTORY

Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision

To develop students' critical thinking, analytical skills, and appreciation for diverse perspectives**.**

Mission

Inspire a lifelong engagement with history and prepare students for careers in education, public service, law, and beyond.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program Outcomes (POs) B.A.

After completing B. A. degree program, students will be able to:
PO 1: Respect core constitutional values like equality, social justice secularism and scientific approach.
PO 2: Get acquainted with and respect the common cultural heritage of pluralism and mutual respect.
PO 3: Become a responsible and dutiful citizen.
PO 4: Get well acquainted with the social, economic, political, historical and geographical facts and trends in India as well as in the world.

Program Specific Outcomes (PSOs)

After Completion of B.A. in History students will be able to:
PSO1: Being a subject of social science, History has its own value in society and human life. It helps the students to develop their ethical and social value.
PSO2: There is huge potentiality in future of a history student. Various options are opened to history students to choose their career. First of all, history is a subject from primary education level to higher study, so they can engage themselves in teaching profession in primary, secondary and post-secondary schools.
PSO3: History is also helpful for those who are preparing for WBCS and SSC. A history student may choose his or her career in journalism or any other editorial board. They may get job in museum, archives and libraries. Beside those, in the field of research and archaeology they may proceed.
PSO4: Sensitivity to gender and social inequities as well as acquaintance with the Historical trajectories of these issues.

Course Outcomes (Cos)

B.A.I (Sem.I)
Course 1: Rise of the Maratha Power (1600-1707) (I) DSE
CO1.1: To describe fundamentals causes of rise of Maratha power.
CO 1.2: To discuss the Chhatrapati Shivaji Maharaja's achievement till 1664.

B.A.I (Sem.II)
Course 2: Polity, society and Economy under the Marathas (1600-1707) (II) DSE 2
CO 2.1: Describe the forts from multiple viewpoints- as sources of history, as centres of control, as sites of historical events, and as heritage sites.
CO 2.2: To explain history of the rise of Maratha power with main emphasis on life and work of Chhatrapati Shivaji Maharaj.

B.A.II (Sem.III)
Course 3: History of Modern Maharashtra (1900 to 1960) (III) DSC
CO 3.1: Explain the beginnings and growth of nationalist consciousness in Maharashtra.
CO 3.2: Explain the contribution of Maharashtra to the national movement.

B.A.II (Sem. III)
Course 4: History of India (1757-1857) (IV) DSC
CO 4.1: Describe the significant events leading to establishment of the rule of East India company.
CO 4.2: Tell the colonial policy adopted by the company to consolidate its rule in India.

B.A.II (Sem.IV)
Course 5: History of Modern Maharashtra (1960-2000) (V) DSC
CO 5.1: This was also a period of massive expansion of education as well as social transformation.
CO 5.2: Tell the students to significant leaders, events and transformations in history of Maharashtra.

B.A.II (Sem.IV)
Course 6: History of India (1858-1947) (VI) DSC
CO 6.1: Explain the events which lead to the growth of nationalism in India
CO 6.2: To categorized the major events of the freedom struggle under the leadership of Mahatma Gandhi.

B.A.III (Sem.V)
Course 7: Early India (from beginning to 4th c. BC) VII) DSC
CO 7.1: Evaluate the transition of humans in India from Hunters to Farmers.
CO 7.2: Explain the transition from Early to Later Vedic period.

B.A.III (Sem. V)
Course 8: History of Medieval India (1206-1526 AD) (VIII) DSE
CO 8.1: Asses the fundamental changes in policy, society, religion and culture of India.
CO 8.2: To compare historiography on political structures and cultures across different realms

of the Rajput's, Delhi Sultanate.

B.A.III (Sem. V)
Course 9: Age of Revolutions (IX) DSC
CO 9.1: Explain the causes and consequences of the Reformation.
CO 9.2: Discover the role played by Martin Luther.

B.A.III (Sem. V)
Course 10: Political History of the Marathas (X) DES-E-230
CO 10.1: Explain the political condition up to 1740
CO 10.2: To tell the role of Peshawa Madhavrao, MahadajiShinde and Nanasaheb Peshawa.

B.A.III (Sem. V)
Course 11: History: Its Theory (XI) DSE
CO 11.1: Explain the definition and Scope of the subject of History.
CO 11.2: Describe the process of acquiring historical data.

B.A.III (Sem.VI)
Course 12: Ancient India (From 4th c. BC to 7th c. AD) (XII) DSC
CO 12.1: To describes the fundamentals of Ancient Indian History.
CO 12.2: Explain the great kings in Ancient India.

B.A.III (Sem.VI)
Course 13: History of Medieval India (1526-1707 AD) (XIII) DSE
CO 13.1: Identify the various sources for writing Medieval Indian history.
CO 13.2: Explain important developments in religion, society and culture.

B.A.III (Sem.VI)
Course 14: Making of the Modern World (16th to 19th Century) (XIV)
CO 14.1: Describe the causes and consequences of the glorious revolution in England
CO 14.2: Explain the concept of Nationalism and account for its rise and spread.

B.A.III (Sem.VI)
Course 15: Polity, Economy and Society under the Marathas (XV) DSE
CO 15.1: Describe the various sources for writing the history of the Marathas
CO 15.2: Explain the significant developments in the polity of the Marathas

B.A.III (Sem.VI)
Course 16: Methods and Applications of History (XVI) DSE
CO16.1: Explain the nature of archival sources
CO16.2: Define the conceptual clarity about recent trends in history.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	1	2	3	3	2	2
CO 1.2	2	2	2	2	3	3	2	2

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	1	2	3	3	2	2
CO 1.2	2	2	2	2	3	3	2	2
CO 2.1	2	1	2	2	3	3	2	1
CO 2.2	2	2	2	2	2	3	1	2
CO 3.1	2	3	2	3	3	3	2	2
CO 3.2	3	2	2	3	3	3	3	1
CO 4.1	2	1	1	1	2	3	2	2
CO 4.2	2	2	1	2	2	3	3	2
CO 5.1	3	1	3	1	2	2	2	1
CO 5.2	2	1	2	1	1	2	2	1
CO 6.1	2	2	3	2	2	3	2	2
CO 6.2	3	2	3	1	2	3	3	2
CO 7.1	1	1	1	1	1	1	1	1
CO 7.2	1	2	1	1	1	1	1	1
CO 8.1	1	2	1	1	2	2	1	1

CO 8.2	2	2	1	2	1	2	1	1
CO 9.1	3	2	3	2	3	3	2	3
CO 9.2	3	2	2	2	2	3	3	2
CO 10.1	2	2	1	1	2	1	2	1
CO 10.2	2	2	2	1	2	2	1	1
CO 11.1	1	1	1	2	2	1	2	2
CO 11.2	1	1	1	2	2	2	2	1
CO 12.1	2	2	2	1	2	1	2	1
CO 12.2	2	3	2	2	2	2	1	1
CO 13.1	2	1	2	2	1	2	2	1
CO 13.2	2	2	2	2	2	1	1	1
CO 14.1	3	3	3	2	3	2	3	2
CO 14.2	3	2	3	3	3	2	2	2
CO 15.1	2	1	2	1	1	1	2	1
CO 15.2	2	2	1	1	1	2	1	2
CO 16.1	1	1	1	1	1	2	1	1
CO 16.2	1	2	1	1	2	1	1	2

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	1	2	3	3	2	2
CO 1.2	2	2	2	2	3	3	2	2
Average ($X_{1,.,l}$)	2	2	1.5	2	3	3	2	2

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 16 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2	2	1.5	2	3	3	2	2
C_2	Course_2	2	1.5	2	2	2.5	3	1.5	1.5
C_3	Course_3	2.5	2.5	2	3	3	3	2.5	1.5
C_4	Course_4	2	1.5	1	1.5	2	3	2.5	2
C_5	Course_5	2.5	1	2.5	1	1.5	2	2	1
C_6	Course_6	2.5	2	3	1.5	2	3	2.5	2
C_7	Course_7	1	1.5	1	1	1	1	1	1
C_8	Course_8	1.5	2	1	1.5	1.5	2	1	1
C_9	Course_9	3	2	2.5	2	2.5	3	2.5	2.5
C_{10}	Course_10	2	2	1.5	1	2	1.5	1.5	1
C_{11}	Course_11	1	1	1	2	2	1.5	2	1.5
C_{12}	Course_12	2	2.5	2	1.5	2	1.5	1.5	1
C_{13}	Course_13	2	1.5	2	2	1.5	1.5	1.5	1
C_{14}	Course_14	3	2.5	3	2.5	3	2	2.5	2
C_{15}	Course_15	2	1.5	1.5	1	1	1.5	1.5	1.5
C_{16}	Course_16	1	1.5	1	1	1.5	1.5	1	1.5

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a program:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as

$X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weight age to external assessment .

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	3	Good	Not Attained
C_6	Course_6	5	Excellent	Attained
C_7	Course_7	4	Very Good	Attained
C_8	Course_8	4	Very Good	Attained
C_9	Course_9	4	Very Good	Attained

C_{10}	Course_10	4	Very Good	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	4	Very Good	Attained
C_{13}	Course_13	3	Good	Not Attained
C_{14}	Course_14	3	Good	Not Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	4	Very Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	2	6
C_2	Course_2	3	2	6
C_3	Course_3	3	2.5	7.5
C_4	Course_4	4	2	8
C_5	Course_5	3	2.5	7.5
C_6	Course_6	5	2.5	12.5
C_7	Course_7	4	1	4
C_8	Course_8	4	1.5	6
C_9	Course_9	4	3	12
C_{10}	Course_10	4	2	8
C_{11}	Course_11	4	1	4
C_{12}	Course_12	4	2	8
C_{13}	Course_13	3	2	6
C_{14}	Course_14	3	3	9
C_{15}	Course_15	4	2	8
C_{16}	Course_16	4	1	4
				116.5
Sum		*59*		
$DALP_1$=116.5/59			1.9746	

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	2	2	1.5	2	3	3	2	2
2	3	2	1.5	2	2	2.5	3	1.5	1.5
3	3	2.5	2.5	2	3	3	3	2.5	1.5
4	4	2	1.5	1	1.5	2	3	2.5	2
5	3	2.5	1	2.5	1	1.5	2	2	1
6	5	2.5	2	3	1.5	2	3	2.5	2
7	4	1	1.5	1	1	1	1	1	1
8	4	1.5	2	1	1.5	1.5	2	1	1
9	4	3	2	2.5	2	2.5	3	2.5	2.5
10	4	2	2	1.5	1	2	1.5	1.5	1
11	4	1	1	1	2	2	1.5	2	1.5
12	4	2	2.5	2	1.5	2	1.5	1.5	1
13	3	2	1.5	2	2	1.5	1.5	1.5	1
14	3	3	2.5	3	2.5	3	2	2.5	2
15	4	2	1.5	1.5	1	1	1.5	1.5	1.5
16	4	1	1.5	1	1	1.5	1.5	1	1.5
Sum	59	32	28.5	28.5	26.5	32	34	29	24

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	6	6	4.5	6	9	9	6	6
2	6	4.5	6	6	7.5	9	4.5	4.5
3	7.5	7.5	6	9	9	9	7.5	4.5
4	8	6	4	6	8	12	10	8
5	7.5	3	7.5	3	4.5	6	6	3
6	12.5	10	15	7.5	10	15	12.5	10
7	4	6	4	4	4	4	4	4
8	6	8	4	6	6	8	4	4
9	12	8	10	8	10	12	10	10
10	8	8	6	4	8	6	6	4
11	4	4	4	8	8	6	8	6
12	8	10	8	6	8	6	6	4
13	6	4.5	6	6	4.5	4.5	4.5	3
14	9	7.5	9	7.5	9	6	7.5	6
15	8	6	6	4	4	6	6	6
16	4	6	4	4	6	6	4	6
Sum	116.5	105	104	95	115.5	124.5	106.5	89
DALP ı	1.9746	1.7797	1.7627	1.6102	1.9576	2.1102	1.8051	1.5085

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained *DALP ı*

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

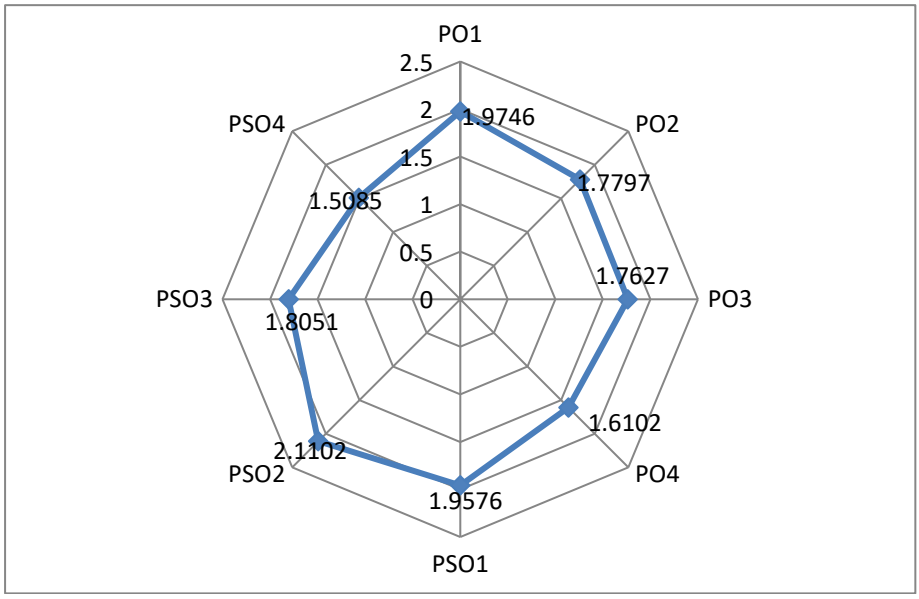
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	1.9746	Good	Attained
PO2	1.7797	Good	Attained
PO3	1.7627	Good	Attained
PO4	1.6102	Good	Attained
PSO1	1.9576	Good	Attained
PSO2	2.1102	Very Good	Attained
PSO3	1.8051	Good	Attained
PSO4	1.5085	Good	Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3(good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

ShikshanPrasarak Sanstha`s
PadmabhushanVasantraodada Patil Mahavidyalaya,KavatheMahankal

Department Of Political Science

Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision: To develop students' critical thinking, analytical skills, and appreciation for diverse perspectives.

Mission: Inspire a lifelong engagement with Indian Constitution and prepare students for careers in education, public service, law, and beyond.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program Outcomes (PO's)
After Completion of in B.A. Program Students Will be able to,

PO1: Get insights into the socio-economic and political issues at local to global.
PO2: Good employability skills as per the current need of society to compete in the competitive world.

PO3: Capable of addressing complex social and environmental issues from a problem oriented interdisciplinary perspective and also assess the its impact on the environment and society.
PO4: To foster the practice of creative writing and studies in applied language skills.

Program Specific Outcome (PSO's)
After Completion of in B.A. Program Students Will be able to,

PSO1: Academic Competence- Create awareness about political science, students will understand relationbetween three organs of the government, namely thelegislature, the executive and the judiciary.

PSO2: Research Competence- Acquiring the skills to conduct research, gather relevant information, and use appropriate resources to support academic work.

PSO3: Critical Thinking- Developing the ability to analyze and evaluate information critically, drawing informed conclusions and forming arguments based on evidence.

PSO4: Professional Competence- Recognizing ethical dilemmas and applying ethical principles in real-life situations. Working effectively as part of a team, respecting diverse perspective and contributing constructively.

Course Outcomes (CO's)

Course 1: Introduction to Political Science

After successfully completing this course, the student will be able to:

CO1.1: Understands the meaning, nature, scope and the Sub-disciplines of Political Science.

CO 1.2: Getting the meaning, features and importance of State & Democracy with key concepts.

Course2:Indian Constitution

After successfully completing this course, the student will be able to:

CO 2.1: Acquiring knowledge of historical background, basic features &Philosophy of Indian Constitution.

CO 2.2: Knowing legislative, executive functions of India & Procedure of judiciary.

Course 3:Political Process in India

After successfully completing this course, the student will be able to:

CO 3.1: Students will understand Indian Federalism & Centre-State relations.

CO 3.2: Understands electoral process, party system in India &various issues in Indian politics.

Course 4: Indian political Thought Part-I

After successfully completing this course, the student will be able to:

CO 4.1: The students will understand Political views of Kautilya& Mahatma Phule.

CO 4.2: Students will be able to understand political thoughts of Ranade& Tilak.

Course 5: Public Administration

After successfully completing this course, the student will be able to:

CO 5.1: Getting knowledge about public & private administration and principles & units of organization.

CO 5.2: Students will come to know various aspects of public corporations and changing perspectives in public administration.

Course 6: Local Self Government in Maharashtra

After successfully completing this course, the student will be able to:

CO 6.1: To know about Historical Background of Local Self Government.

CO 6.2: Getting basic knowledge of Rural Local Self Government&Urban Local Self Government.

Course 7: Indian political Thought Part-II

After successfully completing this course, the student will be able to:

CO 7.1: To understand various Gandhian concepts**.**

CO 7.2: To know Jawaharlal Nehru, Ambedkar & Roy.

Course 8: Public Administration

After successfully completing this course, the student will be able to:

CO 8.1: Students will understand both personnel level administration and financial administration in India.

CO 8.2: To understand delegated legislation, new trends in public administration.

Course 9: Political Theory

After successfully completing this course, the student will be able to:

CO 9.1: Getting basic knowledge&approachesof Political Theory.Knowing Behavioural movement in Political Science.

CO 9.2:Acquiring knowledge about concepts of Power, Authority and Legitimacy.

Course 10: Public Administration

After successfully completing this course, the student will be able to:

CO 10.1: Acquiring information about various concepts in Public Administration &Getting knowledge about Organization, its Bases, Principles and Units.

CO 10.2: Understanding the interface between citizens & Public Administration and other agencies in society and Public Administration.

Course 11: International politics

After successfully completing this course, the student will be able to:

CO 11.1: Getting acquainted with the concepts and dimension of International Politics.

CO 11.2: To know the working of international and regional organizations and the new world orderthat emerged after the end of cold war.

Course 12: Comparative Politics

After successfully completing this course, the student will be able to:

CO 12.1: Students will be familiar with basic theory of comparative politics& be able to understand constitutionalism, federalism.

CO 12.2: Students shall understand party system and pressure groups and its functioning.

Course 13: Western political Thought I

After successfully completing this course, the student will be able to:

CO 13.1: Students will get acquainted with the western tradition from Plato to Rousseau.

CO 13.2: Students will understand the evolution of western Political idea &be able to study historical aspects of western state and society.

Course 14:Modern Political Concepts

After successfully completing this course, the student will be able to:

CO 14.1: Student will know modern concepts such as Feminism, Multiculturalism, Environmentalism and Civil Society etc.

CO 14.2: This will enable students to have comprehensive idea of contemporary scenario in political science.

Course 15: Politics and Movements in Maharashtra

After successfully completing this course, the student will be able to:

CO 15.1: Student will know the Political System and the process of formationof Maharashtra.

CO 15.2: Student will know the movements, pressure groups and political parties in Maharashtra.

Course 16:Foreign Policy of India

After successfully completing this course, the student will be able to:

CO 16.1: Student will understand, 'what is the foundation andobjectivesof ForeignPolicy'.

CO 16.2: Student will come to know India's relation with super powers and neighboring countries.

Course 17:Comparative Government (With special reference to UK & USA)

After successfully completing this course, the student will be able to:

CO 17.1: To familiarizes students with composition, functions, and law making process of legislative bodies in UK and USA.

CO 17.2: To introduce the Judicial System and the role of Pressure Groups in the Politics of UK and USA.

Course 18:Western Political Thought- II

After successfully completing this course, the student will be able to:

CO 18.1: The students will understand Political views of J. S. Mill, Karl Marx, Gramsci& Hannah Arendt

CO 18.2: The students will get acquainted with various aspects of state and society with western perspective.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	1	1	1	3	1	2	2
CO 1.2	3	1	2	1	2	1	2	2

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	1	1	1	3	1	2	2
CO 1.2	3	1	2	1	2	1	2	2
CO 2.1	2	2	1	1	3	1	2	1
CO 2.2	2	1	2	1	2	1	2	1
CO 3.1	2	1	1	1	2	2	3	2
CO 3.2	3	1	2	1	3	1	2	1
CO 4.1	1	1	1	1	2	2	2	1
CO 4.2	1	1	1	1	2	1	1	1
CO 5.1	2	1	1	1	3	1	2	2
CO 5.2	2	1	1	1	2	1	2	1
CO 6.1	3	2	2	1	3	1	2	2
CO 6.2	2	2	2	1	2	1	1	2
CO 7.1	2	1	1	1	2	1	2	2
CO 7.2	2	1	1	1	2	1	1	2
CO 8.1	3	1	2	1	3	1	2	1

CO 8.2	2	1	1	2	2	1	1	2
CO 9.1	2	1	2	1	2	1	1	2
CO 9.2	2	1	2	1	2	1	1	1
CO 10.1	3	1	1	1	3	1	2	2
CO 10.2	2	1	2	1	2	1	2	1
CO 11.1	3	1	2	1	2	1	2	1
CO 11.2	3	1	1	1	2	1	1	2
CO 12.1	3	1	2	1	3	1	2	1
CO 12.2	2	1	1	1	3	1	3	2
CO 13.1	2	1	1	1	2	1	3	1
CO 13.2	2	1	1	1	2	1	2	1
CO 14.1	3	1	2	1	3	1	2	1
CO 14.2	3	1	2	1	3	1	2	1
CO 15.1	2	1	2	1	2	1	2	1
CO 15.2	2	1	1	1	2	1	1	2
CO 16.1	3	1	2	1	3	1	2	2
CO 16.2	2	1	3	1	2	1	1	1

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	1	1	1	3	1	2	2
CO 1.2	3	1	2	1	2	1	2	2
Average ($X_{1,.,l}$)	3	1	1.5	1	2.5	1	2	2

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 16 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	3	1	1.5	1	2.5	1	2	2
C_2	Course_2	2	1.5	1.5	1	2.5	1	2	1
C_3	Course_3	2.5	1	1.5	1	2.5	1.5	2.5	1.5
C_4	Course_4	1	1	1	1	2	1.5	1.5	1
C_5	Course_5	2	1	1	1	2.5	1	2	1.5
C_6	Course_6	2.5	2	2	1	2.5	1	1.5	2
C_7	Course_7	2	1	1	1	2	1	1.5	2
C_8	Course_8	2.5	1	1.5	1.5	2.5	1	1.5	1.5
C_9	Course_9	2	1	2	1	2	1	1	1.5
C_{10}	Course_10	2.5	1	1.5	1	2.5	1	2	1.5
C_{11}	Course_11	3	1	1.5	1	2	1	1.5	1.5
C_{12}	Course_12	2.5	1	1.5	1	3	1	2.5	1.5
C_{13}	Course_13	2	1	1	1	2	1	2.5	1
C_{14}	Course_14	3	1	2	1	3	1	2	1
C_{15}	Course_15	2	1	1.5	1	2	1	1.5	1.5
C_{16}	Course_16	2.5	1	2.5	1	2.5	1	1.5	1.5

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a program:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}$, $CO_{i,2}$, …, $CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weight age to external assessment .

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	4	Very Good	Attained
C_3	Course_3	5	Excellent	Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	4	Very Good	Attained
C_6	Course_6	5	Excellent	Attained
C_7	Course_7	4	Very Good	Attained
C_8	Course_8	4	Very Good	Attained
C_9	Course_9	4	Very Good	Attained

C_{10}	Course_10	4	Very Good	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	4	Very Good	Attained
C_{13}	Course_13	4	Very Good	Attained
C_{14}	Course_14	4	Very Good	Attained
C_{15}	Course_15	5	Excellent	Attained
C_{16}	Course_16	4	Very Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i, \, . \, , \, l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,.....n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	3	9
C_2	Course_2	4	2	8
C_3	Course_3	5	2.5	12.5
C_4	Course_4	4	1	4
C_5	Course_5	4	2	8
C_6	Course_6	5	2.5	12.5
C_7	Course_7	4	2	8
C_8	Course_8	4	2.5	10
C_9	Course_9	4	2	8
C_{10}	Course_10	4	2.5	10
C_{11}	Course_11	4	3	12
C_{12}	Course_12	4	2.5	10
C_{13}	Course_13	4	2	8
C_{14}	Course_14	4	3	12
C_{15}	Course_15	5	2	10
C_{16}	Course_16	4	2.5	10
Sum		66		152
$DALP_1=152/66$			2.303	

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	3	1	1.5	1	2.5	1	2	2
2	4	2	1.5	1.5	1	2.5	1	2	1
3	5	2.5	1	1.5	1	2.5	1.5	2.5	1.5
4	4	1	1	1	1	2	1.5	1.5	1
5	4	2	1	1	1	2.5	1	2	1.5
6	5	2.5	2	2	1	2.5	1	1.5	2
7	4	2	1	1	1	2	1	1.5	2
8	4	2.5	1	1.5	1.5	2.5	1	1.5	1.5
9	4	2	1	2	1	2	1	1	1.5
10	4	2.5	1	1.5	1	2.5	1	2	1.5
11	4	3	1	1.5	1	2	1	1.5	1.5
12	4	2.5	1	1.5	1	3	1	2.5	1.5
13	4	2	1	1	1	2	1	2.5	1
14	4	3	1	2	1	3	1	2	1

15	5	2	1	1.5	1	2	1	1.5	1.5
16	4	2.5	1	2.5	1	2.5	1	1.5	1.5
Sum	66	37	17.5	24.5	16.5	38	17	29	23.5

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	9	3	4.5	3	7.5	3	6	6
2	8	6	6	4	10	4	8	4
3	12.5	5	7.5	5	12.5	7.5	12.5	7.5
4	4	4	4	4	8	6	6	4
5	8	4	4	4	10	4	8	6
6	12.5	10	10	5	12.5	5	7.5	10
7	8	4	4	4	8	4	6	8
8	10	4	6	6	10	4	6	6
9	8	4	8	4	8	4	4	6
10	10	4	6	4	10	4	8	6
11	12	4	6	4	8	4	6	6
12	10	4	6	4	12	4	10	6
13	8	4	4	4	8	4	10	4
14	12	4	8	4	12	4	8	4
15	10	5	7.5	5	10	5	7.5	7.5
16	10	4	10	4	10	4	6	6
Sum	152	73	101.5	68	156.5	70.5	119.5	97
$DALP_l$	2.303	1.1061	1.5379	1.0303	2.3712	1.0682	1.8106	1.4697

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

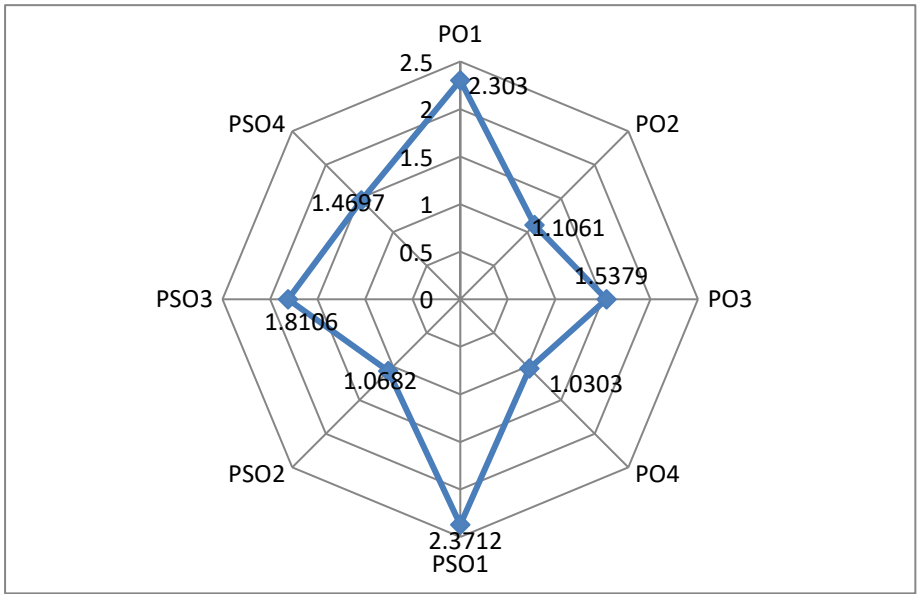
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO’s and PSO’s, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	2.303	Very Good	Attained
PO2	1.1061	Average	Not Attained
PO3	1.5379	Good	Attained
PO4	1.0303	Average	Not Attained
PSO1	2.3712	Very Good	Attained
PSO2	1.0682	Average	Not Attained
PSO3	1.8106	Good	Attained
PSO4	1.4697	Average	Not Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3(good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

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DEPARTMENT OF PSYCHOLOGY

Academic Year- 2021-2022

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision: To cultivate a comprehensive understanding of human behavior, foster critical thinking, and prepare students for diverse careers in psychology and related fields through rigorous academic training, research opportunities, and community engagement.

