

**Shikshan Prasarak Sanstha's
P.V.P. Mahavidyalaya, Kavathe Mahankal
Department of Zoology**

**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 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, critical 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 and cure.**

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, Forestry and Agrochemicals and Pest Management
3. Environmental Management and Masters in Business Administration

Can become an Entrepreneur in applied sciences

4. Professional field such as Poultry, Sericulture, Apiculture, Pisci culture, Dairy so on

Program Specific Outcomes (PSO's)

Program Specific Outcomes (PSO) : B.Sc. Zoology	
PSO 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
PSO 2	Acquire vast knowledge in various branches and its application biological sciences such as biochemistry, apiculture, poultry, Fishery, Goat farming, Agriculture, Vermiculture
PSO 3	To identify the scientific facts behind every natural phenomenon and Gain knowledge and handling in sophisticated equipment's
PSO 4	Understanding the morphology and functional characteristics at cellular and sub-cellular (molecular) level

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

Course outcomes (CO's)

Course Outcomes (CO) B.Sc. I

CO 1: Sem- I: Paper I- DSC – 15 A (Animal Diversity-I)	
CO 1.1	Theory 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.
CO 1.2	Imparting knowledge of five kingdom classification system and biodiversity related to non-chordates from Protista to Echinodermata
CO2 : Sem- I: Paper II- DSC – 16 A (Cell Biology and Evolutionary Biology)	
CO 2.1	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.
CO 2.2	Understanding the evidences of evolution like fossils, connecting links and living fossils, Lamarckism and Darwinism and changes occurs during the evolution of earth and its importance.
CO3 : Sem- II: Paper III- DSC – 15 B (Animal diversity and Insect Vector)	
CO 3.1	Students will be able to understand systematic position, Morphology, Anatomy and Physiology of Rat. Physiology of rat is closely related with Human beings.
CO 3.2	Students will be understood the Insect vectors and Getting aware about various insect borne diseases and their pathogenicity and their control measures.
CO4 : Sem-II: Paper IV- DSC – 16 B (Genetics)	
CO 4.1	Students would have a deeper insights into the understanding concepts like of inheritance, Mendelian genetics, Mendelism patterns of inheritance ,co-dominance, Incomplete dominance, multiple alleles and lethal genes.
CO 4.2	Students will be able to the significance of linkage, crossing over, Different types of mutations and Different types Sex determination
CO5 : Zoology Practical Based on theory Paper DSC- 15A, B and 16 A, B	
CO 5.1	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.
CO 5.2	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 Outcomes (CO) B.Sc. II

CO 6: Semester III: Paper V (Animal Diversity-II)

CO 6.1

Understanding the Characters, classification and phylogenic relations among Protochordates, Agnatha, Pisces, Amphibians Reptiles, Aves and Mammals.

CO 6.2

Making aware about Venomous and non- Venomous snakes, venom and its effect, snake bite and first aid.

CO 7 : Semester III: VI- (Biochemistry)

CO 7.1

Imparting knowledge about nucleic acids (DNA and RNA) and enzyme nomenclature, Classification, enzyme kinetics, Inhibition, regulations and Isozymes.

CO 7.2

Student will be able to understand the different types of Protein, Lipid and carbohydrate metabolism.

CO 8 : Sem: IV Paper VII: (Reproductive Biology)

CO 8.1

Imparting knowledge of hormones, histological structures of mammalian reproductive organs.

CO 8.2

Imparting knowledge of modern technique like IVF, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST

CO 9 : Sem: IV Paper VIII: (Applied Zoology – I)

CO 9.1

Students will able to understand the Transmission, Prevention and control of diseases: Tuberculosis, Typhoid and Imparting knowledge of some crop pests, house hold pests, store rain pests and their biological control and economic importance of different insects

CO 9.2

To understand the Principles of poultry breeding, Management of breeding stock and broilers, Processing and Preservation of eggs.

CO 10 : Zoology Practical I (Paper V and VI) and Practical II (Paper VII and VIII)

CO 10.1

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.

CO 10.2

Practical papers touch upon Insect vectors, and vector borne diseases, types of fossils, demonstration of rat, practical hands on physiological and cytological practicals.

