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DEPARTMENT OF STATISTICS

2022-23

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 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	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 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	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 $X_{i.l} = \frac{1}{k}\sum_{j=1}^{k} X_{ijl}$ 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 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	25
2	9	31
3	10	31
4	9	23
5	10	29
6	10	33
7	7	22
8	9	23
9	8	28
10	10	32
11	9	23
12	9	33
13	8	33
14	10	31
15	9	20
16	10	31
17	10	31
18	10	30
19	9	23
20	9	31
Mean	9.25	28.15
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	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	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	3.4	Very Good	Attained
C_{12}	Course_12	4.2	Excellent	Attained
C_{13}	Course_13	3.4	Very Good	Attained
C_{14}	Course_14	4.2	Excellent	Attained
C_{15}	Course_15	3.4	Very Good	Attained
C_{16}	Course_16	3.4	Very Good	Attained
C_{17}	Course_17	3.4	Very Good	Attained
C_{18}	Course_18	4.2	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	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	4	2	8

C_8	Course_8	4	2	8
C_9	Course_9	4	2	8
C_{10}	Course_10	5	3	15
C_{11}	Course_11	3.4	3	10.2
C_{12}	Course_12	4.2	2	8.4
C_{13}	Course_13	3.4	2	6.8
C_{14}	Course_14	4.2	2	8.4
C_{15}	Course_15	3.4	2	6.8
C_{16}	Course_16	3.4	2.5	8.5
C_{17}	Course_17	3.4	2	6.8
C_{18}	Course_18	4.2	2	8.4
C_{19}	Course_19	5	2	10
Sum		74.6		163.8
			$DALP_1$ = 163.8/74.6	2.1957

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	4	2	2	2	0.5	1.5	2	2	2
8	4	2	2	1	0	2	2.5	2	2
9	4	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	3.4	3	1	1	1	2	2	1	2.5
12	4.2	2	2	1.5	0	1.5	1.5	2	2.5
13	3.4	2	2	3	1	3	3	3	2
14	4.2	2	2	2	0.5	1.5	2	2	3
15	3.4	2	1	1.5	1	2	2	2	2
16	3.4	2.5	1.5	2	0	1.5	1.5	2	3
17	3.4	2	2	2	0	3	2	2	2
18	4.2	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	74.6	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	8	8	8	2	6	8	8	8
8	8	8	4	0	8	10	8	8
9	8	6	10	2	8	10	8	8
10	15	11.25	15	0	11.25	10	11.25	10
11	10.2	3.4	3.4	3.4	6.8	6.8	3.4	8.5
12	8.4	8.4	6.3	0	6.3	6.3	8.4	10.5
13	6.8	6.8	10.2	3.4	10.2	10.2	10.2	6.8
14	8.4	8.4	8.4	2.1	6.3	8.4	8.4	12.6
15	6.8	3.4	5.1	3.4	6.8	6.8	6.8	6.8
16	8.5	5.1	6.8	0	5.1	5.1	6.8	10.2
17	6.8	6.8	6.8	0	10.2	6.8	6.8	6.8
18	8.4	8.4	8.4	2.1	12.6	6.3	10.5	12.6
19	10	10	11.25	1.25	8.75	7.5	10	15
Sum	163.8	134.45	150.15	22.65	157.05	149.45	148.55	150.8
DALP ı	2.1957	1.8023	2.0127	0.3036	2.1052	2.0034	1.9913	2.0214

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 $2 < ALC_i \leq 2.5$,

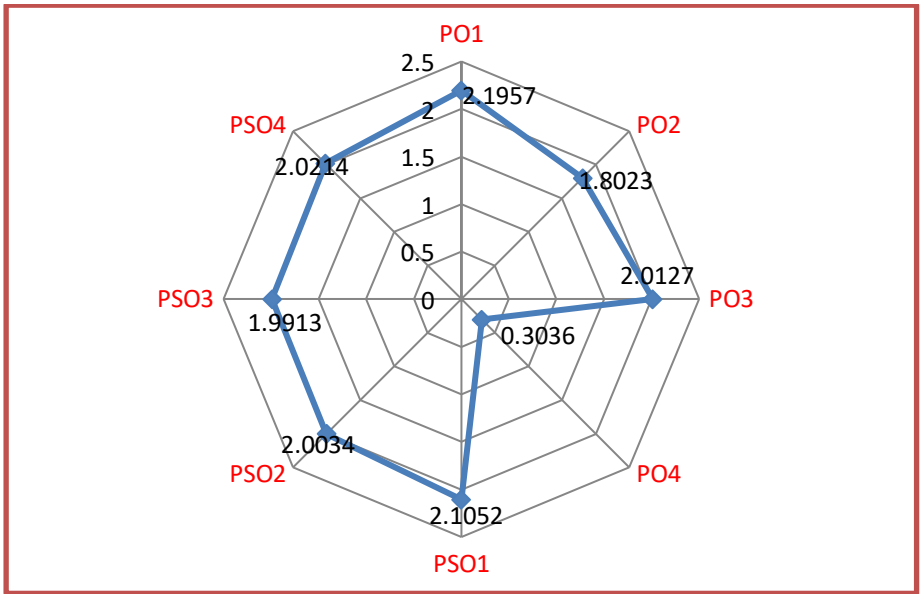
Level 5: Excellent – if $2.5 < ALC_i \leq 3$.

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	2.1957	Very Good	Attained
PO2	1.8023	Good	Not Attained
PO3	2.0127	Very Good	Attained
PO4	0.3036	Poor	Not Attained
PSO1	2.1052	Very Good	Attained
PSO2	2.0034	Very Good	Attained
PSO3	1.9913	Good	Not Attained
PSO4	2.0214	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 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.