Mission: The mission of the Psychology undergraduate program is to provide a comprehensive understanding of psychological principles, foster critical thinking, and prepare students for diverse careers and advanced studies in psychology through rigorous coursework, research opportunities, and practical experiences.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program Outcomes (PO's)

After successfully completing B.A. Program students will be able to:

PO 1	Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
PO 2	Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO 3	Understand the issues of environmental contexts and sustainable development.
PO 4	Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

Program Specific Outcomes (PSO's)

After successfully completing B.A. Psychology Program students will be able to:

PSO 1	Apply their knowledge of psychology to effectively solve problems and address issues related to human behavior.
PSO 2	Apply psychological principles, theories and research results to a wide range of personal, social, cultural and organizational situations and problems.
PSO 3	Understand the importance of adhering to ethical principles, respecting diversity and accepting their own personal and professional limitations. They will use their knowledge of ethics to analyze situations in a thoughtful, deliberate manner.
PSO 4	Demonstrate an awareness of and respect for socio-cultural diversity on a local and global level.

Step 3: Defining Course Outcomes (CO's) of each course in a Program.

Course Outcomes (CO's)

B.A. I (Sem. I)
Course 1: Foundations of Psychology

CO 1.1	Understand the field of Psychology, Perception and Sleep.
CO 1.2	Grasp Learning and Memory Processes.

B.A.I (Sem. II)
Course 2: General Psychology

CO 2.1	Know the concepts of Intelligence and Motivation.
CO 2.2	Comprehend the concepts of Emotion and Personality.

B.A.II (Sem. III)
Course 3: Psychology for Living

CO 3.1	Familiar with the nature of Psychology for Living.
CO 3.2	Know the nature of Better Health, Stress, Mental Disorders and Helping Behavior.

B.A. II (Sem. III)
Course 4: Social Psychology

CO 4.1	Aware with the nature of Social Psychology.
CO 4.2	Get knowledge of the concepts of Social Perception, Self and Attitude.

B.A. II (Sem. IV)
Course 5: Modern Social Psychology

CO 5.1	Understand the concepts of Liking (Attraction) and Social Influence.
CO 5.2	Grasp the Pro-social Behavior and Aggression.

B.A. II (Sem. IV)
Course 6: Applied Psychology

CO 6.1	Familiar with the Applications of the psychology in Personal control, Decision Making, Personal growth, At Work and Leisure.
CO 6.2	Apply the skills in Making and keeping friends and Love and Commitment.

B.A. III (Sem. V)
Course 7: Cognitive Psychology

CO 7.1	Aware the approaches to Human Cognition, Visual Perception and Attention.
CO 7.2	Grasp the processes of Memory, Emotions and Consciousness.

B.A. III (Sem. V)
Course 8: Cross-Cultural Psychology

CO 8.1	Get knowledge the field of Cross-cultural Psychology and Key Concepts.
CO 8.2	Understand the concepts of Etics, Emics, Ethnocentrism and Indigenous Psychology, Culture and Intelligence, Prejudice and Parental Practices, Culture and Abnormality.

B.A. III (Sem. V)
Course 9: Psychopathology

CO 9.1	Familiar with the field of Psychopathology and Perspectives of Psychopathology.
CO 9.2	Understand the nature of Anxiety disorder, OCD, Mood Disorder and Suicide.

B.A. III (Sem. V)
Course 10: Current Trends in Psychology

CO 10.1	Aware with the emerging new trends in Psychology.
CO 10.2	Grasp and learn more about Health, Criminal and Cyber Psychology.

B.A. III (Sem. V)
Course 11: Practical (Experiments)

CO 11.1	Familiar with Psychological Experiments and some Statistical methods.
CO 11.2	Learn the skills for conducting experiments and writing their reports.

B.A. III (Sem. VI)
Course 12: Psychological Testing

CO 12.1	Comprehend the field of Psychological Testing in general.
CO 12.2	Know the nature and uses of Intelligence, Achievement and Personality tests.

B.A. III (Sem. VI)
Course 13: Counselling Psychology

CO 13.1	Get knowledge of the field of Counselling Psychology.
CO 13.2	Apply the skills in the field of Career, School and College counselling.

B.A. III (Sem. VI)
Course 14: Developmental Psychology

CO 14.1	Aware with the field of Lifespan Developmental.
CO 14.2	Understand the nature and processes in the Infancy, Childhood, Adolescence and Adulthood period.

B.A. III (Sem. VI)
Course 15: Psychology of Organizational Behavior

CO 15.1	Familiar with the field of Organizational Behavior.
CO 15.2	Comprehend the nature and importance of Personality, Job satisfaction, Leadership, Group Behavior and Organizational Change.

B.A. III (Sem. VI)
Course 16: Practical (Psychological Tests)

CO 16.1	Get Knowledge of the Psychological tests and some statistical methods.
CO 16.2	Learn the skills for administering Psychological Tests and writing their reports.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	2	3	3	3	2	2
CO 1.2	3	2	2	3	3	3	2	2

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	2	3	3	3	2	2
CO 1.2	3	2	2	3	3	3	2	2
CO 2.1	3	2	2	3	3	3	2	2
CO 2.2	3	2	2	3	3	3	2	2
CO 3.1	3	2	2	3	3	3	2	2
CO 3.2	3	2	2	3	3	3	2	2
CO 4.1	3	2	2	3	3	3	2	2
CO 4.2	3	2	2	3	3	3	2	2
CO 5.1	3	2	2	3	3	3	2	2
CO 5.2	3	2	2	3	3	3	2	2
CO 6.1	3	2	2	3	3	3	2	2
CO 6.2	3	2	2	3	3	3	2	2
CO 7.1	3	2	2	3	3	3	2	2
CO 7.2	3	2	2	3	3	3	2	2
CO 8.1	3	2	2	3	3	3	2	2
CO 8.2	3	2	2	3	3	3	2	2
CO 9.1	3	2	2	3	3	3	2	2
CO 9.2	3	2	2	3	3	3	2	2
CO 10.1	3	2	2	3	3	3	2	2
CO 10.2	3	2	2	3	3	3	2	2
CO 11.1	3	2	1	3	3	3	3	2
CO 11.2	3	2	1	3	3	3	3	2
CO 12.1	3	2	2	3	3	3	2	2
CO 12.2	3	2	2	3	3	3	2	2

CO 13.1	3	2	2	3	3	3	2	2
CO 13.2	3	2	2	3	3	3	2	2
CO 14.1	3	2	2	3	3	3	2	2
CO 14.2	3	2	2	3	3	3	2	2
CO 15.1	3	2	2	3	3	3	2	2
CO 15.2	3	2	2	3	3	3	2	2
CO 16.1	3	2	1	3	3	3	3	2
CO 16.2	3	2	1	3	3	3	3	2

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	2	3	3	3	2	2
CO 1.2	3	2	2	3	3	3	2	2
Average ($X_{1,.,l}$)	3	2	2	3	3	3	2	2

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 19 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	3	2	2	3	3	3	2	2
C_2	Course_2	3	2	2	3	3	3	2	2
C_3	Course_3	3	2	2	3	3	3	2	2
C_4	Course_4	3	2	2	3	3	3	2	2
C_5	Course_5	3	2	2	3	3	3	2	2
C_6	Course_6	3	2	2	3	3	3	2	2
C_7	Course_7	3	2	2	3	3	3	2	2
C_8	Course_8	3	2	2	3	3	3	2	2
C_9	Course_9	3	2	2	3	3	3	2	2
C_{10}	Course_10	3	2	2	3	3	3	2	2
C_{11}	Course_11	3	2	1	3	3	3	3	2
C_{12}	Course_12	3	2	2	3	3	3	2	2
C_{13}	Course_13	3	2	2	3	3	3	2	2
C_{14}	Course_14	3	2	2	3	3	3	2	2
C_{15}	Course_15	3	2	2	3	3	3	2	2
C_{16}	Course_16	3	2	1	3	3	3	3	2

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

Details of a program:

- Name of the Program: XYZ
- Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
- Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

Let $n = n_1 + n_2$, total number of PO's and PSO's.

- For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k, l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i,\,.\,,} = \frac{\sum_{j=1}^{k} X_{i,j,l}}{k}$, Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 80% weightage to external assessment and 20% weightage to internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Good – Attained as target level that is we are aiming minimum level 3 (good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Attained
C_2	Course_2	3	Good	Attained
C_3	Course_3	4	very Good	Attained
C_4	Course_4	3	Good	Attained
C_5	Course_5	4	Very Good	Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	3	Good	Attained
C_8	Course_8	4	Very Good	Attained
C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	4	Very Good	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	3	Good	Attained
C_{13}	Course_13	3	Good	Attained
C_{14}	Course_14	5	Excellent	Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	3	Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	3	9
C_2	Course_2	3	3	9
C_3	Course_3	4	3	12
C_4	Course_4	3	3	9
C_5	Course_5	4	3	12
C_6	Course_6	4	3	12
C_7	Course_7	3	3	9
C_8	Course_8	4	3	12
C_9	Course_9	4	3	12
C_{10}	Course_10	4	3	12
C_{11}	Course_11	4	3	12

C_{12}	Course_12	3	3	9
C_{13}	Course_13	3	3	9
C_{14}	Course_14	5	3	15
C_{15}	Course_15	4	3	12
C_{16}	Course_16	3	3	9
Sum		58		174
			$DALP_1$ = 174/58	3

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	3	2	2	3	3	3	2	2
2	3	3	2	2	3	3	3	2	2
3	4	3	2	2	3	3	3	2	2
4	3	3	2	2	3	3	3	2	2
5	4	3	2	2	3	3	3	2	2
6	4	3	2	2	3	3	3	2	2
7	3	3	2	2	3	3	3	2	2
8	4	3	2	2	3	3	3	2	2
9	4	3	2	2	3	3	3	2	2
10	4	3	2	2	3	3	3	2	2
11	4	3	2	1	3	3	3	3	2
12	3	3	2	2	3	3	3	2	2
13	3	3	2	2	3	3	3	2	2
14	5	3	2	2	3	3	3	2	2
15	4	3	2	2	3	3	3	2	2
16	3	3	2	1	3	3	3	3	2
Sum	58	48	32	30	48	48	48	34	32

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	9	6	6	9	9	9	6	6
2	9	6	6	9	9	9	6	6
3	12	8	8	12	12	12	8	8
4	9	6	6	9	9	9	6	6
5	12	8	8	12	12	12	8	8
6	12	8	8	12	12	12	8	8
7	9	6	6	9	9	9	6	6
8	12	8	8	12	12	12	8	8
9	12	8	8	12	12	12	8	8
10	12	8	8	12	12	12	8	8
11	12	8	4	12	12	12	12	8
12	9	6	6	9	9	9	6	6
13	9	6	6	9	9	9	6	6
14	15	10	10	15	15	15	10	10
15	12	8	8	12	12	12	8	8
16	9	6	3	9	9	9	9	6
Sum	174	116	109	174	174	174	123	116
$DALP_l$	3	2	1.8793	3	3	3	2.1207	2

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

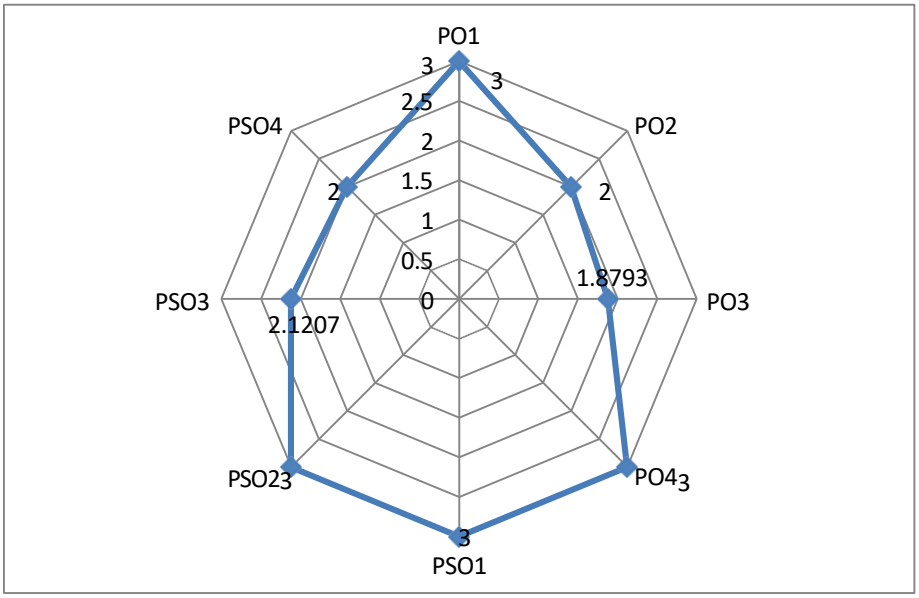
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimum level 4 (very good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	3	Excellent	Attained
PO2	2	Good	Not Attained
PO3	1.8793	Good	Not Attained
PO4	3	Excellent	Attained
PSO1	3	Excellent	Attained
PSO2	3	Excellent	Attained
PSO3	2.1207	Very Good	Attained
PSO4	2	Good	Not Attained

P_l attainment target level say, 4, indicates that, the department is aiming minimum level-4(very good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-3 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-4 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

Shikshan Prasarak Sanstha`s

Padmabhushan VAsantraodada Patil Mahavidyalaya, Kavathe Mahankal

Department of Sociology

Acadedmic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision: "To cultivate a society founded on empathy, equality, and understanding through rigorous sociological inquiry."

Mission: "We strive to advance knowledge of human behavior and social structures through cutting-edge research, education, and community engagement."

Values: "Integrity, diversity, and social justice guide our commitment to fostering a more inclusive and equitable world."

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

After completion of the B.A. programme, Students will be able to,

PO1	Get insights into the local and global socio-economic and political issues.
PO2	Good employability skills as per the current need of society to compete in the competitive world.
PO3	Capable of addressing complex social and environmental issues from a problem-oriented, interdisciplinary perspective and also assessing their impact on the environment and society.
PO4	To foster the practice of creative writing and studies in applied language skills

Program Specific Outcomes (PSOs): B.A. Sociology)

After completion of the B. A. programme, Students will be able to,

PSO1 **Academic Competence:**

i. Graduates should be able to analyse and understand social structures, institutions, and processes that shape human behaviour and interactions within society.

ii. Graduates should demonstrate an understanding of various forms of social inequality, such as class, race, gender, and age, and be able to critically analyse their impacts on individuals and communities.

PSO2 **Professional Competence:**

i. Graduates should be able to apply sociological knowledge and skills to various professional contexts, such as policy development, social services, community development, advocacy organisations, and research institutions.

ii. Graduates should be able to communicate sociological ideas and arguments effectively through oral, written, and visual means, adapting their communication style to different audiences.

PSO3 **Research Competence:**

i. Graduates should possess the skills to design and conduct sociological research using appropriate methodologies, including qualitative and quantitative methods, and be able to interpret and present their findings effectively.

PSO4 **i.** Graduates should be able to apply sociological concepts and theories to identify new ideas, products, or services that meet market demands and have the potential for commercial success.

ii. Graduates develop their Social Competence specifically related to emotional intelligence, communication skills, conflict resolution, networking, and human resource management.

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Step 3: Defining Course Outcomes (CO's) of each course in a Program.

Course Outcomes

B.A.I Sem.- I Introduction to Sociology DSC Paper –I

CO1.1 The student learn to apply to sociological perspective in understanding how society shapes our individual lives.

CO 1.2 Understand the nature and characteristics of Sociology

B.A.I Sem.- II Principles of Sociology DSC Paper –II

CO 2.1 To create awareness about sociological principles in students.

CO 2.2 It provides a foundation for the other more detailed and specialised course in Sociology.

B.A.II Sem.- III: Social issues in IndiaPaper DSC–III

CO 3.1 Realizes social cultural issues variables, Poverty and Unemployment of social economic issues, Human rights and cybercrime of social legal issues.

CO 3.2 Analyse the impact of change on social issues, social-cultural issues and social-legal issues level.

B.A.II Sem.- III Social Movement in India DSC No. – IV

CO 4.1 Understand Social movements in India

CO 4.2 Understand the organise, major types and impacts of social movements in India

B.A.II Sem.- IV: Gender and Violence DSCPaper – V

CO 5.1 Understands the meaning, and nature of major issues of Gender violence development.

CO 5.2 Explains the nature and remedies of violence against different women's movements. nature types and acts of women’s harassment at the workplace

B.A. II Sem.- IV Sociology of Health Paper DSC – VI

CO 6.1 Know the introduction of the sociology of Health and major diseases in India.

CO 6.2 Explain lifestyle and remedies for health problems and health policies in India.

B.A. III Sem.-V Western Sociological Thinkers VI (E- 66) DSE – E - 66

CO 7.1 Understand Western sociological thinkers to enable them to apply theories to their own everyday life experiences.

CO 7.2 Know the theories of the sociological imagination and the capacity to read each situation sociologically and then to think and applicability about it theoretically

B.A. III Sem.-V Methods of Social Research-VII(E- 67) DSE – E 67

CO 8.1 Understanding introduction to methodologies of sociological research

CO 8.2 Explain elementary knowledge of the complexities and philosophical underpinnings of research.

B.A. III Sem.-V Political Sociology- IX (E-68) DSE – E 68

CO 9.1 Get acquainted with major concepts, and theoretical approaches of political sociology.

CO 9.2 Explain and apply the concept in Indian political processes and institutions and also expose emerging perspectives on the political-society relationship in contemporary times.

B.A. III Sem-V Human Rights- X(E- 169) DSE – E 69

CO 10.1 Understand the basic concept of human rights and also the nature and role of human rights in India.

CO 10.2 Explain the violation of Human rights in India.

B.A. III Sem-V Sociology of Religion- XI(E- 70) DSE E 70

CO 11.1 Exposes the distinctiveness of sociological approaches to the study of religion. and also a basic theoretical and methodological study of religion.

CO 11.2 Analyse some aspects of religious phenomena in contemporary times such as secularisation and multiculturalism.

B.A. III Sem-VI Indian Sociological Thinkers (E191) DSE – E 191

CO 12.1 Understanding Indian sociological thinkers and applying theories to their own Indian social life experiences, and also reading and think each situation sociologically

CO 12.2 Analyse the imperative that sociological theory courses demonstrate the applicability.

B.A. III Sem- VI Methods of Social/Research - II (EC- 192) DSE – E 192

CO 13.1 Distinguish introductory comprehensive engagement with social research. theoretical and practical knowledge about different stages of the research process like the creation of research design, methods of data collection and analysis.

CO 13.2 Understand both qualitative and quantitative research important knowledge and training.

B.A.III SEM-VI Social Anthropology XIV (E-193) DSE–E - 193

CO 14.1 Understand the conceptual knowledge of anthropology.

CO 14.2 Explain the social aspects of tribal in India.

B.A. III SEM-VI Rural Sociology - XV(E - 194) DSE – E 194

CO 15.1 Understand foundational material practices and formation of social collectivises and make sense of South Asia's agrarian society, also with rural situation past and present with theoretical and practical knowledge.

CO 15.2 Explain the sense of rural communication, their structure, transformation and trials and tribulations in the modern world. also the legacy of theoretical and empirical work on rural sociology and its continued relevance.

B.A. III SEM-VI Urban Sociology - XVI(E - 195) DSE – E 195

CO 16.1 Understand is an important aspect of urban society with key theoretical perspectives and historical and contemporary contexts and also urban living narrating the subjunctive experience of urban communities with case studies in India.

CO 16.2 Evolve critical thinking and develop a policy perspective on urban society.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	1	3	0	3	2	0	2
CO 1.2	3	1	3	0	3	1	0	2

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	1	3	0	3	2	0	2
CO 1.2	3	1	3	0	3	1	0	2
CO 2.1	3	1	3	0	3	2	0	2
CO 2.2	3	1	3	1	3	3	1	3
CO 3.1	3	0	2	0	3	2	0	1
CO 3.2	3	0	3	0	3	3	1	1
CO 4.1	3	0	2	0	3	1	0	2
CO 4.2	3	0	3	0	3	2	1	2
CO 5.1	3	0	3	0	3	3	0	3
CO 5.2	3	0	3	0	3	3	1	3
CO 6.1	2	1	3	0	3	3	0	2
CO 6.2	2	1	3	0	3	3	1	3
CO 7.1	1	0	2	1	3	1	2	2
CO 7.2	1	0	2	2	3	1	2	3

CO 8.1	0	3	2	2	2	2	3	2
CO 8.2	0	3	2	2	2	2	3	2
CO 9.1	2	0	2	0	2	2	0	1
CO 9.2	2	0	2	0	2	2	1	2
CO 10.1	3	0	3	0	2	2	0	0
CO 10.2	3	0	3	0	2	2	1	1
CO 11.1	3	0	3	0	2	2	0	0
CO 11.2	3	0	3	0	2	2	1	1
CO 12.1	1	0	2	1	3	1	2	2
CO 12.2	1	0	2	2	3	1	2	3
CO 13.1	1	2	2	1	2	3	3	1
CO 13.2	1	2	2	1	2	3	3	2
CO 14.1	2	0	3	0	2	1	0	1
CO 14.2	2	0	3	0	2	1	0	1
CO 15.1	3	0	2	0	2	2	0	1
CO 15.2	3	0	2	0	2	2	1	1
CO 16.1	3	0	2	0	2	2	0	1
CO 16.2	3	1	2	0	2	2	1	1

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	1	3	0	3	2	0	2
CO 1.2	3	1	3	0	3	1	0	2
Average ($X_{1,.,l}$)	3	1	3	0	3	1.5	0	2

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 19 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	3	1	3	0	3	1.5	0	2
C_2	Course_2	3	1	3	0.5	3	2.5	0.5	2.5
C_3	Course_3	3	0	2.5	0	3	2.5	0.5	1
C_4	Course_4	3	0	2.5	0	3	1.5	0.5	2
C_5	Course_5	3	0	3	0	3	3	0.5	3
C_6	Course_6	2	1	3	0	3	3	0.5	2.5
C_7	Course_7	1	0	2	1.5	3	1	2	2.5
C_8	Course_8	0	3	2	2	2	2	3	2
C_9	Course_9	2	0	2	0	2	2	0.5	1.5
C_{10}	Course_10	3	0	3	0	2	2	0.5	0.5
C_{11}	Course_11	3	0	3	0	2	2	0.5	0.5
C_{12}	Course_12	1	0	2	1.5	3	1	2	2.5
C_{13}	Course_13	1	2	2	1	2	3	3	1.5
C_{14}	Course_14	2	0	3	0	2	1	0	1
C_{15}	Course_15	3	0	2	0	2	2	0.5	1
C_{16}	Course_16	3	0.5	2	0	2	2	0.5	1

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

Details of a program:

- Name of the Program: XYZ
- Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
- Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

  Let $n = n_1 + n_2$, total number of PO's and PSO's.

- For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}$, $CO_{i,2}$, … , $CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$ Here k be the number of out come in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weightage to external assessment

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	3	Good	Not Attained
C_6	Course_6	3	Good	Not Attained
C_7	Course_7	4	Very Good	Attained
C_8	Course_8	3	Good	Not Attained
C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	4	Very Good	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	3	Good	Not Attained
C_{13}	Course_13	4	Very Good	Attained
C_{14}	Course_14	4	Very Good	Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	4	Very Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \quad ,l=1,2,\ldots\ldots n.$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	3	9
C_2	Course_2	3	3	9
C_3	Course_3	3	3	9
C_4	Course_4	4	3	12
C_5	Course_5	3	3	9
C_6	Course_6	3	2	6
C_7	Course_7	4	1	4
C_8	Course_8	3	0	0
C_9	Course_9	4	2	8

C_{10}	Course_10	4	3	12
C_{11}	Course_11	4	3	12
C_{12}	Course_12	3	1	3
C_{13}	Course_13	4	1	4
C_{14}	Course_14	4	2	8
C_{15}	Course_15	4	3	12
C_{16}	Course_16	4	3	12
Sum		57		129
			$DALP_1$ = 129/57	2.2632

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	3	1	3	0	3	1.5	0	2
2	3	3	1	3	0.5	3	2.5	0.5	2.5
3	3	3	0	2.5	0	3	2.5	0.5	1
4	4	3	0	2.5	0	3	1.5	0.5	2
5	3	3	0	3	0	3	3	0.5	3
6	3	2	1	3	0	3	3	0.5	2.5
7	4	1	0	2	1.5	3	1	2	2.5
8	3	0	3	2	2	2	2	3	2
9	4	2	0	2	0	2	2	0.5	1.5
10	4	3	0	3	0	2	2	0.5	0.5
11	4	3	0	3	0	2	2	0.5	0.5
12	3	1	0	2	1.5	3	1	2	2.5
13	4	1	2	2	1	2	3	3	1.5
14	4	2	0	3	0	2	1	0	1
15	4	3	0	2	0	2	2	0.5	1
16	4	3	0.5	2	0	2	2	0.5	1
Sum	57	36	8.5	40	6.5	40	32	15	27

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	9	3	9	0	9	4.5	0	6
2	9	3	9	1.5	9	7.5	1.5	7.5
3	9	0	7.5	0	9	7.5	1.5	3
4	12	0	10	0	12	6	2	8
5	9	0	9	0	9	9	1.5	9
6	6	3	9	0	9	9	1.5	7.5
7	4	0	8	6	12	4	8	10
8	0	9	6	6	6	6	9	6
9	8	0	8	0	8	8	2	6
10	12	0	12	0	8	8	2	2
11	12	0	12	0	8	8	2	2
12	3	0	6	4.5	9	3	6	7.5
13	4	8	8	4	8	12	12	6
14	8	0	12	0	8	4	0	4
15	12	0	8	0	8	8	2	4
16	12	2	8	0	8	8	2	4
Sum	129	28	141.5	22	140	112.5	53	92.5
$DALP_l$	2.2632	0.4912	2.4825	0.386	2.4561	1.9737	0.9298	1.6228

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

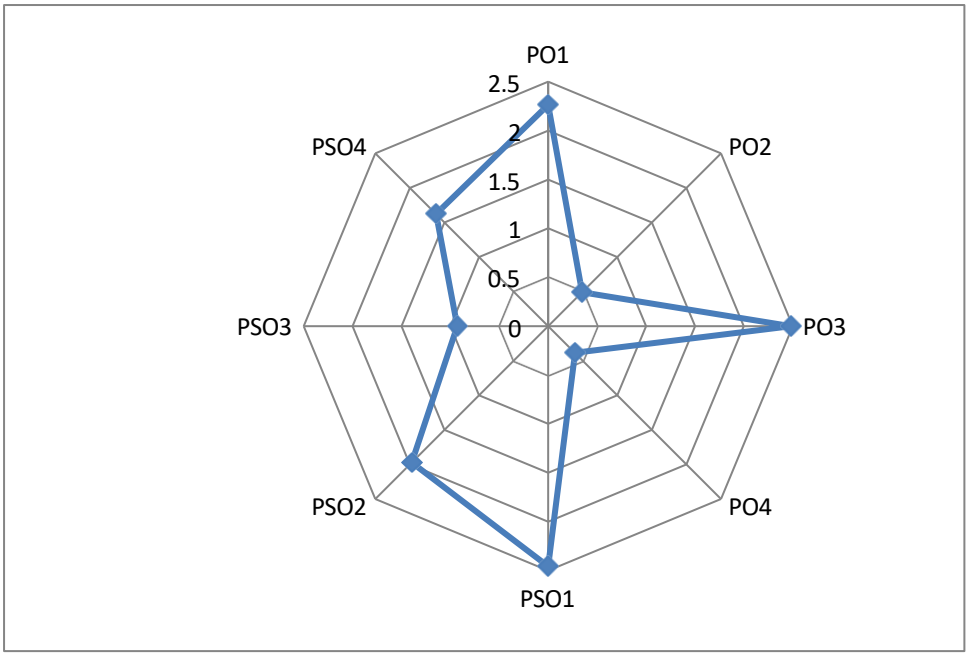
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimum level 4 (very good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	2.263158	Very good	Attained
PO2	0.491228	Poor	Not Attained
PO3	2.482456	Very Good	Attained
PO4	0.385965	Poor	Not Attained
PSO1	2.45614	Very Good	Attained
PSO2	1.973684	Good	Not Attained
PSO3	0.929825	Poor	Not Attained
PSO4	1.622807	Good	Not Attained

P_l attainment target level say, 4, indicates that, the department is aiming minimum level-4 (very good) in the performance of abilities of students.



Step 9: Planned actions

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed by designing the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-4 are addressed by planning remedial measures for the corresponding courses with respect to than Pj

Shikshan Prasarak Sanstha`s
Padmabhushan Vasantraodada Patil Mahavidyalaya, Kavathe Mahankal

DEPARTMENT OF ECONOMICS

(Academic Year 2021-22)

Vision: To be a premier hub of economic education and research, empowering students with the expertise and ethical grounding to drive sustainable development and social progress.