Course Outcomes (CO) B.Sc. III

CO 11: Sem: V: Paper IX: DSE-E29(Comparative Anatomy of Vertebrates)

CO 11.1	Imparting knowledge of integuments and endoskeleton among the vertebrates.
CO 11.2	Imparting knowledge of basic structural and functional parts of digestive, respiratory system, excretory and nervous system of various classes from lower vertebrates to higher vertebrates.

CO 12 : Sem: V: Paper X: DSE-E29 (Molecular Cell Biology and Animal Biotechnology)

CO 12.1	Understanding the molecular concepts in biology and getting aware about various Animal Biotechnology.
CO 12.2	Understanding the synthesis of protein, molecular techniques in gene manipulation.

CO 13 : Sem: V Paper XI: DSE-F30 (Biotechniques and Biostatistics)

CO 13.1	Understanding the many biostatistics terms such as tabulation, measure of central tendency, Graphical representation of data, Dispersion and correlation
CO 13.2	Getting aware about application of biotechnology in medicine, animal husbandry and agriculture and knowledge about production of cloned and transgenic animals.

CO 14 : Sem: V: Paper XII: DSE-F31 (Aquatic biology and Endocrinology)

CO 14.1	Getting aware about environment, Understanding and getting knowledge about the aquatic biomass of various zones and biology of lakes and streams.
CO 14.2	Understanding the anatomy, histology, role, regulation and disorder various endocrine glands of human

CO 15 : Sem: VI Paper XIII: DSE-E30 (Developmental Biology of Vertebrates)

CO 15.1	Understanding the gametogenesis, detailed development of chick upto 72 hrs and early developmental process of frog.
CO 15.2	Imparting the knowledge of placenta formation, types and its significance.

CO 16 : Sem: VI- Paper XIV: DSE-E32 (Immunology)

CO 16.1	Imparting the knowledge of immunology and Understanding the cells and organs of immune system, and basic properties of antigens
CO 16.2	Students will be able understand the structure, function, antigen – antibody interaction of and hybridoma technology.

CO 17 : Sem: VI- Paper XV: DSE-E31(Applied Zoology-II)

CO 17.1	Understanding the economic importance of apiculture, Pearl culture animal Husbandary and goat farming.
CO 17.2	Understanding the fisheries industry and economic importance of fishes and prawn culture.

CO 18 : Sem: VI- Paper XVI: DSE-F32 (Insect Vectors and Histology)

CO 18.1	Getting aware about various pathogenic insect vectors
CO 18.2	Understanding the Histological structure of mammalian organs

CO 19 : Zoology Practical Based on theory Papers IX to XVI

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 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	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	$X_{i, \cdot, 1}$	$X_{i, \cdot, 2}$	$X_{i, \cdot, 3}$	$X_{i, \cdot, 4}$	$X_{i, \cdot, 5}$	$X_{i, \cdot, 6}$	$X_{i, \cdot, 7}$	$X_{i, \cdot, 8}$
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, $PO_1, PO_2, \dots, PO_{n_1}$
- 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 $CO_{i,1}, CO_{i,2}, \dots, CO_{i,k}$, $i = 1, 2, \dots, m$. 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 $X_{ij,l}$ be the level of correlation of CO_{ij} 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 $X_{i, \cdot} = \frac{1}{k} \sum_{j=1}^k X_{ij,l}$

$X_{ij,l}$, 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	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	5	Excellent	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	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	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 , $i = 1, 2, 3, \dots, m$.) and the overall level of relation of course with each PO and PSO ($X_{i,l}$, $i = 1, 2, 3, \dots, m$, $l = 1, 2, 3, \dots, n$.) 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.