Mission: To provide a transformative education in economics, fostering critical thinking, and a commitment to ethical and sustainable economic practices.

Programme Outcomes (Pos)
After completing B. A. degree programme, students will be able to:

PO 1: Get insights into the socio-economic and political issues at local to global.
PO 2: Good employability skills as per the current need of society to compete in the competitive world.
PO 3: Capable for addressing complex social and environmental issues from a problem-oriented, interdisciplinary perspective and also assess its impact on the environment and society.
PO 4: To foster the practice of creative writing and studies in applied language skills

Programme Specific Outcomes (PSOs)
After Completion of B.A. in Economics students will be able to:

PSO 1: Students will be able to analyse the economic and institutional arrangements of firms, industries, organizations, specific regions and countries.
PSO 2: Students will understand the role of government and regulatory framework in the process of economic development.
PSO 3: Apply research knowledge in economics
PSO 4: Students will be able to analysis the current issues of the economies.

Course Outcomes (Cos)

B.A.I (Sem. I)

Course 1: Indian Economy Paper – (I) DSE

CO 1.1 Understand nature and characteristics of Indian economy

CO 1.2 Know growth, feature and impact of Indian population

B.A.I (Sem. II)

Course 2: Indian Economy Paper (II) DSE

CO 2.1 Understand role of agriculture and industrial sector in process of economic development

CO 2.2 Know role of service sector in process of economic development and implementation and impact of economic reforms

B.A.II (Sem. III)

Course 3: Macro Economics-I Paper (III) DSC

CO 3.1 Realize macro-economic variables, macro-economic theories of output and employment

CO 3.2 Analyse impact of change in general price level and consumption and investment function.

B.A.II (Sem. III)

Course 4: Money and Banking Paper No. (IV) DSC

CO 4.1 Understand Indian financial market and the practical banking

CO 4.2 Understand the organise structure and function of Reserve Bank of India and banking practices in India

B.A.II (Sem. IV)

Course 5: Macro Economics-II Paper (V) DSC

CO 5.1 Understands phases of business cycle and Expresses public finance and economic development.

CO 5.2 Explains export, import and foreign trade deficit and balance of payment concepts

B.A.II (Sem. IV)

Course 6: Money and Banking Paper (VI) DSC

CO 6.1 Know Indian Financial System and Financial Institutions.

CO 6.4 Know Banking Reform such as Narasimhan Committee, IDF in banking, Payment Bank, Small Finance Bank and E- banking services

B.A.III (Sem. V)

Course 7: Principles of Micro Economics- I VII) DSC E-71

CO 7.1 Understand consumer decision making, consumer behaviour and the concept of utility and satisfaction

CO 7.2 Derive revenue and cost figures as well as curves and production

B.A.III (Sem. V)

Course 8: Economics of Development (VIII) DSE E-72

CO 8.1 Identify the dimensions of development

CO 8.2 Know the theories of economic development and realise the role of state in economic development

B.A.III (Sem. V)

Course 9: International Economics- I (IX) DSC E-73

CO 9.1 Explain international trade and the measurement of gains from international trade

CO 9.2 Distinguish different rates of exchange and measure the terms of trade

B.A.III (Sem. V)

Course 10: Research Methodology in Economics-I (X) DES-E-74

CO 10.1 Get acquainted with the basic concepts of research and its methodologies.

CO 10.2 Select and define appropriate research problem and parameters.

B.A.III (Sem. V)

Course 11: History of Economic Thoughts- I (XI) DSE E-75

CO 11.1 Understand the basic economic ideas of various economic thinkers of the world

CO 11.2 Understand the development of economic thoughts

B.A.III (Sem.VI)

Course 12: Principles of Micro Economics-II (XII) DSC E-196

CO 12.1 Identify the market structure and analyse the economic behaviour of individual firms and markets

CO 12.2 Analyse a firm's profit maximising strategies under different market conditions and the factor pricing

B.A.III (Sem.VI)

Course 13: Economics of Planning (XIII) DSE E-197

CO 13.1 Get acquainted with economic planning and its importance in development and planning machinery in India

CO 13.2 Evaluate sectorial performance of the Indian economy and Compare and analyse Indian models of economic development

B.A.III (Sem.VI)

Course 14: International Economics- II (XIV) DSE E-198

CO 14.1 Distinguish between balance of trade and balance of payments, analyse the balance of payments

CO 14.2 Understand the various types of foreign capital and the impact of international institutions on Indian economy

B.A.III (Sem.VI)

Course 15: Research Methodology in Economics-II (XV) DSE E-199

CO 15.1 Understand the sampling techniques as a method of data collection and use techniques of data analysis in research

CO 15.2 Write a research report, thesis and a research proposal

B.A.III (Sem.VI)

Course 16: History of Economic Thoughts- II (XVI) DSE E-200

CO 16.1 Understand the economic concepts and theories of Neo-Classical and Indian thinkers.

CO 16.2 Understand the development of economic thoughts

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, COs of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose programme XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrix for a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	1	2	3	3	2	2
CO 1.2	2	2	2	2	3	3	2	2

In the same way we have course articulation matrices for all courses in that Programme.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	1	2	3	3	2	2
CO 1.2	2	2	2	2	3	3	2	2
CO 2.1	2	1	2	2	3	3	2	1
CO 2.2	2	2	2	2	2	3	1	2
CO 3.1	2	3	2	3	3	3	2	2
CO 3.2	3	2	2	3	3	3	3	1
CO 4.1	2	1	1	1	2	3	2	2
CO 4.2	2	2	1	2	2	3	3	2
CO 5.1	3	1	3	1	2	2	2	1
CO 5.2	2	1	2	1	1	2	2	1
CO 6.1	2	2	3	2	2	3	2	2
CO 6.2	3	2	3	1	2	3	3	2
CO 7.1	1	1	1	1	1	1	1	1
CO 7.2	1	2	1	1	1	1	1	1
CO 8.1	1	2	1	1	2	2	1	1
CO 8.2	2	2	1	2	1	2	1	1
CO 9.1	3	2	3	2	3	3	2	3
CO 9.2	3	2	2	2	2	3	3	2
CO 10.1	2	2	1	1	2	1	2	1
CO 10.2	2	2	2	1	2	2	1	1
CO 11.1	1	1	1	2	2	1	2	2
CO 11.2	1	1	1	2	2	2	2	1
CO 12.1	2	2	2	1	2	1	2	1
CO 12.2	2	3	2	2	2	2	1	1
CO 13.1	2	1	2	2	1	2	2	1
CO 13.2	2	2	2	2	2	1	1	1
CO 14.1	3	3	3	2	3	2	3	2
CO 14.2	3	2	3	3	3	2	2	2
CO 15.1	2	1	2	1	1	1	2	1
CO 15.2	2	2	1	1	1	2	1	2
CO 16.1	1	1	1	1	1	2	1	1
CO 16.2	1	2	1	1	2	1	1	2

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	1	2	3	3	2	2
CO 1.2	2	2	2	2	3	3	2	2
Average ($X_{1,.,l}$)	2	2	1.5	2	3	3	2	2

Similarly, the overall level of relation of all the courses in the programme is established. These levels are reported in the matrix form and this matrix is called as the programme articulation matrix. For example, if the programme XYZ has 16 courses then the programme articulation matrix will be as follows.

Programme Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2	2	1.5	2	3	3	2	2
C_2	Course_2	2	1.5	2	2	2.5	3	1.5	1.5
C_3	Course_3	2.5	2.5	2	3	3	3	2.5	1.5
C_4	Course_4	2	1.5	1	1.5	2	3	2.5	2
C_5	Course_5	2.5	1	2.5	1	1.5	2	2	1
C_6	Course_6	2.5	2	3	1.5	2	3	2.5	2
C_7	Course_7	1	1.5	1	1	1	1	1	1
C_8	Course_8	1.5	2	1	1.5	1.5	2	1	1
C_9	Course_9	3	2	2.5	2	2.5	3	2.5	2.5
C_{10}	Course_10	2	2	1.5	1	2	1.5	1.5	1
C_{11}	Course_11	1	1	1	2	2	1.5	2	1.5
C_{12}	Course_12	2	2.5	2	1.5	2	1.5	1.5	1
C_{13}	Course_13	2	1.5	2	2	1.5	1.5	1.5	1
C_{14}	Course_14	3	2.5	3	2.5	3	2	2.5	2
C_{15}	Course_15	2	1.5	1.5	1	1	1.5	1.5	1.5
C_{16}	Course_16	1	1.5	1	1	1.5	1.5	1	1.5

Step 6: Methodology for measuring of Course Outcomes (CO's), Programme Specific Outcomes (PSO's) and Programme Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a programme:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, i = $1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and programme articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, i = $1,2, \dots, m$, j = $1,2, \dots, k$, l = $1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $\bar{X}_{i,\,.\,,} = \sum_{j=1}^{k} X_{i,j,l}$, Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weight age to external assessment .

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$

respectively.The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Good – Attained as target level that is we are aiming minimum level 3 (good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Attained
C_2	Course_2	4	Very Good	Attained
C_3	Course_3	3	Good	Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	3	Good	Attained

C_6	Course_6	4	Very Good	Attained
C_7	Course_7	3	Good	Attained
C_8	Course_8	3	Good	Attained
C_9	Course_9	3	Good	Attained
C_{10}	Course_10	3	Good	Attained
C_{11}	Course_11	3	Good	Attained
C_{12}	Course_12	3	Good	Attained
C_{13}	Course_13	3	Good	Attained
C_{14}	Course_14	3	Good	Attained
C_{15}	Course_15	3	Good	Attained
C_{16}	Course_16	3	Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level ofeach PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	2	6
C_2	Course_2	4	2	8
C_3	Course_3	3	2.5	7.5
C_4	Course_4	4	2	8
C_5	Course_5	3	2.5	7.5
C_6	Course_6	4	2.5	10
C_7	Course_7	3	1	3
C_8	Course_8	3	1.5	4.5

C_9	Course_9	3	3	9
C_{10}	Course_10	3	2	6
C_{11}	Course_11	3	1	3
C_{12}	Course_12	3	2	6
C_{13}	Course_13	3	2	6
C_{14}	Course_14	3	3	9
C_{15}	Course_15	3	2	6
C_{16}	Course_16	3	1	3
Sum		*51*		102.5
$DALP_1$=102.5/51			2.0098	

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	2	2	1.5	2	3	3	2	2
2	4	2	1.5	2	2	2.5	3	1.5	1.5
3	3	2.5	2.5	2	3	3	3	2.5	1.5
4	4	2	1.5	1	1.5	2	3	2.5	2
5	3	2.5	1	2.5	1	1.5	2	2	1
6	4	2.5	2	3	1.5	2	3	2.5	2
7	3	1	1.5	1	1	1	1	1	1
8	3	1.5	2	1	1.5	1.5	2	1	1
9	3	3	2	2.5	2	2.5	3	2.5	2.5
10	3	2	2	1.5	1	2	1.5	1.5	1
11	3	1	1	1	2	2	1.5	2	1.5
12	3	2	2.5	2	1.5	2	1.5	1.5	1
13	3	2	1.5	2	2	1.5	1.5	1.5	1

14	3	3	2.5	3	2.5	3	2	2.5	2
15	3	2	1.5	1.5	1	1	1.5	1.5	1.5
16	3	1	1.5	1	1	1.5	1.5	1	1.5
Sum	51	32	28.5	28.5	26.5	32	34	29	24

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	6	6	4.5	6	9	9	6	6
2	8	6	8	8	10	12	6	6
3	7.5	7.5	6	9	9	9	7.5	4.5
4	8	6	4	6	8	12	10	8
5	7.5	3	7.5	3	4.5	6	6	3
6	10	8	12	6	8	12	10	8
7	3	4.5	3	3	3	3	3	3
8	4.5	6	3	4.5	4.5	6	3	3
9	9	6	7.5	6	7.5	9	7.5	7.5
10	6	6	4.5	3	6	4.5	4.5	3
11	3	3	3	6	6	4.5	6	4.5
12	6	7.5	6	4.5	6	4.5	4.5	3
13	6	4.5	6	6	4.5	4.5	4.5	3
14	9	7.5	9	7.5	9	6	7.5	6
15	6	4.5	4.5	3	3	4.5	4.5	4.5
16	3	4.5	3	3	4.5	4.5	3	4.5
Sum	102.5	90.5	91.5	84.5	102.5	111	93.5	77.5
$DALP_l$	2.0098	1.7745	1.7941	1.6569	2.0098	2.1765	1.8333	1.5196

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

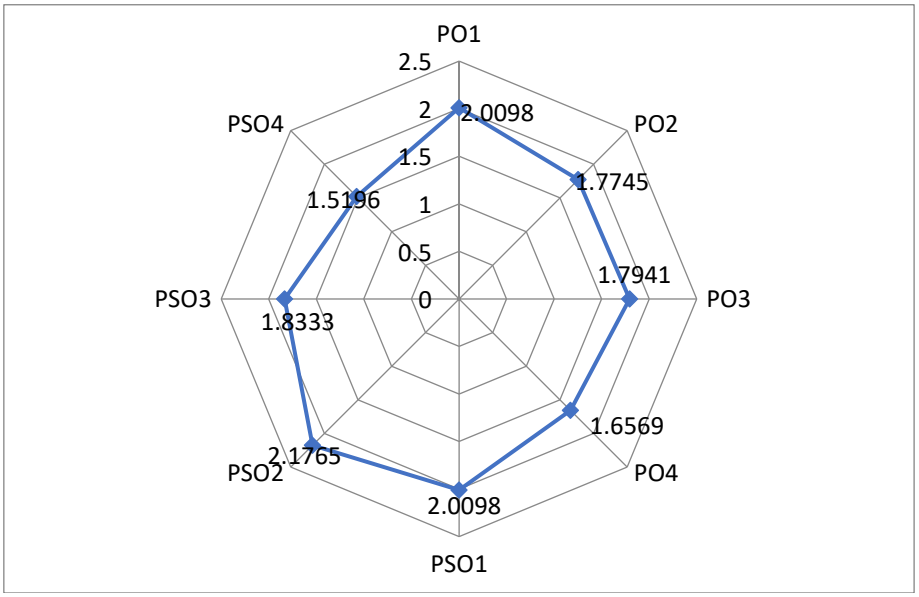
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	2.0098	Very Good	Attained
PO2	1.7745	Good	Attained
PO3	1.7941	Good	Attained
PO4	1.6569	Good	Attained
PSO5	2.0098	Very Good	Attained
PSO6	2.1765	Very Good	Attained
PSO7	1.8333	Good	Attained
PSO8	1.5196	Good	Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3(good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial

Actions:

Planned actions for course attainment: Courses having course level less than level-3
are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect to than P_I.

Shikshan Prasarak Sanstha`s
Padmabhushan Vasantraodada Patil Mahavidyalaya, Kavathe Mahankal

DEPARTMENT OF GEOGRAPHY

Academic Year 2021-22

Vision - To achieve the excellence with academic advanced knowledge by dedicated teaching and promoting knowledge in the discipline of Geography"

Mission - "We are committed to advancing geographical knowledge and promoting sustainability through interdisciplinary collaboration, experiential learning, and inclusive educational practices, preparing our students to address complex societal issues."

Programme Outcomes (Pos)
After completing B. A. degree programme, students will be able to:

PO 1: Get information about the causes and effects of local, national and international problems like global warming, acid rain, ozone depletion, soil degradation, deforestation etc.
PO 2: Gains the knowledge of quantitative methods and their ability of statistical and cartographical Methods to solve the geographical problems.
PO 3: Know the basic concepts and terminologies used in Geography like interior of the earth, plate. tectonic, sea floor spreading, population growth, disasters, composition and structure of atmosphere, hydrosphere, etc.
PO 4: Understand the basic disciplines in Geography and its sub branches.

Programme Specific Outcomes (PSOs)
After Completion of B.A. in Geography students will be able to:

PSO 1: Have got comprehensive knowledge in the discipline of Geography.
PSO 2: Apply geographical knowledge in their day to day life like being alert about disasters, weather and climatic change.
PSO 3: Acquire basic knowledge of surveying methods and map making technique.
PSO 4: Get information about various economic activities of man and their spatial temporal distribution.

Course Outcomes (Cos)

B.A.I (Sem. I)

Course 1: - B. A. I DSE – 1 Physical Geography

CO 1.1 know the latest concepts in Physical Geography (continental drift, plate tectonic, cycle of erosion).

CO 1.2 Understand the Atmosphere, Lithosphere, Fluvial Cycle, Hydrosphere and the work of denudation agents and their associated landforms and the interior structure of the earth.

B.A.I (Sem. II)

Course 2: B. A. I DSE – 2 Human Geography

CO 2.1 Student should know human races, population composition and different population theories.

CO 2.4 To Examine patterns of settlement and the agricultural types, problems and prospects.

B.A.II (Sem. III)

Course 3: B.A. II DSE - 3 Soil Geography

CO 3.1 Understand soil processes, soil formation and soil properties.

CO 3.2 Understand the classification, characteristics and distribution of soils.

B.A.II (Sem. III)

Course 4: B.A. II DSE - 4 Resource Geography

CO 4.1 Understands the concept of resource and studies the classification, examine the major resources

CO 4.2 Knows the sustainable resource development.

B.A.II (Sem. IV)

Course 5: B.A. II Geography DSE - 5 OCEANOGRAPHY

CO 5.1 The students familiarize with the basic and fundamental concepts of oceanography a branch of Physical Geography.

CO 5.2 With this study, students understand marine is key resource for the development of any country and to know physical and chemical properties of oceans.

B.A.II (Sem. IV)

Course 6: B.A. II Course – 6 Agricultural Geography

CO 6.1 Understand the role of agricultural determinants towards the changing cropping pattern.

CO 6.4 understand agricultural concepts and modern technologies used in agriculture, implementation of the Green Revolution in India.

B.A.III (Sem. V)

Course 7: Evolution of Geographical Thought

CO 7.1 Student should be able to understand in-depth about the evolution of thought.

CO 7.2 Understanding of recent trends in geography.

B.A.III (Sem. V)

Course 8: Physical Geography of India

CO 8.1 Understanding physical setup of the country

CO 8.4 Student will be able to understand climate of India

B.A.III (Sem. V)

Course 9: Population Geography

CO 9.1 gets an understanding of distribution and trends of population growth in the developed and less developed countries, along with population theories.

CO 9.2 an understanding of the dynamics of population, the implications of population composition in different regions of the world, An appreciation of the contemporary issues in the field of population Studies.

B.A.III (Sem. V)

Course 10: Economic Geography

CO 10.1 Understand basic concept in economic geography and the relationship between human activities and resources.

CO 10.2 Understand the economic situation at global level and apply this knowledge at local level.

B.A.III (Sem. V)

Course 11: Urban Geography

CO 11.1 Understood the basic concepts in urban Geography

CO 11.2 Understand the impact of site and situation on settlements & types of urban and rural settlements.

B.A.III (Sem.VI)

Course 12: Political Geography

CO 12.1 Understand how and why states are organized.

CO 12.2 Learn the relation between government and its people and the influence of political power on Geographical space.

B.A.III (Sem.VI)

Course 13: Map work and Map Reading

CO 13.1 Learn the importance of map making and map reading

CO 13.2 Understand the concept of scale and map projections.

B.A.III (Sem.VI)

Course 14: Advanced Techniques and Field work.

CO 14.1 Be able to understand the importance of field work and use of advanced techniques (GIS & GPS) in Geography

CO 14.2 Learn how to analyse Geographical data with the help of computer.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtainoverall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	3	3	3	3	1	0
CO 1.2	3	1	3	1	3	2	0	2

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's/PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1.1	3	2	3	3	3	3	1	0
CO1.2	3	1	3	1	3	2	0	2
CO2.1	3	3	3	1	2	2	1	3
CO2.2	3	3	3	2	1	2	1	2
CO3.1	3	2	2	0	1	2	2	2
CO3.2	2	2	2	0	3	3	2	1
CO4.1	3	1	1	0	3	0	0	1
CO4.2	3	2	1	1	2	2	0	2
CO5.1	3	2	1	2	3	2	1	2
CO5.2	3	2	2	1	2	2	1	3
CO6.1	2	2	1	1	2	1	2	2
CO6.2	3	2	2	1	1	2	1	2
CO7.1	1	1	1	1	1	0	0	3
CO7.2	1	2	1	1	1	1	1	3
CO8.1	3	2	2	1	2	3	3	3
CO8.2	3	3	2	2	2	2	3	2
CO9.1	3	3	3	1	2	2	3	2
CO9.2	2	2	1	1	1	1	2	1
CO10.1	2	2	1	1	1	2	2	1
CO10.2	2	2	2	1	2	1	2	1
CO11.1	3	1	1	1	1	0	1	1
CO11.2	2	2	1	1	2	1	1	1
CO12.1	3	1	2	1	1	0	1	1
CO12.2	0	0	1	1	1	1	1	1
CO13.1	1	2	2	1	2	2	3	2
CO13.2	1	2	2	1	1	2	3	2
CO14.1	1	2	0	1	1	1	3	1
CO14.2	0	3	1	1	2	3	3	3

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program ArticulationMatrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	3	3	3	3	1	0
CO 1.2	3	1	3	1	3	2	0	2
Average ($X_{1,.,l}$)	3	1.5	3	2	3	2.5	0.5	1

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 19 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	3	1.5	3	2	3	2.5	0.5	1
C_2	Course_2	3	3	3	1.5	1.5	2	1	2.5
C_3	Course_3	2.5	2	2	0	2	2.5	2	1.5
C_4	Course_4	3	1.5	1	0.5	2.5	1	0	1.5
C_5	Course_5	3	2	1.5	1.5	2.5	2	1	2.5
C_6	Course_6	2.5	2	1.5	1	1.5	1.5	1.5	2
C_7	Course_7	1	1.5	1	1	1	0.5	0.5	3
C_8	Course_8	3	2.5	2	1.5	2	2.5	3	2.5
C_9	Course_9	2.5	2.5	2	1	1.5	1.5	2.5	1.5
C_{10}	Course_10	2	2	1.5	1	1.5	1.5	2	1
C_{11}	Course_11	2.5	1.5	1	1	1.5	0.5	1	1
C_{12}	Course_12	1.5	0.5	1.5	1	1	0.5	1	1
C_{13}	Course_13	1	2	2	1	1.5	2	3	2
C_{14}	Course_14	0.5	2.5	0.5	1	1.5	2	3	2

Step 6: Methodology for measuring of Course Outcomes (CO's), Programme Specific Outcomes(PSO's) and Programme Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

Details of a program:

- Name of the Program: XYZ
- Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
- Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

Let $n = n_1 + n_2$, total number of PO's and PSO's.

- For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m.$ and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 80% weightage to external assessment and 20% weightage to internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

Let $ALC_1, ALC_2, \ldots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \ldots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Good – Attained as target level that is we are aiming minimum level 3 (good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	3	Good	Not Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	3	Good	Not Attained
C_8	Course_8	4	Very Good	Attained
C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	4	Very Good	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	4	Very Good	Attained
C_{13}	Course_13	4	Very Good	Attained
C_{14}	Course_14	4	Very Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level ofeach PO and PSO.

Direct Assess1ment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{\sum_{i=1}^{m} x_{i,.l,} * ALC_i}{\sum_{i=1}^{m} ALC_i}$$,l=1,2,…….n.

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	3	9
C_2	Course_2	3	3	9
C_3	Course_3	3	2.5	7.5
C_4	Course_4	4	3	12
C_5	Course_5	3	3	9
C_6	Course_6	4	2.5	10
C_7	Course_7	3	1	3
C_8	Course_8	4	3	12
C_9	Course_9	4	2.5	10
C_{10}	Course_10	4	2	8
C_{11}	Course_11	4	2.5	10
C_{12}	Course_12	4	1.5	6
C_{13}	Course_13	4	1	4
C_{14}	Course_14	4	0.5	2
Sum		51		111.5
			$DALP_1$ = 111.5/51	2.1863

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	3	1.5	3	2	3	2.5	0.5	1
2	3	3	3	3	1.5	1.5	2	1	2.5
3	3	2.5	2	2	0	2	2.5	2	1.5
4	4	3	1.5	1	0.5	2.5	1	0	1.5

5	3	3	2	1.5	1.5	2.5	2	1	2.5
6	4	2.5	2	1.5	1	1.5	1.5	1.5	2
7	3	1	1.5	1	1	1	0.5	0.5	3
8	4	3	2.5	2	1.5	2	2.5	3	2.5
9	4	2.5	2.5	2	1	1.5	1.5	2.5	1.5
10	4	2	2	1.5	1	1.5	1.5	2	1
11	4	2.5	1.5	1	1	1.5	0.5	1	1
12	4	1.5	0.5	1.5	1	1	0.5	1	1
13	4	1	2	2	1	1.5	2	3	2
14	4	0.5	2.5	0.5	1	1.5	2	3	2
Sum	51	31	27	23.5	15	24.5	22.5	22	25

Sr. No.	ALC_i* $X_{i,.,1}$	ALCi* $X_{i,.,2}$	ALCi* $X_{i,.,3}$	ALCi* $X_{i,.,4}$	ALCi* $X_{i,.,5}$	ALCi* $X_{i,.,6}$	ALCi* $X_{i,.,7}$	ALCi* $X_{i,.,8}$
1	9	4.5	9	6	9	7.5	1.5	3
2	9	9	9	4.5	4.5	6	3	7.5
3	7.5	6	6	0	6	7.5	6	4.5
4	12	6	4	2	10	4	0	6
5	9	6	4.5	4.5	7.5	6	3	7.5
6	10	8	6	4	6	6	6	8
7	3	4.5	3	3	3	1.5	1.5	9
8	12	10	8	6	8	10	12	10
9	10	10	8	4	6	6	10	6
10	8	8	6	4	6	6	8	4
11	10	6	4	4	6	2	4	4
12	6	2	6	4	4	2	4	4

13	4	8	8	4	6	8	12	8
14	2	10	2	4	6	8	12	8
Sum	111.5	98	83.5	54	88	80.5	83	89.5
$DALP_l$	2.1863	1.9216	1.6373	1.0588	1.7255	1.5784	1.6275	1.7549

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

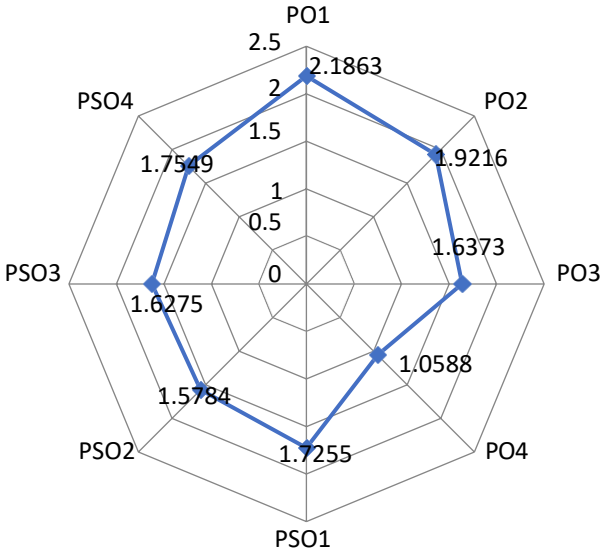
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimum level 4 (very good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	2.1863	Very Good	Attained
PO2	1.9216	Good	Attained
PO3	1.6373	Good	Attained
PO4	1.0588	Average	Not Attained
PSO1	1.7255	Good	Attained
PSO2	1.5784	Good	Attained
PSO3	1.6275	Good	Attained
PSO4	1.7549	Good	Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3 (good) in the performance of abilities of students.



Step 9: Planned actions: RemedialActions:

Planned actions for course attainment: Courses having course level less than level-3 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

Shikshan Prasarak Sanstha`s
Padmabhushan Vasantraodada Patil Mahavidyalaya, Kavathe Mahankal

DEPARTMENT OF PHYSICAL EDUCATION
Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision: To give all students opportunities and experiences that lead to the achievement of total wellness and result in a longer and healthier life.

Mission: To create awareness of the importance and benefits of physical activities in day-to-day life and encourage regular physical activities for a positive health life -style.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Programme Outcomes (Pos)

After completing B. A. degree programme, students will be able to:

PO 1:	Understand the disciplinary content knowledge, application of pedagogical content knowledge to teaching of physical education (Content Knowledge)
PO 2:	Use effective communication skills and strategies to enhance student engagement & learning.
PO 3:	Use appropriate technology to enhance teaching and learning and enhance personal and professional productivity (Proficiency in technology)
PO 4:	Identify diverse needs, plan inclusive classroom experiences and facilitate guidance and counselling programs for differently abled students (Inclusion)
PO5:	Foster relationships and collaboration with colleague's parent's community to support student's growth and wellbeing (Collaboration)

Programme Specific Outcomes (PSOs)

After Completion of B.A. in Physical Education students will be able to:

PSO 1:	Awareness – Create awareness about physical fitness and sports.
PSO 2:	Understand different training methods of Physical Education.
PSO 3:	Knowledge- Apply knowledge of physical education and sports for personality development.
PSO 4:	Ethics – Learn different values including hard work, respect, cooperation, teamwork etc.
PSO5:	Practical Knowledge – Apply the practical knowledge for different play grounds and rules of different games.

Course Outcomes (Cos)

B.A.I (Sem. I)

Course 1: Course 1: Introduction of Physical Education (I) DSE

CO 1.1 The meaning, definition, concepts of physical education.

CO 1.2 The changing concepts of physical education.

CO 1.3 Aim and Objectives of Physical Education

CO 1.4 Practical knowledge of Indian game and athletics

B.A.I (Sem. II)

Course 2: Foundation of Physical Education (II) DSE

CO 2.1 Understand the body posture and its characteristics.

CO 2.2 Learn physical fitness factors and theories of Play.

CO 2.3 Practical knowledge of Ball game and Yoga.

B.A.II (Sem. III)

Course 3: History of the Physical Education III) DSC

CO 3.1 Understand the physical education in ancient period of India.

CO 3.2 Knowledge of Olympic Games.

CO 3.3 Practical Knowledge of Indian game and athletics.

B.A.II (Sem. III)

Course 4: Organization and Administration in Physical Education(IV) DSC

CO 4.1 Understand organization and administration.

CO 4.2 Learn different tournaments of Shivaji University.

CO 4.2 Practical knowledge of Ball game and Yogasanas.

B.A.II (Sem. IV)

Course 5: History of the Physical Education (V) DSC

CO 5.1 Understand the development of physical education in India.

CO 5.2 Learn different institutions of sports and awards.

CO 5.3 Practical knowledge of Suryanamaskara.

B.A.II (Sem. IV)

Course 6: Organization and Administration in Physical Education (VI) DSC

CO 6.1 Understand methods of tournaments.

CO 6.2 Learn playground facilities and sports equipment.

CO 6.3 Practical knowledge of ground marking.

B.A.III (Sem. V)

Course 7: Health Education (VII) DSC

CO 7.1 The Meaning, definitions, Nature and scope of Health Education.

CO 7.2 Personal Health, and Factors influencing on Health.

CO 7.3 Social Health, Communicable diseases Causes & Prevention (HIV / AIDS, Malaria, Dengue, Chikungunya, Swine Flu, Corona etc.)

CO 7.4 Health of the Community, Health problems in family, Community, School and Colleges.

B.A.III (Sem. V)

Course 8: Recreation in Physical Education (VIII) DSE

CO 8.1 Concept, Definitions, Nature and function of Rhythm.

CO 8.2 Need & Importance of Rhythmic exercise.

CO 8.3 Meaning, Definitions, Concept of Recreation, Aim & Objectives of recreation

CO 8.4 Recent trends in recreation Hiking, Trekking, Sports camps and Competitions, Aerobics and Zumba

B.A.III (Sem. V)

Course 9: Yoga (IX) DSC

CO 9.1 Aim, Objectives and Scope of Yoga in Human Life

CO 9.2 Yoga and Physical Health: Promotive, Preventive and Curative aspects Of Physical Health

CO 9.3 Yoga and Mental Health: Nature of problems, Promotive, Preventive and Curative aspects of mental health through Yogic practices.

B.A.III (Sem. V)

Course 10: Anatomy And Physiology (X) DES-E-230

CO 10.1 Introduction OF Anatomy, Physiology and Physiology of exercises

CO 10.2 The cell and its parts

CO 10.3 Structure, classification and Functions OF Skeletal System, Muscular System, Respiratory System.

B.A.III (Sem. V)

Course 11: Dietetics And Nutrition (XI) DSE

CO 11.1 Need & importance Diet components Carbohydrates, Proteins, Fats, vitamins. Mineral Fibers and water.

CO 11.2 Meaning, Definition and sources Of Balance Diet.

CO 11.3 Malnutrition

CO 11.4 Causes, sign and symptoms OF Underweight and Obesity.

B.A.III (Sem.VI)

Course 12: Health Education Program (XII) DSC

CO 12.1 Health Program and Importance of exercises in health and fitness. Drugs, Alcohol and Tobacco-Adverse effect on performance.

CO 12.2 Need Importance and Scope of Population Education, Role of Health education in population education.

CO 12.3 Aims & Objectives program and projects World Health Organization, WHO in india and HIV / AIDS - causes, symptoms and prevention.

B.A.III (Sem.VI)

Course 13: Research In Physical Education (XIII) DSE

CO 13.1 Concept, Meaning and Definition of Research.

CO 13.2 Types of research

CO 13.3 Research Process, Stages in research process.

B.A.III (Sem.VI)

Course 14: Yoga And Health (XIV)

CO 14.1 Relationship of Yoga with Emotional Health and Structure of Human body and yogasanas.

CO 14.2 Effect of yogic exercises on respiratory and nervous system.

CO 14.3 Psychophysical basis of promoting sports career and Contribution of yogic practices for the development of Sports performances.

B.A.III (Sem.VI)

Course 15: Anatomy and Physiology of Exercise (XV) DSE

CO 15.1 Circulatory System: Blood, Heart structure and function, Blood pressure, Pulse, Blood groups, Oxygen debt.

CO 15.2 Organ of digestive system (Mouth, teeth, salivary glands, pharynx, oesphages, stomach, smalland large intestine, pancreas, liver, structure and function - in brief.

CO 15.3 Excretory System: Structure and function of Kidney and skin, Nervous System: Structure of brain and spinal cord, Reflex action.

B.A.III (Sem.VI)

Course 16: Dietetics and Hygiene (XVI) DSE

CO 16.1 Food sources and their effect (Natural food, Impure food, Processed food, Stimulants)

CO 16.2 Meaning, Need and importance Athlete Diet.

CO 16.3 Immunity (Personal hygiene - desirable hygiene habits) and School Health program.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	2	1	3	2	0	2
CO 1.2	2	1	3	0	2	1	0	3

In the same way we have course articulation matrices for all courses in that Program.

CO’s – PO’s & PSO’s mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO’s							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	2	1	3	2	0	2
CO 1.2	2	1	3	0	2	1	0	3
CO 2.1	3	1	2	0	3	2	0	2
CO 2.2	2	1	3	1	2	3	1	3
CO 3.1	3	0	2	0	3	2	0	1
CO 3.2	3	0	3	2	3	3	1	1
CO 4.1	2	2	2	0	3	1	0	2
CO 4.2	3	2	3	2	3	2	1	2
CO 5.1	3	0	3	0	3	3	0	2
CO 5.2	2	0	2	2	3	3	1	2
CO 6.1	2	1	3	0	2	3	0	2
CO 6.2	2	1	3	0	3	3	1	3
CO 7.1	1	2	2	1	3	1	2	2
CO 7.2	1	0	2	2	3	1	2	3
CO 8.1	0	3	2	2	2	3	3	2
CO 8.2	0	3	2	2	2	2	3	2
CO 9.1	3	0	2	0	2	2	1	1
CO 9.2	2	0	2	0	3	3	1	2
CO 10.1	3	1	3	0	2	2	3	0
CO 10.2	3	0	2	0	2	2	1	1
CO 11.1	2	0	3	0	3	2	0	1
CO 11.2	3	1	3	0	2	2	1	1
CO 12.1	1	0	2	1	3	1	2	2
CO 12.2	1	0	2	2	3	1	2	3
CO 13.1	1	2	2	1	2	3	3	1
CO 13.2	1	2	2	1	2	3	3	2
CO 14.1	2	0	2	0	2	1	0	1
CO 14.2	2	1	3	0	2	1	0	1
CO 15.1	3	0	2	0	3	2	1	1
CO 15.2	2	1	2	0	2	2	1	1
CO 16.1	2	0	2	0	2	2	0	1
CO 16.2	3	1	2	0	3	2	1	1

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	2	1	3	2	0	2
CO 1.2	2	1	3	0	2	1	0	3
Average ($X_{1,.,l}$)	2	1.5	2.5	0.5	2.5	1.5	0	2.5

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 16 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2	1.5	2.5	0.5	2.5	1.5	0	2.5
C_2	Course_2	2.5	1	2.5	0.5	2.5	2.5	0.5	2.5
C_3	Course_3	3	0	2.5	1	3	2.5	0.5	1
C_4	Course_4	2.5	2	2.5	1	3	1.5	0.5	2
C_5	Course_5	2.5	0	2.5	1	3	3	0.5	2
C_6	Course_6	2	1	3	0	2.5	3	0.5	2.5
C_7	Course_7	1	1	2	1.5	3	1	2	2.5
C_8	Course_8	0	3	2	2	2	2.5	3	2
C_9	Course_9	2.5	0	2	0	2.5	2.5	1	1.5
C_{10}	Course_10	3	0.5	2.5	0	2	2	2	0.5
C_{11}	Course_11	2.5	0.5	3	0	2.5	2	0.5	1
C_{12}	Course_12	1	0	2	1.5	3	1	2	2.5
C_{13}	Course_13	1	2	2	1	2	3	3	1.5
C_{14}	Course_14	2	0.5	2.5	0	2	1	0	1
C_{15}	Course_15	2.5	0.5	2	0	2.5	2	1	1
C_{16}	Course_16	2.5	0.5	2	0	2.5	2	0.5	1

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a program:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i.l} = \frac{1}{k} \sum_{j=1}^{k} X_{ijl}$ Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weight age to external assessment.

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	4	Very Good	Attained
C_2	Course_2	4	Very Good	Attained
C_3	Course_3	4	Very Good	Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	4	Very Good	Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	5	Excellent	Attained
C_8	Course_8	5	Excellent	Attained
C_9	Course_9	4	Very Good	Attained

C_{10}	Course_10	5	Excellent	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	5	Excellent	Attained
C_{13}	Course_13	4	Very Good	Attained
C_{14}	Course_14	5	Excellent	Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	5	Excellent	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	4	2	8
C_2	Course_2	4	2.5	10
C_3	Course_3	4	3	12
C_4	Course_4	4	2.5	10
C_5	Course_5	4	2.5	10
C_6	Course_6	4	2	8
C_7	Course_7	5	1	5
C_8	Course_8	5	0	0
C_9	Course_9	4	2.5	10
C_{10}	Course_10	5	3	15
C_{11}	Course_11	4	2.5	10
C_{12}	Course_12	5	1	5
C_{13}	Course_13	4	1	4
C_{14}	Course_14	5	2	10
C_{15}	Course_15	4	2.5	10
C_{16}	Course_16	5	2.5	12.5
Sum		70		139.5
$DALP_1 = 139.5/70$			1.9929	

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	4	2	1.5	2.5	0.5	2.5	1.5	0	2.5
2	4	2.5	1	2.5	0.5	2.5	2.5	0.5	2.5
3	4	3	0	2.5	1	3	2.5	0.5	1
4	4	2.5	2	2.5	1	3	1.5	0.5	2
5	4	2.5	0	2.5	1	3	3	0.5	2
6	4	2	1	3	0	2.5	3	0.5	2.5
7	5	1	1	2	1.5	3	1	2	2.5
8	5	0	3	2	2	2	2.5	3	2
9	4	2.5	0	2	0	2.5	2.5	1	1.5
10	5	3	0.5	2.5	0	2	2	2	0.5
11	4	2.5	0.5	3	0	2.5	2	0.5	1
12	5	1	0	2	1.5	3	1	2	2.5
13	4	1	2	2	1	2	3	3	1.5
14	5	2	0.5	2.5	0	2	1	0	1
15	4	2.5	0.5	2	0	2.5	2	1	1
16	5	2.5	0.5	2	0	2.5	2	0.5	1
Sum	70	32.5	14	37.5	10	40.5	33	17.5	27

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	8	6	10	2	10	6	0	10
2	10	4	10	2	10	10	2	10
3	12	0	10	4	12	10	2	4
4	10	8	10	4	12	6	2	8
5	10	0	10	4	12	12	2	8
6	8	4	12	0	10	12	2	10
7	5	5	10	7.5	15	5	10	12.5
8	0	15	10	10	10	12.5	15	10
9	10	0	8	0	10	10	4	6
10	15	2.5	12.5	0	10	10	10	2.5
11	10	2	12	0	10	8	2	4
12	5	0	10	7.5	15	5	10	12.5
13	4	8	8	4	8	12	12	6
14	10	2.5	12.5	0	10	5	0	5
15	10	2	8	0	10	8	4	4
16	12.5	2.5	10	0	12.5	10	2.5	5
Sum	139.5	61.5	163	45	176.5	141.5	79.5	117.5
$DALP_l$	1.9929	0.8786	2.3286	0.6429	2.5214	2.0214	1.1357	1.6786

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

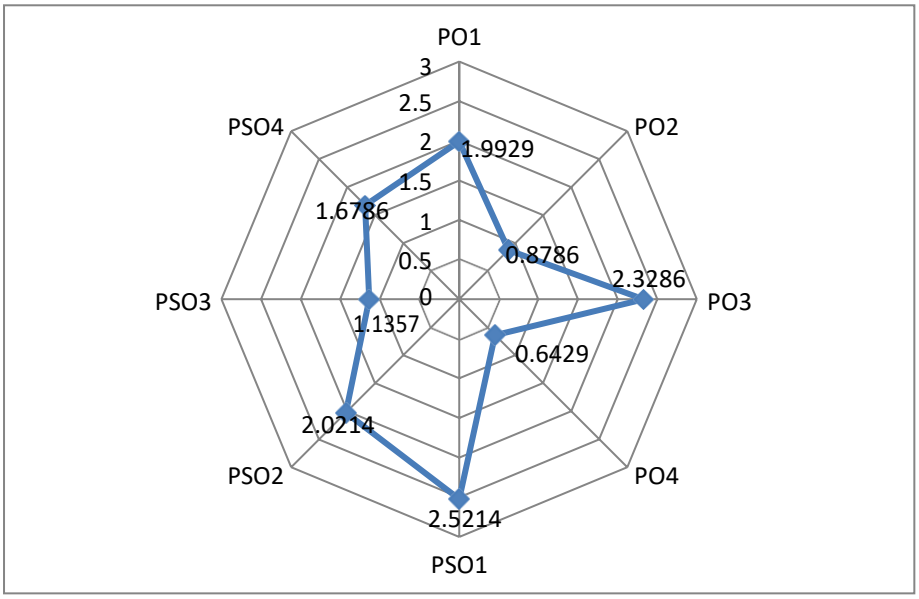
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	1.9929	Good	Attained
PO2	0.8786	Poor	Not Attained
PO3	2.3286	Very Good	Attained
PO4	0.6429	Poor	Not Attained
PSO1	2.5214	Excellent	Attained
PSO2	2.0214	Very Good	Attained
PSO3	1.1357	Average	Not Attained
PSO4	1.6786	Good	Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3(good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

Shikshan Prasarak Sanstha's

PADMABHUSHAN VASANTRAODADA PATIL MAHAVIDYALAYA,

Kavathe Mahankal, Dist.- Sangli

Department of Chemistry

(Academic Year 2021-22)

Vision

The Chemistry Department is committed to prepare competitive and professional graduates within an innovative and intellectually stimulating environment, support other academic programs by offering quality chemistry learning experiences, conduct basic and applied research of national and international impact, build proactive partnerships with industry and offer effective training and educational and technical services to the society. To achieve excellence in teaching and research.

Mission

- Enhance the basic and applied research framework in the Chemistry Department.
- To empower through knowledge and information.
- To develop, enhance, and improve the quality of human resources.
- To cultivate resolute moral and ethical values through good chemical practices.
- To meet contemporary regional and national needs and anticipate future social and economic development.
- Build partnerships with the industry to increase employability skills.

Program Outcomes (Pos)

After completion of this program student will be able to,

PO1: Facilitate the coordination between classical academics and societal needs

PO2: Apply practical knowledge to industrial application and for developing methods

PO3: Cope up with the challenges and the advances in the science

PO4: Acquire the ability of critical analysis of different issues.

Program Specific Outcomes (PSO's)

After completion of this program student will be able to,

PSO1: Cater the needs and the challenges of chemical and metallurgical industries.

PSO2: Handle sophisticated instruments used for different analysis.

PSO3: Work in pharmaceutical industries

PSO4: Cope up for higher education such as post-graduation and research

Course outcomes (CO's)

B.Sc. I (Sem I)

DSC-3A-Course I (Inorganic chemistry)

After completing the course students will able to,

CO-1.1 Foster the ability and to aquire the knowledge of terms, facts, concept principles of atomic structure and ionic bonding

CO-1.2 Develop the proper aptitude and interest towards the concepts of inorganic chemistry like VBT and MOT

DSC-4A Course II (Organic Chemistry)

CO:2.1 Learn fundamentals of chemistry stereochemical aspects and nomenclature of stereoisomers.

CO:2.2 Understood concept of aromaticity Preparation reactions of cycloalkanes cycloalkenes and alkadienes.

B.Sc. I (Sem II)

DSC- 3B: Course III (Physical Chemistry)

CO:3.1 Understand the basic concepts of thermodynamics thermochemistry and free energy change in chemical reaction.

CO:3.2 Understand different theory of gases factors affecting rate of reactions and theories of reaction rates

DSC-4B-Course IV (Analytical Chemistry)

CO:4.1 Understand the basic methods of analysis techniques of sampling basic principle of chromatography and important aspect of titrimetric analysis.

CO:4.2 Acquire the knowledge about physical methods of water analysis chemical methods of water analysis along with basic aspects of fertilizers.

Course V Laboratory course (practical)

CO:5.1 Understood the kinetics of various reaction

CO:5.2 Acquire the knowledge of analysis of organic compounds

CO:5.3 Acquire the knowledge of simple techniques such as paper chromatography, quantitative analysis

CO:5.4 Determine the strength of mineral acid

B.Sc. II (Sem III)

DSC-C3-Course VI (Physical Chemistry)

CO:6.1 Understand conductivity, transport number of the aqueous solutions with different applications surface tension viscosity refractive index and surface phenomena at heterogeneous surfaces.

CO:6.2 Learn the various nuclear phenomena techniques of measurement of nuclear radiations and third order reaction

DSC-C4-Course VII (Industrial Chemistry)

CO:7.1 Understood the basic concepts in Industrial Chemistry and electroplating

CO:7.2 Acquire the knowledge of Indian paper industry, Soaps and Detergents

B.Sc. II (Sem IV)

DSC-D3- Course VIII (Inorganic chemistry)

CO:8.1 Understood the meaning of terminologies, concepts of co ordination chemistry and chelation

CO:8.2 Understood the periodicity of P block, 3d series elements and inorganic qualitative analysis

DSC-D4-Course IX (Organic Chemistry)

CO:9.1 To impart knowledge about Preparation synthesis reactivity and applications of carboxylic acids carbohydrates Amines and Diazonium Salts

CO:9.2 Understood the basic knowledge conformational analysis of organic compounds nomenclature and reactivity of aldehydes and ketones

Course X Laboratory course (practical)

CO:10.1 Understood the kinetics of various reaction and use of instruments for different analytical application

CO:10.2 Acquire the knowledge of Preparation, analysis of organic compounds and mixture.

CO:10.3 Foster the knowledge of extraction, purification of various metals and the analysis of inorganic compounds and mixture.

CO:10.4 Perform the quantitative analysis of various analytes

B.Sc. III (Sem V)

DSE-ES-Course XI (Inorganic Chemistry)

CO:11.1 Acquire the knowledge of Acids bases and bonding in transition metal complexes

CO:11.2 Understood the metals, semiconductor, superconductors, organometallic compounds and catalysis

DSE-E6-Course XII (Organic Chemistry)

CO:12.1 Understand the energy associated parameters chromophore, auxo chrome, calculation of Amax, vibrational transitions, regions of IR spectrum and functional group recognition.

CO:12.2 Get the knowledge of magnetic non-magnetic nuclei, shielding-deshelling, chemical shift, splitting pattern molecular ion, fragmentation pattern and different types of ions produced. Also, able to solve problems based on UV-Vis, IR, NMR, Mass Spectral data and predict the structure of organic compound with the help of provided spectral data

DSE-E7-Course XIII (Physical Chemistry)

CO:13.1 Understand elementary quantum mechanics quantum Chemistry and spectroscopy Knowledge

CO:13.2 Learn different aspects of Photochemistry solutions and electrochemistry

DSC-E8-Course XIV (Analytical Chemistry)

CO:14.1 Learn the techniques of gravimetric analysis potentiometric titrations and acquire the knowledge of instrumental analysis of alkali and alkaline earth elements by using flame photometry

CO:14.2 Understand working applications of optical methods as an analytical tool and Quality control practices in analytical industries/laboratories

B.Sc. III (Sem VI)

DSC-F-5-Course XV (Inorganic Chemistry)

CO.15.1 Impart the advances in coordination Chemistry, Nuclear chemistry and its societal applications

CO:15.2 Understood the Chemistry of f block Elements, extraction of iron and steel and Role of various metals in Bio inorganic chemistry

DSE-F6-Course-XVI (Organic Chemistry)

CO:16.1 Knowledge of different organic reactions reagents used in organic transformations and retrosynthesis of some organic compounds.

CO:16.2 Learn electrophilic addition to >C-C<CC bond and get knowledge of alkaloids and terpenoids understand chemistry of some pharmaceutical drugs

DSE-F7-Course XVII (Physical Chemistry)

CO:17.1 Know Phase equilibria, phase rule, Thermodynamics and solid-state chemistry

CO:17.2 Learn Chemical kinetics and understanding the knowledge of distribution law

DSC-F-8-Course XVIII (Industrial chemistry)

CO:18.1 Understand the process of manufacture of sugar industrial heavy chemicals and synthesis of various polymers

CO:18.2 Understand the petroleum Industry need of use of eco-friendly fuels and Understanding

Course XIX Laboratory course (practical)

CO:19.1 Apply practical knowledge to industrial application and for developing methods

CO 19.2 Understood the kinetics of various reaction

CO 19.3 Handle instruments for different analytical application.

CO:19.4 Foster the knowledge of extraction, purification of various metals the analysis of inorganic compounds and mixture

CO 19.5 Analyze the commercial samples such as talcum powder, milk sample etc

CO:19.6 Acquire the knowledge of preparation of organic compounds though green chemistry approach

CO 19.7 Carry out qualitative analysis of organic mixture

CO:19.8 Work in chemistry related industries.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	0	2	1	2	1	1	2
CO 1.2	3	2	1	2	2	1	2	3

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	0	2	1	2	1	1	2
CO 1.2	3	2	1	2	2	1	2	3
CO 2.1	2	1	3	2	2	1	3	3
CO 2.2	2	2	2	2	2	1	2	2
CO 3.1	2	2	2	2	1	0	2	3
CO 3.2	1	3	1	2	2	1	1	2
CO 4.1	2	3	2	3	2	3	3	2
CO 4.2	1	3	1	2	2	1	1	2
CO 5.1	2	2	3	2	2	1	3	2
CO 5.2	2	3	2	2	2	1	3	2
CO 5.3	3	2	2	2	1	2	3	2
CO 5.4	2	2	1	2	2	0	1	1
CO 6.1	2	2	1	2	2	2	2	2
CO 6.2	1	2	2	2	0	1	0	2
CO 7.1	2	2	1	1	2	1	1	1
CO 7.2	2	2	1	2	2	1	2	1
CO 8.1	2	2	1	2	2	1	1	2
CO 8.2	3	2	2	2	2	2	1	2
CO 9.1	2	2	2	1	2	1	3	2
CO 9.2	2	2	2	2	1	1	2	2
CO 10.1	2	2	3	2	2	2	1	2
CO 10.2	2	2	2	2	1	0	3	2
CO 10.3	2	2	1	2	2	1	3	2
CO 10.4	3	2	1	2	1	1	2	2

CO 11.1	2	2	2	2	1	1	1	2
CO 11.2	2	2	2	2	2	2	0	2
CO 12.1	1	2	2	1	2	1	3	2
CO 12.2	1	2	2	2	2	2	3	3
CO 13.1	1	1	3	2	1	1	0	2
CO 13.2	2	1	1	2	1	2	1	2
CO 14.1	3	2	2	2	3	2	1	3
CO 14.2	3	2	2	1	2	3	2	2
CO 15.1	3	2	2	2	2	1	2	2
CO 15.2	2	2	2	2	2	1	1	2
CO 16.1	2	2	2	2	2	1	2	2
CO 16.2	2	2	2	2	2	1	1	2
CO 17.1	1	1	2	1	1	1	1	2
CO 17.2	2	2	3	2	2	1	1	2
CO 18.1	2	2	2	2	2	2	1	1
CO 18.2	2	2	2	2	2	2	0	2
CO 19.1	2	3	2	2	2	2	2	2
CO 19.2	2	2	3	2	2	2	1	2
CO 19.3	2	2	2	2	2	3	2	2
CO 19.4	2	2	1	2	2	1	2	2
CO 19.5	2	2	1	2	1	1	1	1
CO 19.6	2	2	3	2	2	2	2	2
CO 19.7	2	2	1	2	1	1	2	2
CO 19.8	2	2	2	2	2	2	2	2

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	0	2	1	2	1	1	2
CO 1.2	3	2	1	2	2	1	2	3
Average ($X_{1,.,l}$)	2.5	1	1.5	1.5	2	1	1.5	2.5

Similarly, the overall level of relation of all the courses in the programme is established. These levels are reported in the matrix form and this matrix is called as the programme articulation matrix. For example, if the programme XYZ has 19 courses then the programme articulation matrix will be as follows.