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

ID	Course name	ALC _i	X _{i, l}	ALC _i * X _{i, l}
C ₁	Course_1	5	1.5	7.5
C ₂	Course_2	5	2.5	12.5
C ₃	Course_3	5	2.5	12.5
C ₄	Course_4	5	3	15
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	5	3	15
C ₉	Course_9	5	3	15
C ₁₀	Course_10	5	3	15
C ₁₁	Course_11	3	1.5	4.5
C ₁₂	Course_12	3	3	9
C ₁₃	Course_13	3	3	9
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		82		222.63
$DALP_l = 222.63/82$				2.7149

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	5	1.5	1.5	1	1	2	1.5	2	0.5
2	5	2.5	1.5	0	1	2.5	1.5	2	0
3	5	2.5	2	2	1	3	1.5	2	1
4	5	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	5	3	2	1	2	2.5	3	3	2
9	5	3	3	3	3	3	3	3	1
10	5	3	3	3	2.5	2.5	3	3	1.5
11	3	1.5	1	0	1	2.5	1.5	2	0.5
12	3	3	2	1.5	1.5	3	3	3	2
13	3	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	82	51.625	38.25	24.625	27.75	50.625	39.25	42.75	21.375

Sr. No.	$ALC_i^* X_{i, \cdot, 1}$	$ALC_i^* X_{i, \cdot, 2}$	$ALC_i^* X_{i, \cdot, 3}$	$ALC_i^* X_{i, \cdot, 4}$	$ALC_i^* X_{i, \cdot, 5}$	$ALC_i^* X_{i, \cdot, 6}$	$ALC_i^* X_{i, \cdot, 7}$	$ALC_i^* X_{i, \cdot, 8}$
1	7.5	7.5	5	5	10	7.5	10	2.5
2	12.5	7.5	0	5	12.5	7.5	10	0
3	12.5	10	10	5	15	7.5	10	5
4	15	10	0	0	15	0	10	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	15	10	5	10	12.5	15	15	10
9	15	15	15	15	15	15	15	5
10	15	15	15	12.5	12.5	15	15	7.5
11	4.5	3	0	3	7.5	4.5	6	1.5
12	9	6	4.5	4.5	9	9	9	6
13	9	6	4.5	6	9	9	9	6
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	222.63	167.25	108.63	120.25	217.63	166.75	183.75	92.375
$DALP_l$	2.7149	2.0396	1.3247	1.4665	2.654	2.0335	2.2409	1.1265

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:

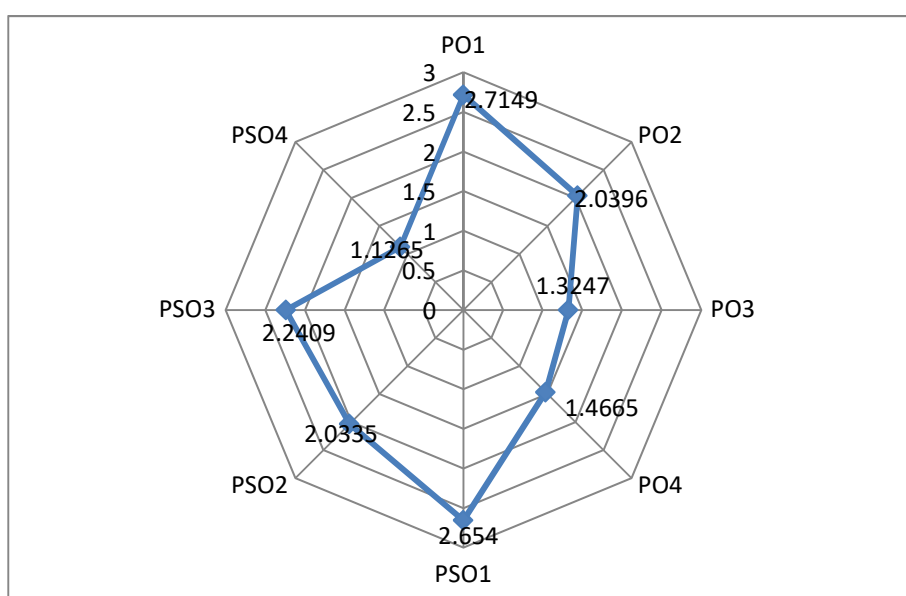
Excellent – if $2.5 < ALC_i \leq 3$.

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	$DALP_i$	Level	Status
PO1	2.7149	Excellent	Attained
PO2	2.0396	Very Good	Attained
PO3	1.3247	Average	Not Attained
PO4	1.4665	Good	Not Attained
PSO5	2.654	Excellent	Attained
PSO6	2.0335	Very Good	Attained
PSO7	2.2409	Very Good	Attained
PSO8	1.1265	Average	Not Attained

P_i 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_i .