Programme Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2.5	1	1.5	1.5	2	1	1.5	2.5
C_2	Course_2	2	1.5	2.5	2	2	1	2.5	2.5
C_3	Course_3	1.5	2.5	1.5	2	1.5	0.5	1.5	2.5
C_4	Course_4	1.5	3	1.5	2.5	2	2	2	2
C_5	Course_5	2.25	2.25	2	2	1.75	1	2.5	1.75
C_6	Course_6	1.5	2	1.5	2	1	1.5	1	2
C_7	Course_7	2	2	1	1.5	2	1	1.5	1
C_8	Course_8	2.5	2	1.5	2	2	1.5	1	2
C_9	Course_9	2	2	2	1.5	1.5	1	2.5	2
C_{10}	Course_10	2.25	2	1.75	2	1.5	1	2.25	2
C_{11}	Course_11	2	2	2	2	1.5	1.5	0.5	2
C_{12}	Course_12	1	2	2	1.5	2	1.5	3	2.5
C_{13}	Course_13	1.5	1	2	2	1	1.5	0.5	2
C_{14}	Course_14	3	2	2	1.5	2.5	2.5	1.5	2.5
C_{15}	Course_15	2.5	2	2	2	2	1	1.5	2
C_{16}	Course_16	2	2	2	2	2	1	1.5	2
C_{17}	Course_17	1.5	1.5	2.5	1.5	1.5	1	1	2
C_{18}	Course_18	2	2	2	2	2	2	0.5	1.5
C_{19}	Course_19	2	2.125	1.875	2	1.75	1.75	1.75	1.875

Step 6: Methodology for measuring of Course Outcomes (CO's), Programme Specific Outcomes (PSO's) and Programme Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a programme:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.
  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
  - Program has m courses, say, $C_1, C_2, \dots, C_m$
  - Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and programme articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i,\,.\,,} = {}^{1}\sum^{*}$ $X_{i,j,l}$, Here k be the number of outcomes in the average cours

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- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 80% weightage to external assessment and 20% weightage to internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	3	Good	Not Attained
C_5	Course_5	5	Excellent	Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	4	Very Good	Attained
C_8	Course_8	4	Very Good	Attained
C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	5	Excellent	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	4	Very Good	Attained
C_{13}	Course_13	4	Very Good	Attained
C_{14}	Course_14	4	Very Good	Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	4	Very Good	Attained
C_{17}	Course_17	4	Very Good	Attained
C_{18}	Course_18	5	Excellent	Attained
C_{19}	Course_19	5	Excellent	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	2.5	7.5
C_2	Course_2	3	2	6
C_3	Course_3	3	1.5	4.5
C_4	Course_4	3	1.5	4.5
C_5	Course_5	5	2.25	11.25
C_6	Course_6	4	1.5	6
C_7	Course_7	4	2	8
C_8	Course_8	4	2.5	10
C_9	Course_9	4	2	8

C_{10}	Course_10	5	2.25	11.25
C_{11}	Course_11	4	2	8
C_{12}	Course_12	4	1	4
C_{13}	Course_13	4	1.5	6
C_{14}	Course_14	4	3	12
C_{15}	Course_15	4	2.5	10
C_{16}	Course_16	4	2	8
C_{17}	Course_17	4	1.5	6
C_{18}	Course_18	5	2	10
C_{19}	Course_19	5	2	10
Sum		76		151
			$DALP_1$ = 151/76	1.9868

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	2.5	1	1.5	1.5	2	1	1.5	2.5
2	3	2	1.5	2.5	2	2	1	2.5	2.5
3	3	1.5	2.5	1.5	2	1.5	0.5	1.5	2.5
4	3	1.5	3	1.5	2.5	2	2	2	2
5	5	2.25	2.25	2	2	1.75	1	2.5	1.75
6	4	1.5	2	1.5	2	1	1.5	1	2
7	4	2	2	1	1.5	2	1	1.5	1
8	4	2.5	2	1.5	2	2	1.5	1	2
9	4	2	2	2	1.5	1.5	1	2.5	2
10	5	2.25	2	1.75	2	1.5	1	2.25	2
11	4	2	2	2	2	1.5	1.5	0.5	2
12	4	1	2	2	1.5	2	1.5	3	2.5
13	4	1.5	1	2	2	1	1.5	0.5	2
14	4	3	2	2	1.5	2.5	2.5	1.5	2.5
15	4	2.5	2	2	2	2	1	1.5	2
16	4	2	2	2	2	2	1	1.5	2
17	4	1.5	1.5	2.5	1.5	1.5	1	1	2
18	5	2	2	2	2	2	2	0.5	1.5
19	5	2	2.125	1.875	2	1.75	1.75	1.75	1.875
Sum	76	37.5	36.875	35.125	35.5	33.5	25.25	30	38.625

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	7.5	3	4.5	4.5	6	3	4.5	7.5
2	6	4.5	7.5	6	6	3	7.5	7.5
3	4.5	7.5	4.5	6	4.5	1.5	4.5	7.5
4	4.5	9	4.5	7.5	6	6	6	6
5	11.25	11.25	10	10	8.75	5	12.5	8.75
6	6	8	6	8	4	6	4	8
7	8	8	4	6	8	4	6	4
8	10	8	6	8	8	6	4	8
9	8	8	8	6	6	4	10	8
10	11.25	10	8.75	10	7.5	5	11.25	10
11	8	8	8	8	6	6	2	8
12	4	8	8	6	8	6	12	10
13	6	4	8	8	4	6	2	8
14	12	8	8	6	10	10	6	10
15	10	8	8	8	8	4	6	8
16	8	8	8	8	8	4	6	8
17	6	6	10	6	6	4	4	8
18	10	10	10	10	10	10	2.5	7.5
19	10	10.625	9.375	10	8.75	8.75	8.75	9.375
Sum	151	147.88	141.13	142	133.5	102.25	119.5	152.13
$DALP_l$	1.9868	1.9457	1.8569	1.8684	1.7566	1.3454	1.5724	2.0016

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

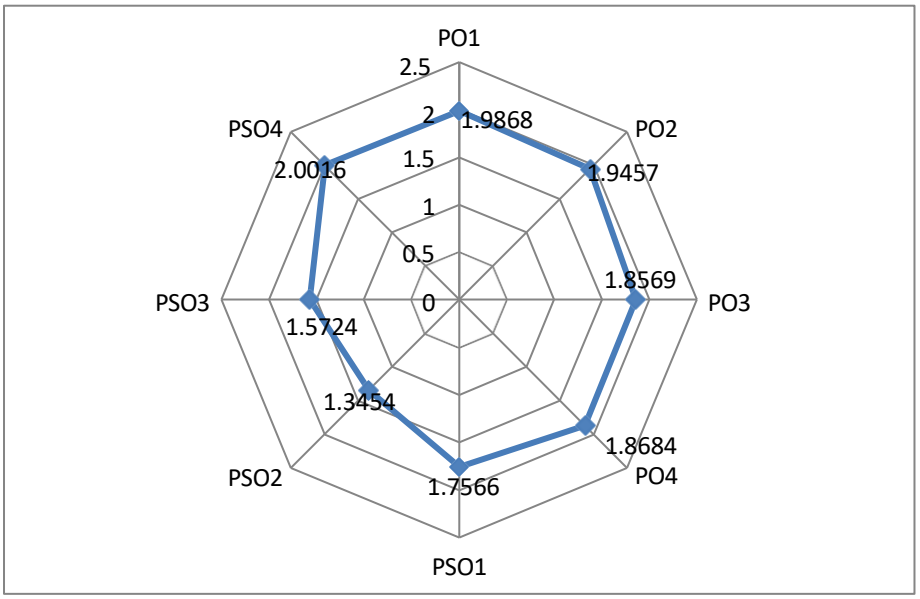
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	1.9868	Good	Attained
PO2	1.9457	Good	Attained
PO3	1.8569	Good	Attained
PO4	1.8684	Good	Attained
PSO1	1.7566	Good	Attained
PSO2	1.3454	Average	Not Attained
PSO3	1.5724	Good	Attained
PSO4	2.0016	Very Good	Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3(good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed by designing the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

DEPARTMENT OF PHYSICS

Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment Step 1: Defining the Vision and Mission of the Department.

Vision

The department of Physics is committed to prepare the competitive and professional graduates by providing stimulating environment and support. It has commitment to advancing scientific knowledge educating students and contributing to society.

Mission

Our mission is to provide rigorous and comprehensive education in preparing the students for successful career in academics, industry and beyond. We are dedicated to conducting cutting edge research, addressing fundamental questions in Physics and applying our findings to address global challenges. Through collaboration, mentorship we strive to inspire curiosity, critical thinking and lifelong passion for science.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program outcomes (PO's)

After successful completion of B Sc students will be able to,

PO 1 acquire the knowledge with facts.

PO 2 understand the basic concepts, fundamental principles and scientific theories.

PO 3 develop scientific outlook with respect to science subject.

Po 4 analyse the scientific idea systematically and critically.

Program Specific Outcomes (PSO's)

After successful completion of three year degree program in physics a student should able to

1 Gain knowledge of physics through theory & practical.

2 Demonstrate solve & understand major concepts in all discipline of physics

3 Solve problems & also think methodically, independently & draw logical conclusion

4 Create an awareness of impact of physics or society & development outside the community.

5 Employ scientific Knowledge to design carryout record & analyze the results of physics experiments

6 Develop research oriented skill

7 Develop skill of reasoning & Problem solving.

Step 3: Defining Course Outcomes (CO's) of each course in a Program.

Course outcomes (CO's)

After completion of the courses,
CO1—
1 Students are able to Understand and identify scalar and vector and physical quantities.
2 1 Students are able to Understand the conceptual evolution of conservation laws of momentum and energy
CO2—
1 Students gain basic knowledge of mechanics and revise basic concept of stress, strain and Elastic constants.
2 Students are exposed to different phenomena-a in physics and can
understand applications of different phenomena in physics
CO3 ----
1 Students are able to study physical significance of gradient, curl and divergence.
2 Gain information about concept of energy density in electric field and capable of applying the concepts to solve numerical.
CO4----
1 Students are able to solve problems related with electric and magnetic field
2 Get idea of Maxwell's equations
CO5 Practical..
1 Awareness of importance of physics developed
2 Students gain skill of handling of instruments
3. Students get knowledge of mechanics
4. Awareness of handling of electronic appliances developed.
CO6-----
1 Studied laws of thermodynamics
2 Students expertise in measurement of temperature with different thermometers.
CO7------
1 Students understand nature of waves and oscillations
2 They studied properties of Sound waves.
CO8 ------
1 Students studied laws of Statistical mechanics
2 Studied TDS equations.
CO9------
1 Students can understand different optical phenomena & can handle polarimeter to determine specific rotation of ppl
2 They can use knowledge of optics for various applications in society and develop research attitude
CO10 Practical…
1 Students gain skill of measurement of thermal conductivity of different metals by various methods.
2 Students are exposed to study of effect of heat on properties of matter
CO11 practical
1 Students can understand properties of sound
2. Students exposed to different properties of light by using various optical instruments
CO12-------
1 Students can understand idea of partial diff equations
2 Students can analyze properties of complex no. and can solve special type integrals.
CO13-----
1 Students well understand wave nature of matter particle.
2 They understand 1D &3D wave equation and use to solve problems. Gain skill how to use Operators
CO14------

1 Students studied various equations and principles and their applications in classical mechanics
2 Students exposed to special theory of relativity and charged particle dynamics.
CO 15--------
1 Students understand working and practical application of transistors; ICs, OPAMPS.
2 They can build electronic circuits and get knowledge about logic circuits.
3 Develop skill of use of CRO.
CO 16-------
1 Students exposed to nuclear properties with detectors and accelerator
2 Get knowledge about elementary particles and their classification.
CO 17-------
1 Students gain knowledge about magnetic properties of materials
2 Students are exposed to research in Materials science.
C18-- ---
1 Develop research skills in astronomy and can study Cosmos and it's origin
2. Develop scientific vision and can use for Society
3 Well understand Atomic and Molecular spectra.
CO19-------
1 Gain knowledge about renewable energy sources.
2 Creates awareness about research in nanomaterial and Super capacitors.
CO20 Practical….
1 Research attitude developed among students.
2 Job oriented skill developed
CO21 Practical
1 Awareness of use of nonconventional energy sources is developed
2 Students can apply practical knowledge to design logic circuits
CO22. Practical ------
1 Gain knowledge about safety of electronic instruments.
2 Students expertise in use of Optical instruments
CO23 Practical…..
1 Expertise in how to use CRO
2 Gain skill of using electric instruments and use of physics for Society

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrix for a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	3	1	1	3	3	1	3
CO 1.2	2	3	1	3	3	2	2	3

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	3	1	1	3	3	1	3
CO 1.2	2	3	1	3	3	2	2	3
CO 2.1	2	3	1	1	3	3	1	2
CO 2.2	2	2	1	1	3	2	1	2
CO 3.1	1	1	0	2	1	1	1	2
CO 3.2	1	3	1	2	1	1	2	0
CO 4.1	0	2	1	2	3	2	2	1
CO 4.2	0	1	1	2	0	1	1	1
CO 5.1	3	3	2	2	3	2	1	3
CO 5.2	2	2	2	3	3	2	3	3
CO 5.3	2	2	1	1	3	3	1	3
CO 5.4	2	3	2	1	3	1	1	2
CO 6.1	3	3	1	1	2	2	1	2
CO 6.2	3	2	1	1	2	1	1	2
CO 7.1	1	2	1	0	1	1	2	1
CO 7.2	1	1	1	1	1	1	2	1
CO 8.1	3	3	2	3	3	2	2	2
CO 8.2	2	2	2	2	2	2	1	2
CO 9.1	2	2	1	1	3	2	2	1
CO 9.2	3	3	1	1	3	2	1	2
CO 10.1	3	2	2	1	3	2	1	2
CO 10.2	3	3	2	2	3	3	1	2
CO 10.3	1	1	1	1	1	1	1	1
CO 10.4	0	1	0	0	0	0	0	0

CO 11.1	2	1	1	1	1	1	1	1
CO 11.2	1	2	0	0	1	2	1	1
CO 12.1	1	2	0	0	1	1	1	1
CO 12.2	2	2	1	1	1	2	2	2
CO 13.1	2	2	2	2	2	2	1	2
CO 13.2	3	3	1	1	3	3	1	2
CO 14.1	2	2	2	1	1	1	1	3
CO 14.2	2	2	1	1	2	2	0	1
CO 15.1	2	2	1	1	2	1	0	2
CO 15.2	1	2	1	1	2	1	1	2
CO 16.1	2	2	0	1	1	0	0	1
CO 16.2	2	2	1	1	1	1	1	2
CO 17.1	2	2	1	1	1	1	1	2
CO 17.2	2	2	0	0	2	1	0	3
CO 18.1	1	1	0	1	2	1	1	2
CO 18.2	1	2	1	1	1	1	1	1
CO 19.1	2	2	1	2	2	1	1	3
CO 19.2	1	1	1	1	1	1	1	1
CO 19.3	3	3	1	2	3	3	1	3
CO 19.4	2	2	1	1	2	1	1	1
CO 19.5	2	2	1	1	2	1	1	2
CO 19.6	2	2	2	2	2	1	1	2
CO 19.7	2	3	1	1	3	3	1	3
CO 19.8	2	3	1	3	3	2	2	3

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	3	1	1	3	3	1	3
CO 1.2	2	3	1	3	3	2	2	3
Average ($X_{1,.,l}$)	2	3	1	2	3	2.5	1.5	3

Similarly, the overall level of relation of all the courses in the Program is established. These levels are reported in the matrix form and this matrix is called as the Program articulation matrix. For example, if the Program XYZ has 19 courses then the Program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2	3	1	2	3	2.5	1.5	3
C_2	Course_2	2	2.5	1	1	3	2.5	1	2
C_3	Course_3	1	2	0.5	2	1	1	1.5	1
C_4	Course_4	0	1.5	1	2	1.5	1.5	1.5	1
C_5	Course_5	2.75	2.25	2.25	1.25	2.25	2	2	2
C_6	Course_6	2	2.5	1.5	1	3	2	1	2.5
C_7	Course_7	3	2.5	1	1	2	1.5	1	2
C_8	Course_8	1	1.5	1	0.5	1	1	2	1
C_9	Course_9	2.5	2.5	2	2.5	2.5	2	1.5	2
C_{10}	Course_10	2.75	2.5	1.5	1.25	3	2.25	1.25	1.75
C_{11}	Course_11	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5
C_{12}	Course_12	1.5	1.5	0.5	0.5	1	1.5	1	1
C_{13}	Course_13	1.5	2	0.5	0.5	1	1.5	1.5	1.5
C_{14}	Course_14	2.5	2.5	1.5	1.5	2.5	2.5	1	2
C_{15}	Course_15	2	2	1.5	1	1.5	1.5	0.5	2
C_{16}	Course_16	1.5	2	1	1	2	1	0.5	2
C_{17}	Course_17	2	2	0.5	1	1	0.5	0.5	1.5
C_{18}	Course_18	2	2	0.5	0.5	1.5	1	0.5	2.5
C_{19}	Course_19	1.75	1.875	1	1.375	1.875	1.25	1	1.875

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes

(PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

Details of a program:

- Name of the Program: XYZ
- Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
- Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

  Let $n = n_1 + n_2$, total number of PO's and PSO's.
- For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and Program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 80% weightage to external assessment and 20% weightage to internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	3	Good	Not Attained
C_5	Course_5	5	Excellent	Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	4	Very Good	Attained
C_8	Course_8	4	Very Good	Attained
C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	5	Excellent	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	4	Very good	Attained
C_{13}	Course_13	3	Good	Not Attained
C_{14}	Course_14	4	Very good	Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	5	Excellent	Attained
C_{17}	Course_17	4	Very Good	Attained
C_{18}	Course_18	4	Very good	Attained
C_{19}	Course_19	5	Excellent	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	6	10
C_2	Course_2	3	6	8
C_3	Course_3	3	3	6
C_4	Course_4	3	0	6
C_5	Course_5	5	13.75	12.5
C_6	Course_6	4	8	8
C_7	Course_7	4	12	8
C_8	Course_8	4	4	8

C_9	Course_9	4	10	8
C_{10}	Course_10	5	13.75	15
C_{11}	Course_11	4	2	10.2
C_{12}	Course_12	4	6	8.4
C_{13}	Course_13	3	4.5	6.8
C_{14}	Course_14	4	10	8.4
C_{15}	Course_15	4	8	6.8
C_{16}	Course_16	5	7.5	8.5
C_{17}	Course_17	4	8	6.8
C_{18}	Course_18	4	8	8.4
C_{19}	Course_19	5	8.75	10
Sum		75		139.25
			$DALP_1$ = 139.25/75	1.8567

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	2	3	1	2	3	2.5	1.5	3
2	3	2	2.5	1	1	3	2.5	1	2
3	3	1	2	0.5	2	1	1	1.5	1
4	3	0	1.5	1	2	1.5	1.5	1.5	1
5	5	2.75	2.25	2.25	1.25	2.25	2	2	2
6	4	2	2.5	1.5	1	3	2	1	2.5
7	4	3	2.5	1	1	2	1.5	1	2
8	4	1	1.5	1	0.5	1	1	2	1
9	4	2.5	2.5	2	2.5	2.5	2	1.5	2
10	5	2.75	2.5	1.5	1.25	3	2.25	1.25	1.75
11	4	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5
12	4	1.5	1.5	0.5	0.5	1	1.5	1	1
13	3	1.5	2	0.5	0.5	1	1.5	1.5	1.5
14	4	2.5	2.5	1.5	1.5	2.5	2.5	1	2
15	4	2	2	1.5	1	1.5	1.5	0.5	2
16	5	1.5	2	1	1	2	1	0.5	2
17	4	2	2	0.5	1	1	0.5	0.5	1.5
18	4	2	2	0.5	0.5	1.5	1	0.5	2.5
19	5	1.75	1.875	1	1.375	1.875	1.25	1	1.875
Sum	75	34.25	39.625	20.25	22.375	35.125	29.5	21.25	33.125

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	6	9	3	6	9	7.5	4.5	9
2	6	7.5	3	3	9	7.5	3	6
3	3	6	1.5	6	3	3	4.5	3
4	0	4.5	3	6	4.5	4.5	4.5	3
5	13.75	11.25	11.25	6.25	11.25	10	10	10
6	8	10	6	4	12	8	4	10
7	12	10	4	4	8	6	4	8
8	4	6	4	2	4	4	8	4
9	10	10	8	10	10	8	6	8
10	13.75	12.5	7.5	6.25	15	11.25	6.25	8.75
11	2	4	2	2	2	2	2	2
12	6	6	2	2	4	6	4	4
13	4.5	6	1.5	1.5	3	4.5	4.5	4.5
14	10	10	6	6	10	10	4	8
15	8	8	6	4	6	6	2	8
16	7.5	10	5	5	10	5	2.5	10
17	8	8	2	4	4	2	2	6
18	8	8	2	2	6	4	2	10
19	8.75	9.375	5	6.875	9.375	6.25	5	9.375
Sum	139.25	156.13	82.75	86.875	140.13	115.5	82.75	131.63
$DALP_l$	1.8567	2.0817	1.1033	1.1583	1.8683	1.54	1.1033	1.755

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained $DALP_l$

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

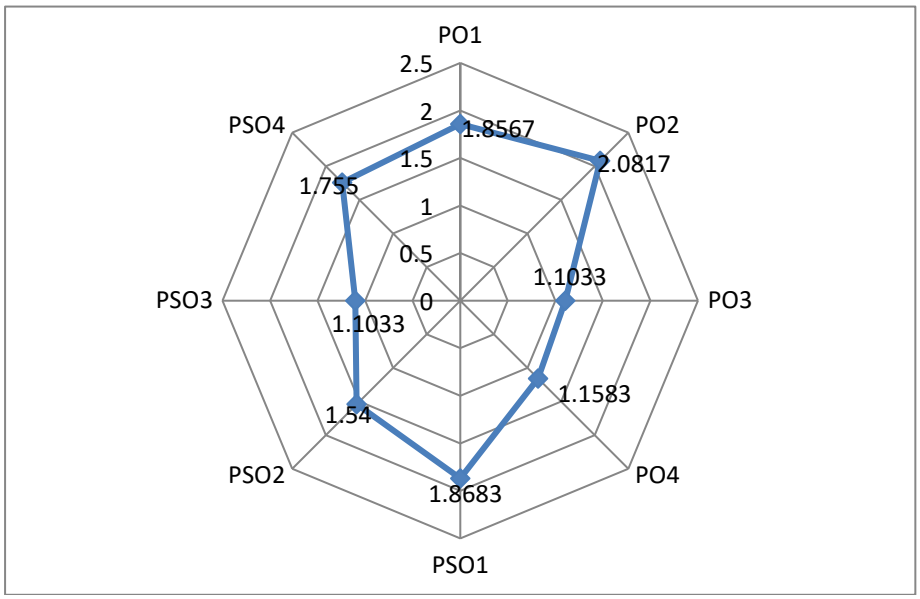
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	1.8567	Good	Attained
PO2	2.0817	Very Good	Attained
PO3	1.1033	Average	Not Attained
PO4	1.1583	Average	Not Attained
PSO1	1.8683	Good	Attained
PSO2	1.54	Good	Attained
PSO3	1.1033	Average	Not Attained
PSO4	1.755	Good	Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3(good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-3 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

Shikshan Prasarak Sanstha's

Padmabhushan Vasantraodada Patil Mahavidyalaya, Kavathe Mahankal

Department of Botany

Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring theirAttainment

Step1: Definingthe Vision and Mission ofthe Department.

Vision –

The Department of Botany is a fostering ground for an individual's comprehensive development and to inculcate fraternal spirit for scientific work & ability to pursue studies far beyond graduation and effective contribution to the society.

Mission –

- To impart knowledge is the basic aim of education. The students are expected acquire the knowledge of Plants science, natural phenomenon, manipulation of environment by man.
- Understanding the scientific terms, concepts, facts, phenomenon etc.
- To develop scientific attitude which is the major objective.
- This makes the students open minded, cirtical observations, curiosity, thinking etc.
- Appreciation of the subject, contributions of scientists, scientific methods, scientific programs etc.

Step2: DefiningProgramOutcomes (PO's)and ProgramSpecificOutcomes(PSO's)oftheprogram.

Programoutcomes(PO's)

Aftercompletionof**B. Sc**.**Botany**ProgramStudentswill beableto,

PSO 1: To understand the various aspect of plant systematics and anatomical features of higher plant.

PSO 2: To understand the basics of genetics and molecular biology.

PSO 3: To understand the plant ecology, phytogeography, centre of origin of cultivated plants and utilization of plants.

PSO 4: To understand vital physiological processes in plants and skills of nursery and garden technique.

ProgramSpecificOutcomes(PSO's)

After completion of graduation in **B. Sc. Botany**students will beable to,

1. To know the scope and importance of the plant systematics.
2. To understand plant morphology, nomenclature and classification
3. To prepare and demonstrate herbarium and to understand importance of Botanical gardens.
4. To examine internal organization of plant organs.

Step3:DefiningCourseOutcomes(CO's)ofeachcourseinaProgram.

Courseoutcomes(CO's)

Course1: Microbes, Algae and Biofertilizers

Atthe endofthiscourse studentswill beable to,

C01.1-Students will able to recognize the position of plant in phylogenetic level.

CO1.2- Students will able to identify the plants

Course2:Cell Biology and analytical techniques

Atthe endofthiscourse studentswill beableto,

CO2.1-Students will be able to present scientific hypotheses.

CO2.2-Students will be able to distinguish the characteristics of fungi, algae, bryophytes, pteridophytes,gymnopsperm and Angiosperm.

Course3: Mycology, Phytopathology and Mushroom cultivation

At the end of this course students will be able to,

CO3.1-Students will be able to explain different parts of the plants and their function.

CO3.2-Students will be able to explain the skills of bio fertilizer production, Mushroom Cultivation and Different analytical techniques used in the plant science.

Course4: Archegoniate

At the end of this course students will be able to,

CO4.1- Studentsunderstand the Microbial Genetics and Recombination in Bacteria.

CO4.2-Students understand the scope and importance of Mushroom cultivation.

Course5: PracticalI

CO5.1-Students can understand Gardening skills, Nursery techniques,Plant identification and herbarium techniquePlant resources and preservation technique of Indian native seeds or land races

CO5.2-Students can understand water analysis,Germplasm conservation (in-vivo)

Course6:Plant systematics and Anatomy

At the end of this course students will be able to,

CO6.1- To know the scope and importance of the plant systematics.

CO6.2- To understand plant morphology, nomenclature and classification

Course7: Genetics and Molecular Biology

At the end of this course students will be able to,

CO7.1- To understand the principles of Mendelian inheritance and gene interaction.

CO7.2- To differentiate between structural and numerical variations in chromosomes.

Course8:Plant Ecology and Economic botany

Atthe endofthiscourse studentswill beable to,

CO8.1- To understand core concepts of biotic and abiotic components.

CO8.2- To gain and insight in to the diverse ecosystem, related food web and ecological pyramids.

Course9: Plant physiology, Nursery and Gardening techniques

Atthe endofthiscourse studentswill beable to,

CO9.1- To understand various physiological processes in plants.

CO9.2- To understand significance and mechanism of photosynthesis.

Course10:PracticalII&Practical III

Atthe endofthiscourse studentswill beable to,

CO10.1- Students will able to identify the plants

CO10.2-Students will be able to present scientific hypotheses.

Course11: Genetics and Plant Breeding

Atthe endofthiscourse studentswill beable to,

CO11.1- To understand Mendelian and Neo-mendelian genetics and mechanism of crossing over and linkage and mutation.

CO11.2- To understand Get the detail knowledge about modern strategies applied in Plant Breeding for crop improvement i.e. Mass selection, Pure line Selection and Clonal selection.

Course12:Microbiology, Plant Pathology and Mushroom Culture Technology

Atthe endofthiscourse studentswill beable to,

CO12.1- Understand the Microbial Genetics and Recombination in Bacteria.

CO12.2- Understand the scope and importance of Mushroom cultivation.

Course13:Cytology and Research Techniques in Biology

Atthe endofthis coursestudents will be able to,

CO13.1-To gain knowledge about "Cell Science".

CO13.2- Know the details of Microscopy, Chromatography and cultural techniques in Botany.

Course14:Horticulture and Gardening

Attheendofthiscoursestudentswillbeable to,

CO14.1-To know the importance of Pomoculture, Olericulture, Floriculture and Land scape gardening and infrastructure for nursery.

CO14.2-To get the knowledge of Horticultural produce and management of pest and diseases.

Course15:Plant Biochemistry and Molecular Biology

Attheendofthiscoursestudentswillbeableto,

COS15.1-Understand the properties of Monosaccharides, Oligosaccharides and Polysaccharides.They will learn about the Significance of Carbohydrates and understand the Properties of saturated fatty acids, and unsaturated fatty acids.

COS15.2-Understand the protein - structure and classification and protein biosynthesis in prokaryotes and eukaryotes.

Course16:Bioinformatics, Biostatistics and Economic Botany

Attheendofthiscoursestudentswillbeableto,

COS16.1-To know the scope and branches of Binformatics, biological data bases and applications.

COS16.2-To understand the collection and presentation biostatical data, Census method and sampling methods, classification, tabulation and graphical representation.

Course17:Plant biotechnology and Palaeobotany

Attheendofthiscoursestudentswillbeableto,

COS17.1- Know about the genomic organization of living organisms and understanding the fundamentals of Recombinant DNA Technology, DNA fingerprinting, molecular DNA markers, PCR and concept of gene bank.

COS17.2- Understanding the Genetic Engineering and principle and basic protocols for Plant Tissue Culture.

Course18:Biofertilizers and Herbal Drug Technology

Attheendofthiscoursestudentswillbeableto,

COS18.1- Understand the importance, types and study of bacterial, blue green algal, mycorrhizal and trichodermal biofertilizers and methods of vermicomposting.

COS18.2- To Know the importance of herbal medicines, classification of crude drugs and applications of herbs in cosmetics, facemasks, bath oil and perfumes.

Course19:PracticalIV,V,VI&VII

COS19.1- Students can understand to examine the structure of DNA.

COS19.2- Students can identify the common plant diseases according to geographical locations and device control measures.

COS19.3- Students can understand to compared the effect of chromosomal abnormalities in numerical as well as structural changes leading to genetic disorders.

COS19.4- Students can conceptual understanding of plant genetic resources, plant breeding, gene bank and gene pool.

COS19.5- Students can understand the herbal preparations of churns, decoction, hair oil and shampoo.

COS19.6- Students can understand the micrometry, microphotography and microtomy techniques.

COS19.7- Students can understand the varices branches of horticulture, fruit and vegetable crops, floriculture, medicinal and aromatic plants.

COS19.8- Students can understand the different landscaping practices and garden design.

Step4:DefiningrelationbetweenCourseOutcomes(COs)andPOs/PSOsforeachcoursetoobtainoverall CO mappingwith eachPOs/PSOs.(CourseArticulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is establishedbetween CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's andPO's/ PSO's,1 beinglow,2 beingmedian and 3beinghigh.

Forexample,supposeprogram XYZ(say)has4PO's&4PSO's.Then,coursearticulationmatrixforacourse–1 (say) with two CO'sis asfollows.

CO's–PO's &PSO'smappingmatrix(1-low,2-medium,3-high,0-Nocorrelation)

CO's	PO's/PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1.1	2	2	2	0	3	3	1	1
CO1.2	2	2	1	0	2	2	2	2

In the same way we have course articulation matrices for all courses in that Program.

CO's–PO's &PSO'smappingmatrix(1-low,2-medium,3-high,0-Nocorrelation)

CO's	PO's/PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1.1	2	2	2	0	3	3	1	1
CO1.2	2	2	1	0	2	2	2	2
CO2.1	2	2	2	0	3	2	2	2
CO2.2	2	2	2	0	3	2	2	2
CO3.1	2	2	3	2	3	2	2	2
CO3.2	2	1	3	2	3	2	2	2
CO4.1	2	1	3	2	3	2	2	2
CO4.2	3	1	2	2	3	3	2	1
CO5.1	3	3	2	1	2	3	1	1
CO5.2	3	2	2	2	1	3	2	1
CO5.3	1	1	2	2	3	2	2	1
CO5.4	2	1	2	1	1	2	2	2
CO6.1	2	2	3	2	3	3	2	1
CO6.2	3	2	3	3	2	3	2	1
CO7.1	2	2	2	3	2	3	2	1
CO7.2	3	3	2	2	2	3	2	1
CO8.1	3	2	2	2	2	2	2	1
CO8.2	2	3	2	2	2	2	2	1
CO9.1	2	3	2	2	3	2	2	2
CO9.2	2	2	2	2	3	1	2	2
CO10.1	2	2	2	2	2	1	2	2
CO10.2	2	2	2	2	1	1	1	2
CO10.3	2	2	2	3	3	1	1	1
CO10.4	2	3	2	3	3	2	1	1

CO11.1	3	2	2	2	3	2	2	2
CO11.2	2	2	3	0	3	1	2	2
CO12.1	3	2	3	2	3	2	2	2
CO12.2	3	2	3	2	1	1	2	2
CO13.1	2	2	3	3	1	2	2	2
CO13.2	2	2	3	3	1	3	2	2
CO14.1	3	1	1	3	3	3	3	2
CO14.2	3	1	2	3	1	2	3	2
CO15.1	2	2	1	0	3	2	3	3
CO15.2	3	3	1	0	1	2	3	2
CO16.1	2	2	1	0	3	2	3	2
CO16.2	3	3	2	0	2	2	2	2
CO17.1	2	3	3	1	2	2	2	2
CO17.2	3	2	2	1	2	2	2	3
CO18.1	2	2	2	1	3	2	1	2
CO18.2	2	2	3	1	3	2	1	2
CO19.1	2	2	1	0	3	2	3	3
CO19.2	3	3	1	0	1	2	3	2
CO19.3	2	2	1	0	3	2	3	2
CO19.4	3	3	2	0	2	2	2	2
CO19.5	2	3	3	1	2	2	2	2
CO19.6	3	1	1	3	3	3	3	2
CO19.7	3	1	2	3	1	2	3	2
CO19.8	2	2	1	0	3	2	3	3

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program ArticulationMatrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged toobtain overall level of relation of course with each PO & PSO. For example, the overall relation ofcourse– 1 (say) arereported thefollowingmatrix.

CO's	PO's/PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1.1	2	2	2	0	3	3	1	1
CO1.2	2	2	1	0	2	2	2	2
Average ($X_{1,.,l}$)	2	2	1.5	0	2.5	2.5	1.5	1.5

Similarly, the overall level of relation of all the courses in the program is established. Theselevels are reported in the matrix form and this matrix is called as the program articulation matrix.For example, if the program XYZ has 19 courses then the program articulation matrix will be asfollows.

ProgramArticulationMatrix

ID	Coursename	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2.5	2	3	0	3	2	1	1
C_2	Course_2	2	2	1.5	0	2	2	2	1
C_3	Course_3	2	1	3	1	2.5	2	2	1
C_4	Course_4	2	2	1	0	3	3	2	1
C_5	Course_5	2.5	1.5	2.5	0	1.25	1.25	2	1
C_6	Course_6	2	2	1	0	2	2.5	2	2
C_7	Course_7	2	2	2	0.5	1.5	2	2	2
C_8	Course_8	2	2	1	0	2	2.5	2	2
C_9	Course_9	2	1.5	2.5	0.5	2	2.5	2	2
C_{10}	Course_10	3	2.25	3	0	2.25	2	2.25	2
C_{11}	Course_11	3	1	1	1	2	2	1	2.5
C_{12}	Course_12	2	2	1.5	0	1.5	1.5	2	2.5
C_{13}	Course_13	2	2	3	1	3	3	3	2
C_{14}	Course_14	2	2	2	0.5	1.5	2	2	3
C_{15}	Course_15	2	1	1.5	1	2	2	2	2
C_{16}	Course_16	2.5	1.5	2	0	1.5	1.5	2	3
C_{17}	Course_17	2	2	2	0	3	2	2	2
C_{18}	Course_18	2	2	2	0.5	3	1.5	2.5	3
C_{19}	Course_19	2	2	2.25	0.25	1.75	1.5	2	3

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes(PSO's)andProgram Outcomes (PO's) andsettingupthetarget level.

In this step, methodology for measuring the attainment level of learning outcomes is definedandthe target levels forthebatch are defined.

- **Methodologyfortheattainmentoflearningoutcomesforthisyear:**

  Detailsofaprogram:

  - NameoftheProgram: XYZ
  - Programhasn_1PO's,say,PO_1,PO_2,...,PO_{n1}
  - Programhasn_2PSO's,say,PSO_1,PSO_2,...,PSO_{n2}

    Letn=n_1 +n_2,totalnumberofPO'sandPSO's.
  - Forconvenience,letusdenotethePO's&PSO's PO_1,PO_2,...,PO_{n1},PSO_1,PSO_2,...,PSO_{n2}byP_1,P_2,...,P_n
  - Program hasmcourses,say,C_1,C_2,...,C_m
  - Eachcourse$C_i$haskcourseoutcomes(CO's)denotedas$CO_{i,1}$,$CO_{i,2}$,...,$CO_{i,k}$, i=1,2,...,m.and k represents thenumberof outcomes particularlythat ofcourse.

Course articulation matrices and program articulation matrix are obtained as discussed inprevioussteps.Let$X_{i,j,l}$bethelevelofcorrelationof$CO_{i,j}$with$P_l$where,i = 1,2, ... , m,j =1,2,...,k,l=1,2,...,n.Then,theoverallCOlevelswithPO's&PSO'sofcourse$C_i$iscomputedas

$X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$Here k be the number of outcome in the average course taken.

- **AttainmentofCOs:**

The CO attainment levels are measured based on the results of the internal assessment and externalexamination conducted by the university. The CO attainment level based on internal assessment andexternalassessment arecomputed separately.

Attainmentlevelsbasedoninternal/external assessmentmethodaredefined asfollows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment

method**Level 2**: Average of student marks belongs to the class 20% - 40% for that assessment

method**Level 3**: Average of student marks belongs to the class 40% - 60% for that assessment

method**Level 4**: Average of student marks belongs to the class 60% - 80% for that assessment

method**Level5**:Averageofstudentmarksbelongsto the class 80%-

100%forthatassessmentmethod

Let $ALC_E$and ALC_Ibe the CO attainment level of the course based on external assessment andinternal assessment respectively. The overall CO attainment of the course is calculated by taking 80%weightageto external assessment and 20%weightageto internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

LetALC_1,ALC_2,...,ALC_mbetheattainmentlevelsofthecoursesC_1,C_2,...,$C_m$respectively.Theoverall course attainment levelsarecategorized asbelow,

Level 1: Poor – if 0 < $ALC_i \leq 1$,Level

2: Average – if 1 <$ALC_i \leq 2$,Level3:

Good – if2 <$ALC_i \leq 3$,

Level 4: Very Good – if 3 <$ALC_i \leq 4$,

Level5:Excellent – if4<$ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aimingminimum level 4 (very good) and how the course status is attained in the performance of abilities ofstudents.

Attheend wewillhave attainmentlevelsof allthecourses,

ID	Coursename	ALC_i	Level	Status
C_1	Course_1	5	Excellent	Attained
C_2	Course_2	5	Excellent	Attained
C_3	Course_3	5	Excellent	Attained
C_4	Course_4	5	Excellent	Attained
C_5	Course_5	3	Good	Not Attained
C_6	Course_6	4	VeryGood	Attained
C_7	Course_7	4	VeryGood	Attained
C_8	Course_8	5	Excellent	Attained
C_9	Course_9	5	Excellent	Attained
C_{10}	Course_10	5	Excellent	Attained
C_{11}	Course_11	3	Good	Not Attained
C_{12}	Course_12	3	Good	Not Attained
C_{13}	Course_13	3	Good	Not Attained
C_{14}	Course_14	4	VeryGood	Attained
C_{15}	Course_15	4	VeryGood	Attained
C_{16}	Course_16	4	VeryGood	Attained
C_{17}	Course_17	4	VeryGood	Attained
C_{18}	Course_18	4	Very Good	Attained
C_{19}	Course_19	5	Excellent	Attained

Step7:Calculationofattainmentlevelsof PO'sandPSO's.

- **AttainmentofPO's &PSO's:**

TheattainmentofPO's&PSO'sarecalculatedusingdirectmethod.Indirectmethodtheattainment of PO's & PSO's are calculated through the attainment levels of courses. The courseattainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each POand PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainmentlevel ofeachPO and PSO.

DirectAssessment: Directattainmentlevelofthel^{th},PO's& PSO'siscalculatedasfollows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Coursename	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	5	2	10
C_2	Course_2	5	2	8
C_3	Course_3	5	2	6
C_4	Course_4	5	2.5	6
C_5	Course_5	3	3	12.5
C_6	Course_6	4	2.5	8
C_7	Course_7	4	2.5	8
C_8	Course_8	5	2.5	8
C_9	Course_9	5	2	8

C_{10}	Course_10	5	2	15
C_{11}	Course_11	3	2.5	10.2
C_{12}	Course_12	3	3	8.4
C_{13}	Course_13	3	2	6.8
C_{14}	Course_14	4	3	8.4
C_{15}	Course_15	4	2.5	6.8
C_{16}	Course_16	4	2.5	8.5
C_{17}	Course_17	4	2.5	6.8
C_{18}	Course_18	4	2	8.4
C_{19}	Course_19	5	2.5	10
Sum		80		189
			$DALP_1$=163.63/80	2.3625

Similarly,wehavetofindattainmentlevelsofall PO'sandPSO's.

Sr.No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	5	2	2	1.5	0	2.5	2.5	1.5	1.5
2	5	2	2	2	0	3	2	2	2
3	5	2	1.5	3	2	3	2	2	2
4	5	2.5	1	2.5	2	3	2.5	2	1.5
5	3	3	2.5	2	1.5	1.5	3	1.5	1
6	4	2.5	2	3	2.5	2.5	3	2	1
7	4	2.5	2.5	2	2.5	2	3	2	1
8	5	2.5	2.5	2	2	2	2	2	1
9	5	2	2.5	2	2	3	1.5	2	2
10	5	2	2	2	2	1.5	1	1.5	2
11	3	2.5	2	2.5	1	3	1.5	2	2
12	3	3	2	3	2	2	1.5	2	2
13	3	2	2	3	3	1	2.5	2	2
14	4	3	1	1.5	3	2	2.5	3	2
15	4	2.5	2.5	1	0	2	2	3	2.5
16	4	2.5	2.5	1.5	0	2.5	2	2.5	2
17	4	2.5	2.5	2.5	1	2	2	2	2.5
18	4	2	2	2.5	1	3	2	1	2
19	5	2.5	2.125	1.5	0.875	2.25	2.125	2.75	2.25
Sum	80	45.5	39.125	41	28.375	43.75	40.625	38.75	34.25

Sr.No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	10	10	7.5	0	12.5	12.5	7.5	7.5
2	10	10	10	0	15	10	10	10
3	10	7.5	15	10	15	10	10	10
4	12.5	5	12.5	10	15	12.5	10	7.5
5	9	7.5	6	4.5	4.5	9	4.5	3
6	10	8	12	10	10	12	8	4
7	10	10	8	10	8	12	8	4
8	12.5	12.5	10	10	10	10	10	5
9	10	12.5	10	10	15	7.5	10	10
10	10	10	10	10	7.5	5	7.5	10
11	7.5	6	7.5	3	9	4.5	6	6
12	9	6	9	6	6	4.5	6	6
13	6	6	9	9	3	7.5	6	6
14	12	4	6	12	8	10	12	8
15	10	10	4	0	8	8	12	10
16	10	10	6	0	10	8	10	8
17	10	10	10	4	8	8	8	10
18	8	8	10	4	12	8	4	8
19	12.5	10.625	7.5	4.375	11.25	10.625	13.75	11.25
Sum	189	163.63	170	116.88	187.75	169.63	163.25	144.25
DALP ı	2.3625	2.0453	2.125	1.4609	2.3469	2.1203	2.0406	1.8031

Step8:Comparisonoftargetlevelwithobtained POattainment.

InthisstepthetargetlevelofPO'sandPSO'sattainmentare comparedwithobtained$DALP_l$

Attainmentlevelsaredefinedasstatedbelow.

Level1: Poor – if 0 <$ALC_i \leq$ 1,

Level 2: Average – if 1 <$ALC_i \leq$

1.5,Level 3: Good – if 1.5

<$ALC_i \leq 2$,Level 4: Very Good – if 2

<$ALC_i \leq$ 2.5,Level5:Excellent–if2.5

<$ALC_i \leq 3$.

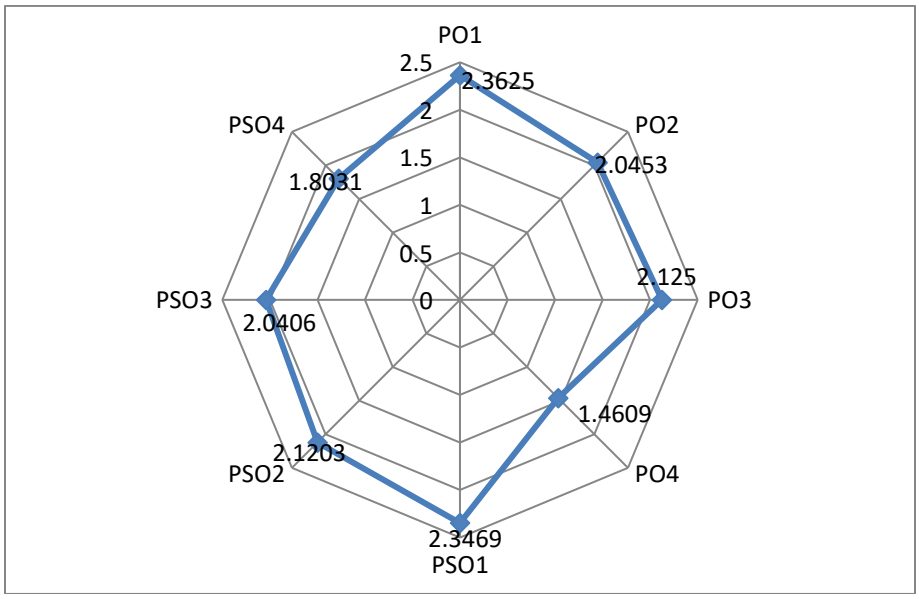
For every PO's and PSO's, we have set level 4 as target level that is we are aiming

minimumlevel4(verygood) in theperformanceof abilities ofstudents.

Attainmentlevelof allthePOs andPSOs

PO's	$DALP_l$	Level	Status
PO1	2.3625	Excellent	Attained
PO2	2.0453	Very Good	Attained
PO3	2.125	VeryGood	Attained
PO4	1.4609	Average	NotAttained
PSO5	2.3469	VeryGood	Attained
PSO6	2.1203	VeryGood	Attained
PSO7	2.0406	Very Good	Attained
PSO8	1.8031	Good	NotAttained

$P_l$attainment target level say, 4, indicates that, the department is aiming minimum level-4(verygood)in theperformanceofabilities of students.



Step 9: Planned actions:

RemedialActions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigningthedifferent remedialmeasures like

assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less thanlevel-4 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

Shikshan Prasarak Sanstha's

P.V.P. Mahavidyalaya, Kavathe Mahankal

Department of Zoology

Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision : The Department of Zoology is a fostering ground for an individual's comprehensive development and to inculcate fraternal spirit for scientific work & ability to pursue studies far beyond graduation and effective contribution to the society.

Mission

- To impart knowledge is the basic aim of education. The students are expected acquire the knowledge of animal science, natural phenomenon, manipulation ofenvironment by man.
- Understanding the scientific terms, concepts, facts, phenomenon etc.
- To develop scientific attitude which is the major objective.
- This makes the students open minded, cirtical observations, curiosity, thinking etc.
- Abilities to apply scientific methods, collection of scientific data, problem solving,organize science exhibitions, clubs etc.
- Appreciation of the subject, contributions of scientists, scientific methods,scientific programs etc.
- To bring about an awareness of health related problems, its prevention andcure.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program outcomes (PO's)

After graduating with a degree in Zoology, the students can venture into different fields and can make a career:

1. Research in different fields of Cell-Biology, Genetics, Physiology, Entomology, Marine Sciences, Food Technology
2. Forensic Sciences and Forestry
3. Agrochemicals and Pest Management
4. Environmental Management and Masters in Business Administration

   Can become an Entrepreneur in applied sciences

Program Specific Outcomes (PSO's)

1. Develop insight and improve their analytical and practical knowledge in various aspects of Life Science, Genetics, Molecular Biology, Physiology, Applied Zoology, Embryology, Evolution, Biochemistry Applied Branches and Health.
2. Acquire vast knowledge in various branches and its application biological sciences such as biochemistry, apiculture, poultry, Fishery, Goat farming, Agriculture, Vermiculture
3. To identify the scientific facts behind every natural phenomenon
4. Gain knowledge and handling in sophisticated equipments

Step 3: Defining Course Outcomes (CO's) of each course in a Program.

Course outcomes (CO's)

Course 1: Animal Diversity-I

At the end of this course students will be able to,

CO1.1: Theory and practical papers touch upon systematics, animal diversity from phyla from Protista to Annelida. and will enhance in understanding the usefulness of systematic in the identification, nomenclature and classification of animal diversity.

CO1.2: Imparting knowledge of five kingdom classification system and biodiversity related to non-chordates from Protista to Echinodermata

Course 2: Cell Biology and Evolutionary Biology

At the end of this course students will be able to,

CO2.1: Students would have a deeper insights into the structure and functions of a living cells, deeper knowledge of cell theory, difference between prokaryotes and eukaryotes and to understand the importance and functions of cell organelle.

CO2.2: Understanding the evidences of evolution like fossils, connecting links and living fossilsand its importance.

Course 3: Animal diversity and Insect Vector

At the end of this course students will be able to,

CO3.1: Students will be able to understand systematic position, Morphology, Anatomy and Physiology of Rat. Physiology of rat is closely related with Human beings.

CO3.2: Students will be understand the Insect vectors and Getting aware about various insect born diseases and their pathogenicity and their control measures.

Course 4: Genetics

At the end of this course students will be able to,

CO4.1: students would have a deeper insights into the understanding concepts like of inheritance, Mendelian genetics

CO4.2: understanding the divergence from Mendelism patterns of inheritance ,co-dominance, Incomplete dominance, multiple alleles and lethal genes

Course 5: Practical I

At the end of this course students will be able to,

CO5.1: Practical papers touch upon systematics, animal diversity, phyla from Protista to Annelida and will enhance in understanding the systematic in the identification, nomenclature and knowing the actual morphological characters by observing specimen.

CO5.2: Practical papers touch upon Insect vectors, and vector borne diseases, types of fossils, demonstration of rat, practical's hands on physiological and cytological practical's.

Course 6: Animal Diversity-II

At the end of this course students will be able to,

CO6.1: Understanding the Characters, classification and phylogenic relations among Protochordates,Agnatha, Pisces, Amphibians Reptiles, Aves and Mammals.

CO6.2: Making aware about Venomous and non- Venomous snakes, venom and its effect,

snake bite and first aid.

Course 7: Biochemistry

At the end of this course students will be able to,

CO7.1: Imparting knowledge about nucleic acids (DNA and RNA) and enzyme nomenclature, Classification, enzyme kinetics, Inhibition, regulations and Isozymes.

CO7.2: Student will be able to understand the different types of Protein, Lipid and carbohydrate metabolism

Course 8: Reproductive Biology

At the end of this course students will be able to,

CO8.1: Imparting knowledge of histological structures of mammalian reproductive organs

CO8.2: Imparting knowledge of hormones

Course 9: Applied Zoology – I

At the end of this course students will be able to,

CO9.1: Students will able to understand the Transmission, Prevention and control of diseases: Tuberculosis, Typhoid.

CO9.2: To understand the Economic importance of different insects

Course 10: Practical II& Practical III

At the end of this course students will be able to,

CO11.1: Practical papers touch upon systematics, animal diversity, phyla from Hemichordata to Mammals and will enhance in understanding the systematic in the identification,nomenclature and knowing the actual morphological characters by observing specimen

CO11.2: Practical papers touch upon Insect vectors, and vector borne diseases, types of fossils, demonstration of rat, practical hands on physiological and cytological practicals

Course 11: **Comparative Anatomy of Vertebrates**

At the end of this course students will be able to,

CO11.1: Imparting knowledge of integuments and endoskeleton among the vertebrates.

CO11.2: Imparting knowledge of basic structural and functional parts of digestive and respiratory system from lower vertebrates to higher vertebrates.

Course 12: Molecular Cell Biology and Animal Biotechnology

At the end of this course students will be able to,

CO12.1: Understanding the molecular concepts in biology

CO12.2: Getting aware about various Animal Biotechnology.

Course 13: **Biotechniques and Biostatistics**

At the end of this course students will be able to,

CO13.1: Understanding the many biostatistics terms such as tabulation, measure of central tendency, Graphical representation of data, Dispersion and correlation

CO13.2: Getting aware about application of biotechnology in medicine, animal husbandry and agriculture

Course 14: **Aquatic biology and Endocrinology**

At the end of this course students will be able to,

CO14.1: Getting aware about environment, Understanding and getting knowledge about the aquatic

biomass of various zones and biology of lakes and streams.

CO14.2: Understanding the anatomy, histology, role, regulation and disorder various endocrine glands of human

Course 15: **Developmental Biology of Vertebrates**

At the end of this course students will be able to,

CO15.1: Understanding the gametogenesis and detailed development of chick upto 72 hrs

CO15.2: Understanding the early developmental process of frog

Course 16: **Immunology**

At the end of this course students will be able to,

CO16.1: Imparting the knowledge of immunology

CO16.2: Understanding the cells and organs of immune system, and basic properties of antigens

Course 17: **Applied Zoology-II** At the end of this course students will be able to,

CO17.1: Understanding the economic importance of apiculture, Pearl culture.

CO17.2: Imparting knowledge about animal Husbandary and goat farming

Course 18: **Insect Vectors and Histology**

At the end of this course students will be able to,

CO18.1 Getting aware about various pathogenic insect vectors

CO18.2: Understanding the Histological structure of mammalian organs

Course 19: Practical IV, V, VI & VII

CO 19.1	**Practical I:** Practical papers touch upon integuments and endoskeleton, comparative study of heart, brain respiration and digestive system of lower to higher vertebrate.
CO 19.2	Imparting the knowledge of Developmental stages of frog, chick embryo, histology of placenta, study of gametes of rat and frog and preparation of W.M. of chick embryo.
CO 19.3	**Practical II:** Practical papers touch upon economic importance of apiculture, Pearl culture, prawn culture, animal Husbandry and goat farming.
CO 19.4	Imparting the study of lymphoid organs, histology of lymphoid organs and practicals of physiology and cell biology like study types of blood cells, determination of A, B, O blood group, cell counting and viability and demonstration of ELISA and Electrophoresis.
CO 19.5	**Practical III:** Practical papers touch upon preparation of permanent slides through microtechniques and study of example in biostatistics.
CO 19.6	Imparting practical's like chromatography, DNA isolation and study of techniques like PCR, DNA fingerprinting etc.
CO 19.7	**Practical IV:** Practical papers touch upon practical based on limnology, study of instruments used in limnology.
CO 19.8	Imparting the study of Insect vectors, Vector borne diseases and Histology of Mammalian Organs.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrix for a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	2	2	2	2	2	0
CO 1.2	1	1	0	0	2	1	2	1

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	2	2	2	2	2	0
CO 1.2	1	1	0	0	2	1	2	1
CO 2.1	3	2	0	2	3	2	2	0
CO 2.2	2	1	0	0	2	1	2	0
CO 3.1	2	1	1	0	3	1	2	2
CO 3.2	3	3	3	2	3	2	2	0
CO 4.1	3	2	0	0	3	0	2	0
CO 4.2	3	2	0	0	3	0	2	0
CO 5.1	2	2	2	2	3	2	2	3
CO 5.2	3	3	3	2	2	1	2	2
CO 6.1	2	2	2	2	2	2	2	0
CO 6.2	3	3	2	1	2	1	3	1
CO 7.1	3	3	3	2	3	1	2	2
CO 7.2	3	3	3	2	3	2	2	0
CO 8.1	3	3	2	1	2	3	3	2
CO 8.2	3	1	0	3	3	3	3	2
CO 9.1	3	3	3	3	3	3	3	1
CO 9.2	3	3	3	3	3	3	3	1
CO 10.1	3	3	3	2	2	3	3	2
CO 10.2	3	3	3	3	3	3	3	1
CO 11.1	1	1	0	1	2	1	2	1
CO 11.2	2	1	0	1	3	2	2	0
CO 12.1	3	1	1	2	3	3	3	2
CO 12.2	3	3	2	1	3	3	3	2

CO 13.1	3	2	2	2	3	3	3	2
CO 13.2	3	2	1	2	3	3	3	2
CO 14.1	3	2	1	2	2	2	1	0
CO 14.2	3	2	0	0	2	3	2	0
CO 15.1	3	2	0	2	2	2	2	2
CO 15.2	3	0	0	0	3	2	2	0
CO 16.1	3	2	1	0	3	2	2	2
CO 16.2	3	2	1	0	3	2	2	2
CO 17.1	3	1	1	3	3	2	2	0
CO 17.2	3	1	1	3	3	2	2	0
CO 18.1	3	2	2	2	3	3	2	2
CO 18.2	3	3	0	0	3	3	2	0
CO 19.1	1	1	0	1	3	2	2	2
CO 19.2	2	1	0	1	3	3	1	3
CO 19.3	3	1	1	3	3	3	1	3
CO 19.4	3	2	1	0	2	2	2	3
CO 19.5	3	3	0	0	2	2	2	3
CO 19.6	3	2	0	1	2	2	2	3
CO 19.7	3	2	1	2	3	2	2	3
CO 19.8	3	2	2	2	3	2	2	3

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	2	2	2	2	2	0
CO 1.2	1	1	0	0	2	1	2	1
Average ($X_{1,.,l}$)	1.5	1.5	1	1	2	1.5	2	0.5

Similarly, the overall level of relation of all the courses in the Program is established. These levels are reported in the matrix form and this matrix is called as the Program articulation matrix. For example, if the Program XYZ has 19 courses then the Program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	1.5	1.5	1	1	2	1.5	2	0.5
C_2	Course_2	2.5	1.5	0	1	2.5	1.5	2	0
C_3	Course_3	2.5	2	2	1	3	1.5	2	1
C_4	Course_4	3	2	0	0	3	0	2	0
C_5	Course_5	2.5	2.5	2.5	2	2.5	1.5	2	2.5
C_6	Course_6	2.5	2.5	2	1.5	2	1.5	2.5	0.5
C_7	Course_7	3	3	3	2	3	1.5	2	1
C_8	Course_8	3	2	1	2	2.5	3	3	2
C_9	Course_9	3	3	3	3	3	3	3	1
C_{10}	Course_10	3	3	3	2.5	2.5	3	3	1.5
C_{11}	Course_11	1.5	1	0	1	2.5	1.5	2	0.5
C_{12}	Course_12	3	2	1.5	1.5	3	3	3	2
C_{13}	Course_13	3	2	1.5	2	3	3	3	2
C_{14}	Course_14	3	2	0.5	1	2	2.5	1.5	0
C_{15}	Course_15	3	1	0	1	2.5	2	2	1
C_{16}	Course_16	3	2	1	0	3	2	2	2
C_{17}	Course_17	3	1	1	3	3	2	2	0
C_{18}	Course_18	3	2.5	1	1	3	3	2	1
C_{19}	Course_19	2.625	1.75	0.625	1.25	2.625	2.25	1.75	2.875

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes

(PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

Details of a Program:

- Name of the Program: XYZ
- Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
- Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

  Let $n = n_1 + n_2$, total number of PO's and PSO's.
- For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, i = 1,2, … , m. and k represents the number of outcomes particularly that of course.

Course articulation matrices and Program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, i = 1,2, … , m, j = 1,2, … , k, l = 1,2, … , n. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i,\,.\,,} = \frac{1}{k}\sum^{k} X_{i,j,l}$, Here k be the number of outcomes in the average course taken.

k j=1

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 80% weightage to external assessment and 20% weightage to internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$

respectively.The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	3	Good	Not Attained
C_5	Course_5	5	Excellent	Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	4	Very Good	Attained
C_8	Course_8	4	Very Good	Attained

C_9	Course_9	4	Very Good	Attained
C_{10}	Course_10	5	Excellent	Attained
C_{11}	Course_11	4	Very Good	Attained
C_{12}	Course_12	4	Very Good	Attained
C_{13}	Course_13	4	Very Good	Attained
C_{14}	Course_14	4	Very Good	Attained
C_{15}	Course_15	4	Very Good	Attained
C_{16}	Course_16	4	Very Good	Attained
C_{17}	Course_17	4	Very Good	Attained
C_{18}	Course_18	4	Very Good	Attained
C_{19}	Course_19	5	Excellent	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	1.5	4.5
C_2	Course_2	3	2.5	7.5
C_3	Course_3	3	2.5	7.5
C_4	Course_4	3	3	9
C_5	Course_5	5	2.5	12.5
C_6	Course_6	4	2.5	10
C_7	Course_7	4	3	12
C_8	Course_8	4	3	12
C_9	Course_9	4	3	12
C_{10}	Course_10	5	3	15
C_{11}	Course_11	4	1.5	6
C_{12}	Course_12	4	3	12
C_{13}	Course_13	4	3	12
C_{14}	Course_14	4	3	12
C_{15}	Course_15	4	3	12
C_{16}	Course_16	4	3	12
C_{17}	Course_17	4	3	12
C_{18}	Course_18	4	3	12
C_{19}	Course_19	5	2.625	13.125

Sum	75		205.13
		$DALP_1$ = 205.13/75	2.735

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	1.5	1.5	1	1	2	1.5	2	0.5
2	3	2.5	1.5	0	1	2.5	1.5	2	0
3	3	2.5	2	2	1	3	1.5	2	1
4	3	3	2	0	0	3	0	2	0
5	5	2.5	2.5	2.5	2	2.5	1.5	2	2.5
6	4	2.5	2.5	2	1.5	2	1.5	2.5	0.5
7	4	3	3	3	2	3	1.5	2	1
8	4	3	2	1	2	2.5	3	3	2
9	4	3	3	3	3	3	3	3	1
10	5	3	3	3	2.5	2.5	3	3	1.5
11	4	1.5	1	0	1	2.5	1.5	2	0.5
12	4	3	2	1.5	1.5	3	3	3	2
13	4	3	2	1.5	2	3	3	3	2
14	4	3	2	0.5	1	2	2.5	1.5	0
15	4	3	1	0	1	2.5	2	2	1
16	4	3	2	1	0	3	2	2	2
17	4	3	1	1	3	3	2	2	0
18	4	3	2.5	1	1	3	3	2	1
19	5	2.625	1.75	0.625	1.25	2.625	2.25	1.75	2.875
Sum	75	51.625	38.25	24.625	27.75	50.625	39.25	42.75	21.375

Sr. No.	ALC_i* $X_{i,.,1}$	ALCi* $X_{i,.,2}$	ALCi* $X_{i,.,3}$	ALCi* $X_{i,.,4}$	ALCi* $X_{i,.,5}$	ALCi* $X_{i,.,6}$	ALCi* $X_{i,.,7}$	ALCi* $X_{i,.,8}$
1	4.5	4.5	3	3	6	4.5	6	1.5
2	7.5	4.5	0	3	7.5	4.5	6	0
3	7.5	6	6	3	9	4.5	6	3
4	9	6	0	0	9	0	6	0
5	12.5	12.5	12.5	10	12.5	7.5	10	12.5
6	10	10	8	6	8	6	10	2
7	12	12	12	8	12	6	8	4
8	12	8	4	8	10	12	12	8
9	12	12	12	12	12	12	12	4
10	15	15	15	12.5	12.5	15	15	7.5
11	6	4	0	4	10	6	8	2
12	12	8	6	6	12	12	12	8
13	12	8	6	8	12	12	12	8
14	12	8	2	4	8	10	6	0
15	12	4	0	4	10	8	8	4
16	12	8	4	0	12	8	8	8
17	12	4	4	12	12	8	8	0
18	12	10	4	4	12	12	8	4
19	13.125	8.75	3.125	6.25	13.125	11.25	8.75	14.375
Sum	205.13	153.25	101.63	113.75	199.63	159.25	169.75	90.875
DALP ı	2.735	2.0433	1.355	1.5167	2.6617	2.1233	2.2633	1.2117

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained *DALP ı*

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

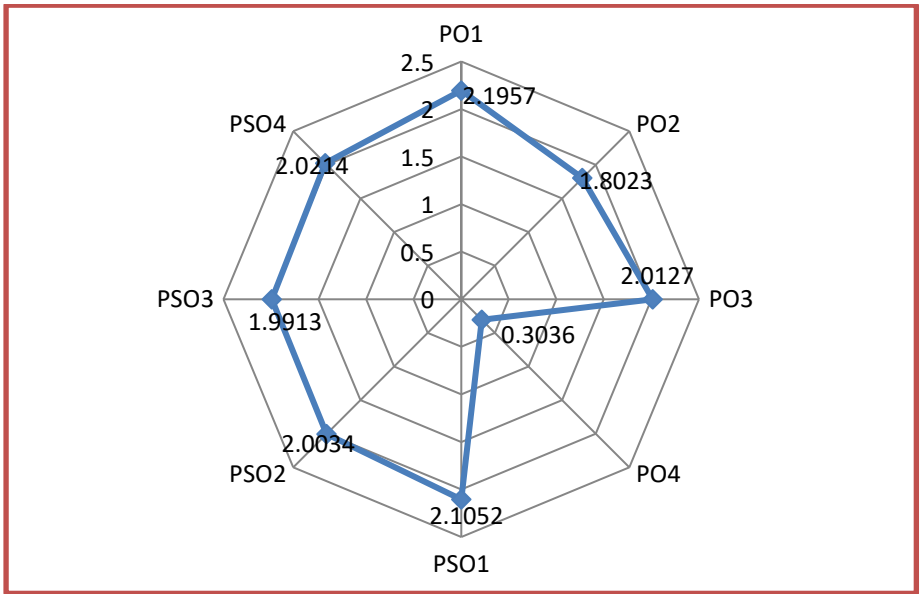
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimum level 4 (very good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	2.735	Excellent	Attained
PO2	2.0433	Very Good	Attained
PO3	1.355	Average	Not Attained
PO4	1.5167	Good	Not Attained
PSO1	2.6617	Excellent	Attained
PSO2	2.1233	Very Good	Attained
PSO3	2.2633	Very Good	Attained
PSO4	1.2117	Average	Not Attained

P_l attainment target level say, 4, indicates that, the department is aiming minimum level-4(very good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-4 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

DEPARTMENT OF MATHEMATICS

Academic Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision

To develop and offer dynamic programmes in the mathematical sciences that will prepare students to enter new fields of specialization.

Mission

To develop the role of Mathematics in general in other fields and in society.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program outcomes (PO's)

Program outcomes (PO's)

After completion of B. Sc. Program Students will be able to,

PO1 : understand the basic concepts, fundamental principles and scientific theories.
PO2 : develop scientific outlook with respect to science subjects.
PO3 : analyze the given scientific data critically and systematically.
PO4 : Acquire in–depth knowledge and integrate with existing knowledge to sensitize the people about global and local environmental issues

Program Specific Outcomes (PSO's)

After successive completion of 3 year degree program in mathematics students should able to :
PSO1.Think in critical manner
PSO2. Understand the basic concept of advance mathematics
PSO3. Develops the program solving
PSO4. Acquire good knowledge and understand in advanced areas in mathematics & statistics, chosen by the students from the course

Step 3: Defining Course Outcomes (CO's) of each course in a Program.

Course outcomes (CO's)

After the completion of the course ,
CO 1: Differential Calculus :

CO1.1 Use the Demovire's theorem and solving different problems .
CO1.2Use of Leibnitz's theorem and solve n th order derivative

CO 2: Calculus :

CO2.1 Students will able to understand differ and fundamental theorem in differentiation & various rule
CO2.2 Introduction of ordinary Differential Equation and also concept of limit ,continuity, differentiation

CO3: Differential Equation :

CO3.1 Understand basic idea of differential equation of first order and first degree .
CO3.2 Concept of different types of partial derivatives are studied

CO 4: Higher Order Differential Equation :

CO4.1 Understand concept of second order linear differential equation
CO 4.2 Understand concept of simultaneous differential equation and total differential equation

CO 5 : CCPM I (Bsc I Practical)

CO5.1By using Leibnitz's theorem to find the nth differention of function
CO5.2 Using Tayler's and Machlauerian series expands given function

CO 6: Real Analysis –I

CO6.1 Understand types of functions and how to identify them
CO6.2 Use mathematical induction to use the various properties and Understand the basic of real analysis

CO 7: Algebra –I

CO7.1 Understand properties of matrices
CO7.2 Solve system of Linear homogeneous equation. And liner non- homogeneous equation

CO 8: Real Analysis –II

CO8.1 Understand the sequence and subsequence
CO8.2 prove the Bolzano –WeiestrassTheorm and derive the Cauchy converges criterion and find convergence of series

CO 9 : Algebra –II

CO9.1 Understand properties of normal subgroup , factor group
CO9.2 Define basic properties of Ring and subring .

CO 10: CCPM 2 (BSc II Practical)

CO10.1 Find the Eigen value, Eigen vectors
CO10.2 Introduction of scilab Programming

CO 11: Mathematics Analysis :

CO11.1The integration of bounded function on a closed and bounded interval
CO11.2Some of the families and properties of Riemann integrable functions and The application of fundamental theorem of integration

CO 12: Abstract algebra

CO12.1 Basic concept og group and ring and Identify the given set with the composition form Ring, integral domain or field
CO12.2 understand the difference between the ring and group and Apply the fundamental theorems, Isomorphisms theorem of group to prove that these theorem of ring

CO 13: Optimization Techniques :

CO13.1provid the students basic knowledge of the operation research model and techniques, which can be apply to a variety of industries and real life application
CO13.2 Identify and select suitable methods for various games .To apply the linear programming and find algebraic solutionto games

CO 14: Integral Transform

CO14.1 understand the concept of laplace transform
CO14.2Aplly the properties of laplace Transform to solve the differential equation

CO 15: Metric Space

CO15.1demostrats the properties of continuous function on matrix space Apply the notion of matix spaces to continuous function on matrix space
CO15.2 understand the basic concept of connectedness , completeness , and compactness of matrix space

CO 16: Linear algebra

CO16.1 understand of vector space , subspace and understand the concept of linear transformation and its application t real life situations
CO16.2 work out algebra of linear transformation

CO 17: Complex analysis

CO17.1 Learn the basic concept of functions of complex variable
CO17.2 learn concept of complex integration and basic result theorem be introduce basic concept of sequence and series of complex variable

CO 18: Discrete Mathematics

CO18.1 use the classical notion of logic , implication ,equivalence ,negation , proof by

contradictions and quantifiers and apply notion in logic in other branches of mathematics
CO18.2knowlementaryalgorithims : searching algorithims ,sorting ,greedy algorithims

CO 19 : CCPM IV ,V ,VI (BSc III Practical)

CO19.1 Linear programming and its Method .
CO19.2 Theory of games, Game with saddle pt and without saddle point.
CO19.3 Laplace Transformation of given function and inverse laplace by using standard result.
CO19.4Using convolution theorem of fourier transform.
CO19.5 Introduction of Python, Expressions and operaters, Python Data Structure
CO19.6 Data Visualization in python – 2D and 3D plot in Python.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrix for a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	3	3	2	2	3	2
CO 1.2	3	3	3	3	1	2	3	2

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO'S	PO'S							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	3	3	2	2	3	2
CO 1.2	3	3	3	3	1	2	3	2
CO 2.1	3	3	3	2	3	3	1	2
CO 2.2	3	3	3	2	2	2	2	2
CO 3.1	3	3	3	3	3	3	2	3
CO 3.2	3	3	2	2	1	3	3	3
CO 4.1	3	2	3	2	2	2	1	2
CO 4.2	2	2	1	2	2	1	2	2
CO 5.1	3	3	2	3	2	1	1	0
CO 5.2	3	3	3	3	2	3	2	1
CO 6.1	3	3	3	3	2	3	3	2
CO 6.2	2	2	2	1	2	3	3	2
CO 7.1	3	2	3	2	1	2	3	1
CO 7.2	2	2	2	1	2	3	1	1
CO 8.1	3	2	3	2	2	3	2	1
CO 8.2	3	3	2	2	1	3	2	1
CO 9.1	2	1	2	2	2	1	3	2
CO 9.2	2	1	2	0	1	2	1	2
CO 10.1	1	2	2	2	1	2	1	2

CO 10.2	3	2	3	2	2	3	1	2
CO 11.1	3	3	2	3	1	2	1	2
CO 11.2	3	2	3	2	2	3	2	2
CO 12.1	2	2	3	3	2	2	1	2
CO 12.2	3	2	3	2	1	2	1	2
CO 13.1	2	3	3	2	2	1	2	2
CO 13.2	3	3	3	2	2	1	1	0
CO 14.1	3	2	3	2	2	3	3	2
CO 14.2	2	3	2	2	1	1	1	2
CO 15.1	3	3	3	2	2	3	2	1
CO 15.2	2	2	1	2	2	1	1	2
CO 16.1	3	2	2	2	3	2	1	2
CO 16.2	2	3	2	0	1	1	1	1
CO 17.1	3	3	2	2	2	3	1	2
CO 17.2	3	3	2	2	2	1	2	1
CO 18.1	3	2	2	2	1	1	2	1
CO 18.2	2	2	1	2	1	2	1	1
CO 19.1	3	2	3	2	1	2	1	1
CO 19.2	3	2	1	2	1	1	2	1
CO19.3	3	2	3	2	1	1	2	1
CO19.4	3	2	2	2	2	1	2	1
CO 19.5	3	2	2	3	2	1	2	2
CO 19.6	3	2	2	2	1	2	2	1

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	3	2	3	3	2	2	3	2
CO 1.2	3	3	3	3	1	2	3	2
Average ($X_{1,.,l}$)	3	2.5	3	3	1.5	2	3	2

Similarly, the overall level of relation of all the courses in the program is established. These levels are reported in the matrix form and this matrix is called as the program articulation matrix. For example, if the program XYZ has 19 courses then the program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	3	2.5	3	3	1.5	2	3	2
C_2	Course_2	3	3	3	2	2.5	2.5	1.5	2
C_3	Course_3	3	3	2.5	2.5	2	3	2.5	3
C_4	Course_4	2.5	2	2	2	2	1.5	1.5	2
C_5	Course_5	3	3	2.5	3	2	2	1.5	0.5
C_6	Course_6	2.5	2.5	2.5	2	2	3	3	2
C_7	Course_7	2.5	2	2.5	1.5	1.5	2.5	2	1
C_8	Course_8	3	2.5	2.5	2	1.5	3	2	1
C_9	Course_9	2	1	2	1	1.5	1.5	2	2
C_{10}	Course_10	2	2	2.5	2	1.5	2.5	1	2
C_{11}	Course_11	3	2.5	2.5	2.5	1.5	2.5	1.5	2
C_{12}	Course_12	2.5	2	3	2.5	1.5	2	1	2
C_{13}	Course_13	2.5	3	3	2	2	1	1.5	1
C_{14}	Course_14	2.5	2.5	2.5	2	1.5	2	2	2
C_{15}	Course_15	2.5	2.5	2	2	2	2	1.5	1.5
C_{16}	Course_16	2.5	2.5	2	1	2	1.5	1	1.5
C_{17}	Course_17	3	3	2	2	2	2	1.5	1.5
C_{18}	Course_18	2.5	2	1.5	2	1	1.5	1.5	1
C_{19}	Course_19	3	2	2.1667	2.1667	1.3333	1.3333	1.8333	1.1667

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

Details of a program:

- Name of the Program: XYZ
- Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
- Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

  Let $n = n_1 + n_2$, total number of PO's and PSO's.
- For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m.$ and k represents the number of outcomes particularly that of course.

Course articulation matrices and program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$ Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 80% weightage to external assessment and 20% weightage to internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

For example, the CO attainment level of course – 12 based on the performance of 20 students in the internal and external exam is shown in the following table.

Roll No.	Marks in internal exam (Out of 10)	Marks in external exam (Out of 40)
1	10	34
2	10	34
3	10	30
4	10	27
5	10	18
Mean	10	28.6
ALC_I and ALC_E	5	4
ALC_{14}	**0.2*5 + 0.8*4 = 4.2**	

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	3	Good	Not Attained
C_2	Course_2	3	Good	Not Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	3	Good	Not Attained
C_5	Course_5	4	Very Good	Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	4	Very Good	Attained
C_8	Course_8	5	Excellent	Attained
C_9	Course_9	5	Excellent	Attained
C_{10}	Course_10	5	Excellent	Attained
C_{11}	Course_11	3.4	Very Good	Attained
C_{12}	Course_12	4.2	Excellent	Attained
C_{13}	Course_13	4.2	Excellent	Attained
C_{14}	Course_14	3.4	Very Good	Attained
C_{15}	Course_15	4.2	Excellent	Attained
C_{16}	Course_16	5	Excellent	Attained
C_{17}	Course_17	4.2	Excellent	Attained
C_{18}	Course_18	5	Excellent	Attained
C_{19}	Course_19	5	Excellent	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	3	9
C_2	Course_2	3	3	9
C_3	Course_3	3	3	9
C_4	Course_4	3	2.5	7.5
C_5	Course_5	4	3	12
C_6	Course_6	4	2.5	10
C_7	Course_7	4	2.5	10

C_8	Course_8	5	3	15
C_9	Course_9	5	2	10
C_{10}	Course_10	5	2	10
C_{11}	Course_11	3.4	3	10.2
C_{12}	Course_12	4.2	2.5	10.5
C_{13}	Course_13	4.2	2.5	10.5
C_{14}	Course_14	3.4	2.5	8.5
C_{15}	Course_15	4.2	2.5	10.5
C_{16}	Course_16	5	2.5	12.5
C_{17}	Course_17	4.2	3	12.6
C_{18}	Course_18	5	2.5	12.5
C_{19}	Course_19	5	3	15
Sum		77.6		204.3
			$DALP_1$ = 204.3/77.6	2.6327

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	3	2.5	3	3	1.5	2	3	2
2	3	3	3	3	2	2.5	2.5	1.5	2
3	3	3	3	2.5	2.5	2	3	2.5	3
4	3	2.5	2	2	2	2	1.5	1.5	2
5	4	3	3	2.5	3	2	2	1.5	0.5
6	4	2.5	2.5	2.5	2	2	3	3	2
7	4	2.5	2	2.5	1.5	1.5	2.5	2	1
8	5	3	2.5	2.5	2	1.5	3	2	1
9	5	2	1	2	1	1.5	1.5	2	2
10	5	2	2	2.5	2	1.5	2.5	1	2
11	3.4	3	2.5	2.5	2.5	1.5	2.5	1.5	2
12	4.2	2.5	2	3	2.5	1.5	2	1	2
13	4.2	2.5	3	3	2	2	1	1.5	1
14	3.4	2.5	2.5	2.5	2	1.5	2	2	2
15	4.2	2.5	2.5	2	2	2	2	1.5	1.5
16	5	2.5	2.5	2	1	2	1.5	1	1.5
17	4.2	3	3	2	2	2	2	1.5	1.5
18	5	2.5	2	1.5	2	1	1.5	1.5	1
19	5	3	2	2.1667	2.1667	1.3333	1.3333	1.8333	1.1667
Sum	77.6	50.5	45.5	45.667	39.167	32.833	39.333	33.333	31.167

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	9	7.5	9	9	4.5	6	9	6
2	9	9	9	6	7.5	7.5	4.5	6
3	9	9	7.5	7.5	6	9	7.5	9
4	7.5	6	6	6	6	4.5	4.5	6
5	12	12	10	12	8	8	6	2
6	10	10	10	8	8	12	12	8
7	10	8	10	6	6	10	8	4
8	15	12.5	12.5	10	7.5	15	10	5
9	10	5	10	5	7.5	7.5	10	10
10	10	10	12.5	10	7.5	12.5	5	10
11	10.2	8.5	8.5	8.5	5.1	8.5	5.1	6.8
12	10.5	8.4	12.6	10.5	6.3	8.4	4.2	8.4
13	10.5	12.6	12.6	8.4	8.4	4.2	6.3	4.2
14	8.5	8.5	8.5	6.8	5.1	6.8	6.8	6.8
15	10.5	10.5	8.4	8.4	8.4	8.4	6.3	6.3
16	12.5	12.5	10	5	10	7.5	5	7.5
17	12.6	12.6	8.4	8.4	8.4	8.4	6.3	6.3
18	12.5	10	7.5	10	5	7.5	7.5	5
19	15	10	10.833	10.833	6.6667	6.6667	9.1667	5.8333
Sum	204.3	182.6	183.83	156.33	131.87	158.37	133.17	123.13
DALP ı	2.6327	2.3531	2.369	2.0146	1.6993	2.0408	1.7161	1.5868

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained *DALP ı*

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

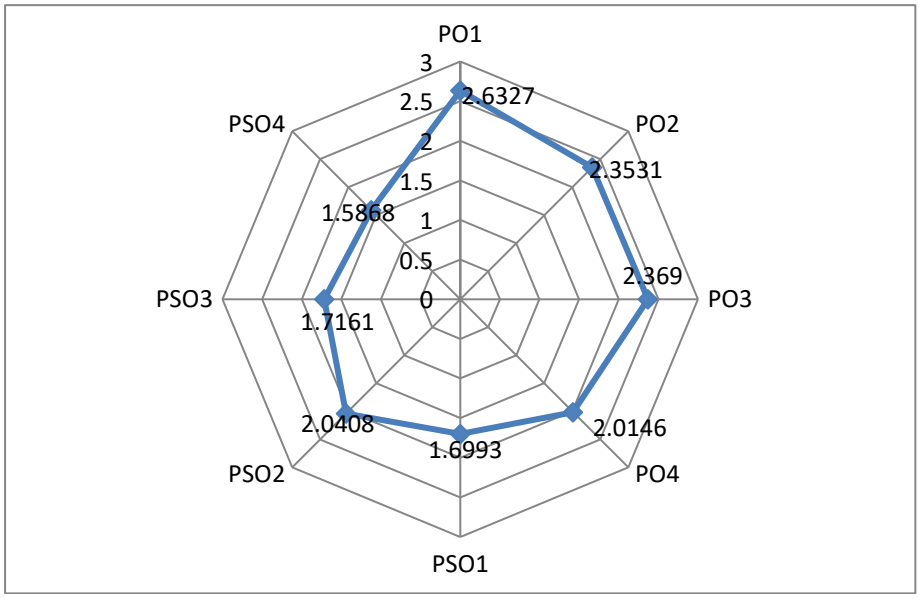
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimum level 4 (very good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	*DALP* $_l$	Level	Status
PO1	2.6327	Excellent	Attained
PO2	2.3531	Very Good	Attained
PO3	2.369	Very Good	Attained
PO4	2.0146	Very good	Attained
PSO1	1.6993	Good	Not Attained
PSO2	2.0408	Very Good	Attained
PSO3	1.7161	Good	Not Attained
PSO4	1.5868	Good	Not Attained

P_l attainment target level say, 4, indicates that, the department is aiming minimum level-4(very good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed bydesigning the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-4 are addressed by planning remedial measures for the corresponding courses with respect tothan P_l.

ShikshanPrasarak Sanstha`s
Padmabhushan Vasantraodada Patil Mahavidyalaya, Kavathe Mahankal

DEPARTMENT OF STATISTICS
2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of the Department.

Vision

1. To strengthen the teaching of statistics and applications of statistics.
2. To occupy a significant place in the field of statistical education by offering distinguished effective and on-going opportunities to the students.
3. To popularize the Department as center for excellence in Statistics.

Mission

1. To produce potential graduates having sound knowledge of major statistical tools.
2. To develop the techniques that can be applied in various domains of research areas like biological sciences, mathematical sciences, management sciences and data sciences.
3. Better understanding of this interdisciplinary subject will result into fruitful outcomes for the betterment of science and society.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

Program outcomes (PO's)

After completion of **B. Sc**. Program Students will be able to,

PO1: understand the basic concepts, fundamental principles and scientific theories.

PO2: develop scientific outlook with respect to science subjects.

PO3: analyze the given scientific data critically and systematically.

PO4: Acquire in–depth knowledge and integrate with existing knowledge to sensitize the people about global and local environmental issues.

Program Specific Outcomes (PSO's)

After completion of graduation in **B. Sc. Statistics** students will be able to,

PSO1: formulate a real life problem as a scientific problem.

PSO2: develop stochastic models for studying real life phenomenon in diverse disciplines.

PSO3: design and conduct experiments, analyze and interpret the result to investigate the real problems.

PSO4: effectively solve the specific task using computer software's like EXCEL and R.

Step 3: Defining Course Outcomes (CO's) of each course in a Program.

Course outcomes (CO's)

Course 1: Descriptive Statistics I

At the end of this course students will be able to,

CO1.1: Know meaning and scope of statistics in various fields and to know various types of data.

CO1.2: Evaluate summary measures, to know concept of attribute, independence and association.

Course 2: Elementary Probability Theory

At the end of this course students will be able to,

CO2.1: Explain random and non random experiments and compute probabilities of various events.

CO2.2: Explain concept of independence, conditional probabilities and apply Baye's theorem.

Course 3: Descriptive Statistics II

At the end of this course students will be able to,

CO3.1: Compute index numbers by various methods.

CO3.2: Know the concept of correlation and regression and it's applications.

Course 4: Discrete Probability Distributions

At the end of this course students will be able to,

CO4.1: Know probability models for discrete random variables, concept of Skewness and kurtosis.

CO4.2: Know some standard discrete probability distributions, the concept of Bivariate distributions.

Course 5: Practical I

At the end of this course students will be able to,

CO5.1: Represent statistical data diagrammatically and graphically.

CO5.2: Compute measures of central tendency, dispersion, correlation and regression coefficients.

CO5.3: Explain the concept of consistency, association and independence of attributes and compute index numbers.

CO5.4: Know applications of some standard discrete probability distributions.

Course 6: Probability Distributions – I

At the end of this course students will be able to,

CO6.1: Understand the concept of discrete and continuous distributions and evaluate probabilities.

CO6.2: Derive the probability distributions of transformed univariate and bivariate continuous r.v's

Course 7: Statistical Methods I

At the end of this course students will be able to,

CO7.1: Fit multiple linear regression and to compute multiple and partial correlation coefficients.

CO7.2: Know the concept of sampling, vital statistics, mortality, fertility and growth rates.

Course 8: Probability Distributions – II

At the end of this course students will be able to,

CO8.1: Know various continuous probability distributions and to evaluate the various measures.

CO8.2: Understand Chi-square, t and F distributions and inter relations among them.

Course 9: Statistical Methods II

At the end of this course students will be able to,

CO9.1: know the concept of time series, SQC and to construct varies control charts.

CO9.2: Understand the basic terms in testing of hypothesis and apply the large and small sample tests.

Course 10: Practical II& Practical III

At the end of this course students will be able to,

CO10.1: Compute probabilities of standard probability distributions, expected frequencies and test for goodness of fit also to draw random samples by various sampling methods

CO10.2: Fit plane of regression and to compute multiple and partial correlation coefficients.

CO10.3: Construct various control charts and to decide the state of production process.

CO10.4: Apply the large and small sample tests in various hypothesis testing problem.

Course 11: Probability Distributions

At the end of this course students will be able to,

CO11.1: Understand Laplace, Cauchy, Lognormal, Weibull, Logistic, Pareto and Power Series distributions with their applications and inter relations.

CO11.2: Know Multinomial distribution, Bivariate Normal distribution and Truncated Distributions.

Course 12: Statistical Inference I

At the end of this course students will be able to,

CO12.1: Understand the basic concepts in statistical inference and important properties of estimator.

CO12.2: Obtain estimate of the parameters using MLE and know the inference of parameters of standard discrete and continuous distributions.

Course 13: Design of Experiments

At the end of this course students will be able to,

CO13.1: Know the basic concepts and principles in design of experiments and to know ANOVA table.

CO13.2: Design and analyze CRD, RBD and LSD also the factorial experiments with confounding.

Course 14: R Programming and Quality Management At

the end of this course students will be able to,

CO14.1: Acquire the knowledge of identifiers, operators, conditional statements, loops used in R, write simple programs to compute various statistical measures.

CO14.2: Acquire the knowledge of quality tools and to know the concept of process and product control used in Quality management.

Course 15: Probability Theory and Applications

At the end of this course students will be able to,

CO15.1: Know the Chebychev's inequality and to understand the concept of order statistics and its applications.

CO15.2: Know the various modes of convergence of sequence of random variables and the concept of reliability also to compute reliability of various systems.

Course 16: Statistical Inference II

At the end of this course students will be able to,

CO16.1: Obtain and interpret interval estimates of population parameters.

CO16.2: Differentiate between parametric and nonparametric tests, to develop parametric and non parametric tests for various hypothesis testing problems.

Course 17: Sampling Theory

At the end of this course students will be able to,

CO17.1: Select and implement appropriate probabilistic sampling scheme and to estimate desired population parameters based on SRS, Stratified Sampling, Systematic sampling and Cluster Sampling.

CO17.2: Compare various sampling techniques and utilize auxiliary information in survey by means of Ratio and Regression method of estimation.

Course 18: Operations Research

At the end of this course students will be able to,

CO18.1: Formulate a problem as a LPP and to obtain its solution of LPP by different methods.

CO18.2: Obtain the solution of transportation, assignment and sequencing problems, to apply the simulation techniques.

Course 19: Practical IV, V, VI & VII

At the end of this course students will be able to,

CO19.1: Compute probabilities of standard probability distributions, test for goodness of fit and to draw random samples by various sampling methods.

CO19.2: Determine the parameters and probabilities for multinomial and bivariate normal distribution.

CO19.3: Estimate the various parameters by point and interval estimation method.

CO19.4: Test various hypothesis by using parametric and non-parametric tests based on observed data.

CO19.5: Analyze the CRD, RBD, LSD also factorial and confounded designs.

CO19.6: Determine sample size in SRS for variables and attributes and to obtain the estimators of population parameters.

CO19.7: Develop R code for specific task, formulate LPP and obtain the solution by different methods.

CO19.8: Construct the control charts and study the state of production process.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose Program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	3	0	3	2	1	1
CO 1.2	3	2	3	0	3	2	1	1

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	3	0	3	2	1	1
CO 1.2	3	2	3	0	3	2	1	1
CO 2.1	2	2	1	0	2	2	2	1
CO 2.2	2	2	2	0	2	2	2	1
CO 3.1	2	1	3	0	2	1	2	1
CO 3.2	2	1	3	2	3	3	2	1
CO 4.1	2	2	1	0	3	3	2	1
CO 4.2	2	2	1	0	3	3	2	1
CO 5.1	2	1	2	0	1	0	2	1
CO 5.2	2	1	3	0	1	1	2	1
CO 5.3	3	2	3	0	1	2	2	1
CO 5.4	3	2	2	0	2	2	2	1
CO 6.1	2	2	1	0	3	3	2	2
CO 6.2	2	2	1	0	1	2	2	2
CO 7.1	2	2	2	1	1	2	2	2
CO 7.2	2	2	2	0	2	2	2	2
CO 8.1	2	2	1	0	3	3	2	2
CO 8.2	2	2	1	0	1	2	2	2
CO 9.1	2	2	3	1	2	3	2	2
CO 9.2	2	1	2	0	2	2	2	2
CO 10.1	3	2	3	0	3	2	3	2
CO 10.2	3	3	3	0	3	2	2	2
CO 10.3	3	2	3	0	2	2	2	2
CO 10.4	3	2	3	0	1	2	2	2
CO 11.1	3	1	1	1	2	2	1	2
CO 11.2	3	1	1	1	2	2	1	3
CO 12.1	2	2	1	0	1	1	2	2

CO 12.2	2	2	2	0	2	2	2	3
CO 13.1	2	2	3	1	3	3	3	2
CO 13.2	2	2	3	1	3	3	3	2
CO 14.1	2	2	2	0	1	2	2	3
CO 14.2	2	2	2	1	2	2	2	3
CO 15.1	2	1	1	1	2	2	2	2
CO 15.2	2	1	2	1	2	2	2	2
CO 16.1	2	2	2	0	1	1	2	3
CO 16.2	3	1	2	0	2	2	2	3
CO 17.1	2	2	2	0	3	2	2	2
CO 17.2	2	2	2	0	3	2	2	2
CO 18.1	2	2	2	1	3	1	2	3
CO 18.2	2	2	2	0	3	2	3	3
CO 19.1	2	2	3	0	2	2	2	3
CO 19.2	2	2	3	0	2	2	2	3
CO 19.3	2	2	1	0	1	1	2	3
CO 19.4	2	2	1	0	1	1	2	3
CO 19.5	2	2	3	1	2	2	3	3
CO 19.6	2	2	3	1	2	2	3	3
CO 19.7	2	2	2	0	2	1	1	3
CO 19.8	2	2	2	0	2	1	1	3

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program ArticulationMatrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	2	3	0	3	2	1	1
CO 1.2	3	2	3	0	3	2	1	1
Average ($X_{1,.,l}$)	**2.5**	**2**	**3**	**0**	**3**	**2**	**1**	**1**

Similarly, the overall level of relation of all the courses in the Program is established. These levels are reported in the matrix form and this matrix is called as the Program articulation matrix. For example, if the Program XYZ has 19 courses then the Program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,,8}$
C_1	Course_1	2.5	2	3	0	3	2	1	1
C_2	Course_2	2	2	1.5	0	2	2	2	1
C_3	Course_3	2	1	3	1	2.5	2	2	1
C_4	Course_4	2	2	1	0	3	3	2	1
C_5	Course_5	2.5	1.5	2.5	0	1.25	1.25	2	1
C_6	Course_6	2	2	1	0	2	2.5	2	2
C_7	Course_7	2	2	2	0.5	1.5	2	2	2
C_8	Course_8	2	2	1	0	2	2.5	2	2
C_9	Course_9	2	1.5	2.5	0.5	2	2.5	2	2
C_{10}	Course_10	3	2.25	3	0	2.25	2	2.25	2
C_{11}	Course_11	3	1	1	1	2	2	1	2.5
C_{12}	Course_12	2	2	1.5	0	1.5	1.5	2	2.5
C_{13}	Course_13	2	2	3	1	3	3	3	2
C_{14}	Course_14	2	2	2	0.5	1.5	2	2	3
C_{15}	Course_15	2	1	1.5	1	2	2	2	2
C_{16}	Course_16	2.5	1.5	2	0	1.5	1.5	2	3
C_{17}	Course_17	2	2	2	0	3	2	2	2
C_{18}	Course_18	2	2	2	0.5	3	1.5	2.5	3
C_{19}	Course_19	2	2	2.25	0.25	1.75	1.5	2	3

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

Details of a Program:

- Name of the Program: XYZ
- Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
- Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

  Let $n = n_1 + n_2$, total number of PO's and PSO's.
- For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$
- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m$. and k represents the number of outcomes particularly that of course.

Course articulation matrices and Program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i,\,.\,,\,.} = \frac{\sum_{j=1}^{k} X_{i,j,l}}{k}$, Here k be the number of outcomes in the average course taken.

- **Attainment of COs:**

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 80% weightage to external assessment and 20% weightage to internal assessment.

$$ALC = 0.2 * ALC_I + 0.8 * ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$, Level

2: Average – if $1 < ALC_i \leq 2$,Level 3:

Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$.

For every course, we have set Very Good – Attained as target level that is we are aiming minimum level 4 (very good) and how the course status is attained in the performance of abilities of students.

For example, the CO attainment level of course – 14 based on the performance of 20 students in the internal and external exam is shown in the following table.

Roll No.	Marks in internal exam (Out of 10)	Marks in external exam (Out of 40)
1	8	34
2	10	32
3	9	26
4	10	29
5	10	29
6	10	32
7	10	32
8	10	38
9	10	32
10	10	37
11	9	29
12	10	34
13	10	32
14	10	37
15	10	38
16	9	29
17	10	30
18	10	37
19	9	35
20	9	37
Mean	9.65	32.95
ALC_I and ALC_E	5	5
ALC_{14}	**0.2*5 + 0.8*5 = 5**	

At the end we will have attainment levels of all the courses,

ID	Course name	ALC_i	Level	Status
C_1	Course_1	4	Very Good	Attained
C_2	Course_2	4	Very Good	Attained
C_3	Course_3	3	Good	Not Attained
C_4	Course_4	3	Good	Not Attained
C_5	Course_5	5	Excellent	Attained
C_6	Course_6	4	Very Good	Attained
C_7	Course_7	5	Excellent	Attained
C_8	Course_8	5	Excellent	Attained
C_9	Course_9	5	Excellent	Attained
C_{10}	Course_10	5	Excellent	Attained
C_{11}	Course_11	4.2	Excellent	Attained
C_{12}	Course_12	3.4	Very Good	Attained
C_{13}	Course_13	4.2	Excellent	Attained
C_{14}	Course_14	5	Excellent	Attained
C_{15}	Course_15	5	Excellent	Attained
C_{16}	Course_16	4.2	Excellent	Attained
C_{17}	Course_17	3.4	Very Good	Attained
C_{18}	Course_18	5	Excellent	Attained
C_{19}	Course_19	5	Excellent	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level ofeach PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	4	2.5	10
C_2	Course_2	4	2	8
C_3	Course_3	3	**2**	6
C_4	Course_4	3	2	6
C_5	Course_5	5	2.5	12.5
C_6	Course_6	4	2	8
C_7	Course_7	5	2	10
C_8	Course_8	5	2	10
C_9	Course_9	5	2	10

C_{10}	Course_10	5	3	15
C_{11}	Course_11	4.2	3	12.6
C_{12}	Course_12	3.4	2	6.8
C_{13}	Course_13	4.2	2	8.4
C_{14}	Course_14	5	2	10
C_{15}	Course_15	5	2	10
C_{16}	Course_16	4.2	2.5	10.5
C_{17}	Course_17	3.4	2	6.8
C_{18}	Course_18	5	2	10
C_{19}	Course_19	5	2	10
	Sum	82.4		180.6
			$DALP_1$ = 180.6/82.4	2.1917

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	4	2.5	2	3	0	3	2	1	1
2	4	2	2	1.5	0	2	2	2	1
3	3	**2**	**1**	**3**	**1**	**2.5**	**2**	**2**	**1**
4	3	2	2	1	0	3	3	2	1
5	5	2.5	1.5	2.5	0	1.25	1.25	2	1
6	4	2	2	1	0	2	2.5	2	2
7	5	2	2	2	0.5	1.5	2	2	2
8	5	2	2	1	0	2	2.5	2	2
9	5	2	1.5	2.5	0.5	2	2.5	2	2
10	5	3	2.25	3	0	2.25	2	2.25	2
11	4.2	3	1	1	1	2	2	1	2.5
12	3.4	2	2	1.5	0	1.5	1.5	2	2.5
13	4.2	2	2	3	1	3	3	3	2
14	5	2	2	2	0.5	1.5	2	2	3
15	5	2	1	1.5	1	2	2	2	2
16	4.2	2.5	1.5	2	0	1.5	1.5	2	3
17	3.4	2	2	2	0	3	2	2	2
18	5	2	2	2	0.5	3	1.5	2.5	3
19	5	2	2	2.25	0.25	1.75	1.5	2	3
Sum	82.4	41.5	33.75	37.75	6.25	40.75	38.75	37.75	38

Sr. No.	$ALC_i * X_{i,.,1}$	$ALCi * X_{i,.,2}$	$ALCi * X_{i,.,3}$	$ALCi * X_{i,.,4}$	$ALCi * X_{i,.,5}$	$ALCi * X_{i,.,6}$	$ALCi * X_{i,.,7}$	$ALCi * X_{i,.,8}$
1	10	8	12	0	12	8	4	4
2	8	8	6	0	8	8	8	4
3	6	3	9	3	7.5	6	6	3
4	6	6	3	0	9	9	6	3
5	12.5	7.5	12.5	0	6.25	6.25	10	5
6	8	8	4	0	8	10	8	8
7	10	10	10	2.5	7.5	10	10	10
8	10	10	5	0	10	12.5	10	10
9	10	7.5	12.5	2.5	10	12.5	10	10
10	15	11.25	15	0	11.25	10	11.25	10
11	12.6	4.2	4.2	4.2	8.4	8.4	4.2	10.5
12	6.8	6.8	5.1	0	5.1	5.1	6.8	8.5
13	8.4	8.4	12.6	4.2	12.6	12.6	12.6	8.4
14	10	10	10	2.5	7.5	10	10	15
15	10	5	7.5	5	10	10	10	10
16	10.5	6.3	8.4	0	6.3	6.3	8.4	12.6
17	6.8	6.8	6.8	0	10.2	6.8	6.8	6.8
18	10	10	10	2.5	15	7.5	12.5	15
19	10	10	11.25	1.25	8.75	7.5	10	15
Sum	180.6	146.75	164.85	27.65	173.35	166.45	164.55	168.8
DALP ı	2.1917	1.7809	2.0006	0.3356	2.1038	2.02	1.997	2.0485

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained *DALP ı*

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$, Level

4: Very Good – if $2 < ALC_i \leq 2.5$,Level 5:

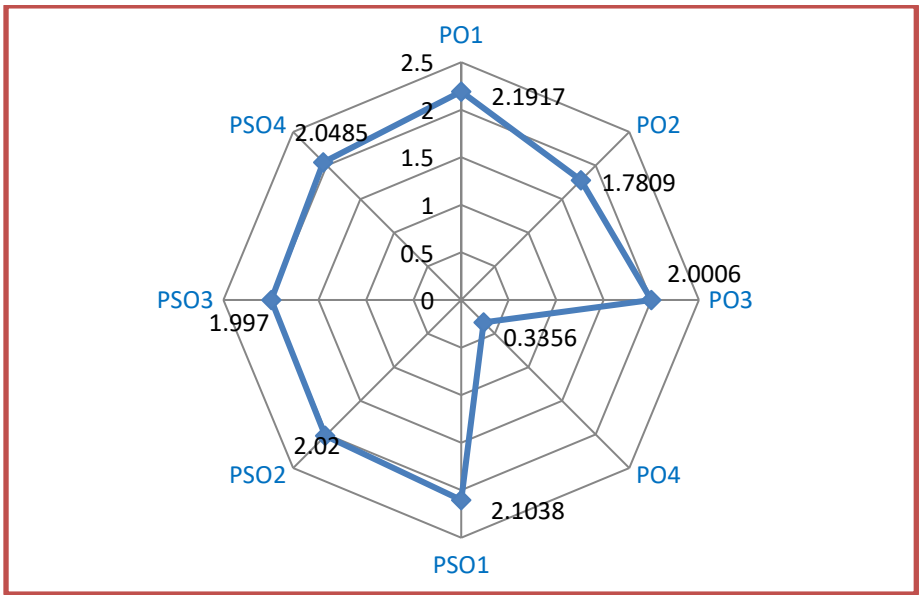
Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 4 as target level that is we are aiming minimum level 4 (very good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	$DALP_l$	Level	Status
PO1	2.1917	Very Good	Attained
PO2	1.7809	Good	Not Attained
PO3	2.0006	Very Good	Attained
PO4	0.3356	Poor	Not Attained
PSO1	2.1038	Very Good	Attained
PSO2	2.02	Very Good	Attained
PSO3	1.997	Good	Not Attained
PSO4	2.0485	Very Good	Attained

P_l attainment target level say, 4, indicates that, the department is aiming minimum level-4 (very good) in the performance of abilities of students.



Step 9: Planned actions:

Remedial Actions:

Planned actions for course attainment: Courses having course level less than level-4 are addressed by designing the different remedial measures like assignment/tutorials/remedial teaching.

Planned actions for program outcome attainment: PO's and PSO's with level attainment less than level-4 are addressed by planning remedial measures for the corresponding courses with respect to P_l.

Shikshan Prasarak Sanstha's

Padmabhushan Vasantraodada Patil Mahavidyalaya, Kavathe-*Mahankal.*

Department of Commerce
Program and Course Outcomes
Bachelor of Commerce – B.Com
Year 2021-22

Mechanism for framing Learning Outcomes and Measuring their Attainment

Step 1: Defining the Vision and Mission of commerce the Department.

Vision

1. To strengthen the teaching of commerce and applications of commerce
2. To occupy a significant place in the field of commerce by offering distinguishedeffective and on-going opportunities to the students.
3. To popularize the Department as center for excellence in Commerce.

Mission

1. To produce potential graduates having sound knowledge of major various concepts of Commerce.
2. To develop the entrepreneurship techniques that can be applied in various domains of research areas.
3. Promoting a culture of ethical behavior, social responsibility, and lifelong learning.
4. Better understanding of this interdisciplinary subject will result into fruitful outcomes for the betterment of science and society.

Step 2: Defining Program Outcomes (PO's) and Program Specific Outcomes (PSO's) of the program.

PO 1 Students can synthesize values through the three year degree program of Bachelor of Commerce which helps build character that is unique to a commerce graduate and contributes a lifelong way of thinking that influences their holistic development.

PO 2 After completing a three-year Bachelor of Commerce (B.Com.) course; Students will be able to apply comprehensive knowledge, understanding and ability to analyse financial data, interpret economic trends to make informed decisions

PO 3 The students will develop application skills in the domain of Accountancy, Management, Auditing, Taxation, Economics, Commerce, Costing, Marketing And Finance.

PO 4 This program improves logical thinking, statistical and accounting skills. Competing globally requires communication skills, confidence and practical awareness Employability in the corporate world and development into a resourceful and responsible citizen India.

Program Specific Outcomes (PSO's)

After completion of **B. Com** Programme Students will be able to,

PSO1: Maintaining books of accounts and small medium scale industrial units

PSO2: Students will learn relevant managerial accounting career skill applying both quantity and quantitative knowledge to their future careers in business.

PSO3: Aware the knowledge about basic concept corporate accounting

PSO4: Builds abilities become successful entrepreneurs prepare a business plan set up and own venture.

Step 3: Defining Course Outcomes (CO's) of each course in a Program.

Course outcomes (CO's)

Course: 1 Management Principles and Application -Paper-I

CO01: To get an idea about motivation concept and theories

CO02: To develop their leadership skill, coordination and control, green management

Course2: ***Management Principles and Application -Paper-II***

After completing this course, students will be able:

CO 01 To provide basic knowledge of concepts and principles of marketing.

CO 02 The students will be aware with four basic elements of marketing i.e.4Ps in detail and he will be armed with various Skills about branding, labeling and advertisement.

Course3: Industrial Management Paper – I

CO01 Understanding the concept Industrial Management, Work Environment

CO02 Acquaintance with the Plant Maintenance, Financial Management

Course4: Industrial Management Paper – II

CO01 Knowledge about the Human Resource Management.

CO02 Acquaintance with the Employee Training and Recent Trends in HRM

Course5: Industrial Management Paper-III

CO01 Understanding the Meaning concept of Production Management and PPC, Inventory Management

CO02 Acquaintance with the Productivity, Logistic Management

Course6 Industrial Management Paper-IV

CO01 Knowing the meaning and concept about the Employee Remuneration.

CO02 Acquaintance with the Industrial Relations, Employee Safety, Health and Moral, HR accounting.

Step 4: Defining relation between Course Outcomes (COs) and POs/PSOs for each course to obtain overall CO mapping with each POs/PSOs. (Course Articulation Matrix)

In this step, CO's of each course are mapped with PO's & PSO's. A correlation is established between CO's and PO's / PSO's in the scale of 0 to 3. 0 if there is no correlation between CO's and PO's / PSO's, 1 being low, 2 being median and 3 being high.

For example, suppose Program XYZ (say) has 4 PO's & 4 PSO's. Then, course articulation matrixfor a course – 1 (say) with two CO's is as follows.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	0	1	1	2	0	1	1
CO 1.2	3	1	0	1	3	1	0	0

In the same way we have course articulation matrices for all courses in that Program.

CO's – PO's & PSO's mapping matrix (1-low, 2-medium, 3-high, 0-No correlation)

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	0	1	1	2	0	1	1
CO 1.2	3	1	0	1	3	1	0	0
CO 2.1	2	2	1	2	0	0	3	1
CO 2.2	1	2	1	0	1	0	3	2
CO 3.1	2	3	3	2	0	0	2	1
CO 3.2	3	2	2	2	1	2	3	3
CO 4.1	2	2	1	0	2	2	1	1
CO 4.2	1	1	2	0	1	1	1	3
CO 5.1	2	3	3	0	2	0	0	1
CO 5.2	0	2	3	3	3	2	1	0
CO 6.1	1	1	3	3	2	1	3	2
CO 6.2	3	0	2	1	3	2	0	2

Step 5: Development of overall CO's-PO's mapping matrix for all courses (Program Articulation Matrix).

The CO levels corresponding to each PO/PSO in course articulation matrix are averaged to obtain overall level of relation of course with each PO & PSO. For example, the overall relation of course – 1 (say) are reported the following matrix.

CO's	PO's / PSO's							
	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO 1.1	2	0	1	1	2	0	1	1
CO 1.2	3	1	0	1	3	1	0	0
Average ($X_{1,.,l}$)	2.5	0.5	0.5	1	2.5	0.5	0.5	0.5

Similarly, the overall level of relation of all the courses in the Program is established. These levels are reported in the matrix form and this matrix is called as the Program articulation matrix. For example, if the Program XYZ has 19 courses then the Program articulation matrix will be as follows.

Program Articulation Matrix

ID	Course name	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
C_1	Course_1	2.5	0.5	0.5	1	2.5	0.5	0.5	0.5
C_2	Course_2	1.5	2	1	1	0.5	0	3	1.5
C_3	Course_3	2.5	2.5	2.5	2	0.5	1	2.5	2
C_4	Course_4	1.5	1.5	1.5	0	1.5	1.5	1	2
C_5	Course_5	1	2.5	3	1.5	2.5	1	0.5	0.5
C_6	Course_6	2	0.5	2.5	2	2.5	1.5	1.5	2

Step 6: Methodology for measuring of Course Outcomes (CO's), Program Specific Outcomes (PSO's) and Program Outcomes (PO's) and setting up the target level.

In this step, methodology for measuring the attainment level of learning outcomes is defined and the target levels for the batch are defined.

- **Methodology for the attainment of learning outcomes for this year:**

  Details of a Program:

  - Name of the Program: XYZ
  - Program has n_1 PO's, say, $PO_1, PO_2, \dots, PO_{n1}$
  - Program has n_2 PSO's, say, $PSO_1, PSO_2, \dots, PSO_{n2}$

    Let $n = n_1 + n_2$, total number of PO's and PSO's.

  - For convenience, let us denote the PO's & PSO's $PO_1, PO_2, \dots, PO_{n1}, PSO_1, PSO_2, \dots, PSO_{n2}$ by $P_1, P_2, \dots, P_n$

- Program has m courses, say, $C_1, C_2, \dots, C_m$
- Each course C_i has k course outcomes (CO's) denoted as $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1,2, \dots, m.$ and k represents the number of outcomes particularly that of course.

Course articulation matrices and Program articulation matrix are obtained as discussed in previous steps. Let $X_{i,j,l}$ be the level of correlation of $CO_{i,j}$ with P_l where, $i = 1,2, \dots, m$, $j = 1,2, \dots, k$, $l = 1,2, \dots, n$. Then, the overall CO levels with PO's & PSO's of course C_i is computed as $X_{i.l} = \frac{1}{k} \sum_{j=1}^{k} X_{ijl}$ Here k be the number of outcome in the average course taken.

➢ Attainment of COs:

The CO attainment levels are measured based on the results of the internal assessment and external examination conducted by the university. The CO attainment level based on internal assessment and external assessment are computed separately.

Attainment levels based on internal/external assessment method are defined as follows:

Level 1: Average of student marks belongs to the class 0% - 20% for that assessment method

Level 2: Average of student marks belongs to the class 20% - 40% for that assessment method

Level 3: Average of student marks belongs to the class 40% - 60% for that assessment method

Level 4: Average of student marks belongs to the class 60% - 80% for that assessment method

Level 5: Average of student marks belongs to the class 80%-100% for that assessment method

Let ALC_E and ALC_I be the CO attainment level of the course based on external assessment and internal assessment respectively. The overall CO attainment of the course is calculated by taking 100% weightage to external assessment.

$$ALC = ALC_E.$$

Let $ALC_1, ALC_2, \dots, ALC_m$ be the attainment levels of the courses $C_1, C_2, \dots, C_m$ respectively.

The overall course attainment levels are categorized as below,

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 2$,

Level 3: Good – if $2 < ALC_i \leq 3$,

Level 4: Very Good – if $3 < ALC_i \leq 4$,

Level 5: Excellent – if $4 < ALC_i \leq 5$

For every course, we have set Good – Attained as target level that is we are aiming minimum level 3 (good) and how the course status is attained in the performance of abilities of students.

At the end we will have attainment levels of all the courses,

ID	Course name	$X_{i,.,1}$	Level	Status
C_1	Course_1	3	Good	Attained
C_2	Course_2	3	Good	Attained
C_3	Course_3	4	Very Good	Attained
C_4	Course_4	4	Very Good	Attained
C_5	Course_5	4	Very Good	Attained
C_6	Course_6	4	Very Good	Attained

Step 7: Calculation of attainment levels of PO's and PSO's.

- **Attainment of PO's & PSO's:**

The attainment of PO's & PSO's are calculated using direct method. In direct method the attainment of PO's & PSO's are calculated through the attainment levels of courses. The course attainment values (ALC_i , i = 1, 2, 3, ….., m.) and the overall level of relation of course with each PO and PSO ($X_{i,.,l}$, i = 1, 2, 3, ….., m, l = 1, 2, 3, ….., n.) are used to compute direct attainment level of each PO and PSO.

Direct Assessment: Direct attainment level of the l^{th}, PO's & PSO's is calculated as follows.

$$DALP_l = \frac{1}{\sum_{i=1}^{m} ALC_i} \sum_{i=1}^{m} x_{i,.l,} * ALC_i \text{ ,l=1,2,…….n.}$$

ID	Course name	ALCi	$X_{i,.,1}$	$ALC_i * X_{i,.,1}$
C_1	Course_1	3	2.5	7.5
C_2	Course_2	3	1.5	4.5
C_3	Course_3	4	2.5	10
C_4	Course_4	4	1.5	6
C_5	Course_5	4	1	4
C_6	Course_6	4	2	8
Sum		22		40
			$DALP_1$ = 40/22	1.8182

Similarly, we have to find attainment levels of all PO's and PSO's.

Sr. No.	ALC_i	$X_{i,.,1}$	$X_{i,.,2}$	$X_{i,.,3}$	$X_{i,.,4}$	$X_{i,.,5}$	$X_{i,.,6}$	$X_{i,.,7}$	$X_{i,.,8}$
1	3	2.5	0.5	0.5	1	2.5	0.5	0.5	0.5
2	3	1.5	2	1	1	0.5	0	3	1.5
3	4	2.5	2.5	2.5	2	0.5	1	2.5	2
4	4	1.5	1.5	1.5	0	1.5	1.5	1	2
5	4	1	2.5	3	1.5	2.5	1	0.5	0.5
6	4	2	0.5	2.5	2	2.5	1.5	1.5	2
Sum	22	11	9.5	11	7.5	10	5.5	9	8.5

Sr. No.	ALC_i* $X_{i,.,1}$	ALCi* $X_{i,.,2}$	ALCi* $X_{i,.,3}$	ALCi* $X_{i,.,4}$	ALCi* $X_{i,.,5}$	ALCi* $X_{i,.,6}$	ALCi* $X_{i,.,7}$	ALCi* $X_{i,.,8}$
1	7.5	1.5	1.5	3	7.5	1.5	1.5	1.5
2	4.5	6	3	3	1.5	0	9	4.5
3	10	10	10	8	2	4	10	8
4	6	6	6	0	6	6	4	8
5	4	10	12	6	10	4	2	2
6	8	2	10	8	10	6	6	8
Sum	40	35.5	42.5	28	37	21.5	32.5	32
DALP l	1.8182	1.6136	1.9318	1.2727	1.6818	0.9773	1.4773	1.4545

Step 8: Comparison of target level with obtained PO attainment.

In this step the target level of PO's and PSO's attainment are compared with obtained *DALP l*

Attainment levels are defined as stated below.

Level 1: Poor – if $0 < ALC_i \leq 1$,

Level 2: Average – if $1 < ALC_i \leq 1.5$,

Level 3: Good – if $1.5 < ALC_i \leq 2$,

Level 4: Very Good – if $2 < ALC_i \leq 2.5$,

Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

For every PO's and PSO's, we have set level 3 as target level that is we are aiming minimum level 3 (good) in the performance of abilities of students.

Attainment level of all the POs and PSOs

PO's	$DALP_l$	Level	Status
PO1	1.8182	Good	Attained
PO2	1.6136	Good	Attained
PO3	1.9318	Good	Attained
PO4	1.2727	Average	Not Attained
PSO1	1.6818	Good	Attained
PSO2	0.9773	Poor	Not Attained
PSO3	1.4773	Average	Not Attained
PSO4	1.4545	Average	Not Attained

P_l attainment target level say, 3, indicates that, the department is aiming minimum level-3 (good) in the performance of abilities of students.