



Outcome Based Education



Since : 1983

Rayat Shikshan Sanstha's

**Karmaveer Bhaurao Patil
College of Engineering, Satara**



Contents

| | |
|--|----|
| 1. Preamble | 03 |
| 2. Key constituents of OBE | 04 |
| 3. Correlation : PEOs, POs and Cos | 04 |
| 4. Vision & Mission of the institute | 05 |
| 5. Quality Policy of Institute | 06 |
| 6. Programme outcomes | 04 |
| 7. OBE Framework of the Institute | 06 |
| 8. Course Outcomes (COs) | 09 |
| 9. Development of Course Plan | 12 |
| 10. CO-PO Mapping and CO-PSO Mapping | 13 |
| 11. Attainment of Program Outcomes and Program Specific Outcomes | 19 |
| 12. Code of professional ethics | 21 |
| 13. Appendix | 26 |



Our Inspiration

Founder of Rayat Shikshan Sanstha, Satara

Rayat Mauli



Padmabhushan Dr. Karmaveer Bhaurao Patil



Sou. Laxmibai Bhaurao Patil

President

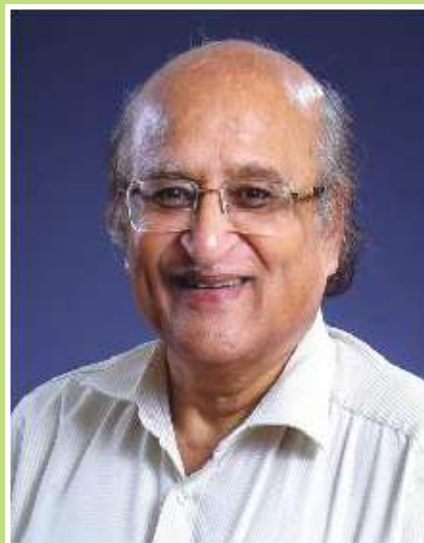
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Chairman

Rayat Shikshan Sanstha, Satara



Hon'ble Dr. Anil Patil

Chairman

BOG
KBP College of Engineering Satara



Hon'ble Dilip Walse Patil



Hon'ble Dilip Walse Patil
Chairman, BOP
KBP College of Engineering Satara



Hon'ble Prin. Dr. V. S. Shivankar
Secretary, Rayat Shikshan Sanstha, Satara
Member : BOP



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Member : BOP



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Member : BOP



Hon'ble Prin. Dr. A. C. Attar
Member Secretary : BOP

Board of Governance

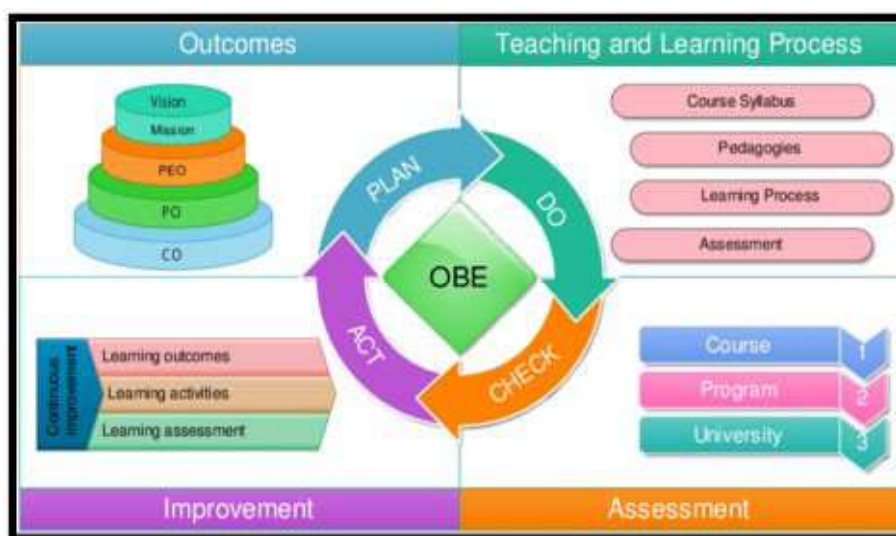
➤ Preamble

The basic aim of the traditional education system is to pass on the **knowledge of the previous generation to the upcoming generation of students.**

Unlike traditional education system **Outcome based education** system is targeted at achieving desirable outcomes (in terms of knowledge, skills, attitudes and behavior) at the end of a program. Teaching with this awareness and making the associated effort constitutes outcome based education. This entails a regular methodology for ascertaining the attainment of outcomes, and benchmarking these against the program outcomes consistent with the objectives of the program.

Initially, **NBA accreditation** used to be based on “Input – Process – Output” model with major emphasis on availability of resources / facilities and the outputs thereof. In the year 2009, NBA aligned its methodology with international benchmarks and started accreditation on the basis of outcomes. It believes that educational quality must be measured by outcomes rather than inputs, because inputs do not necessarily correlate with quality outcomes. Outcomes are dependent not only on inputs but also on the processes followed by an institution to convert inputs into defined outcomes.

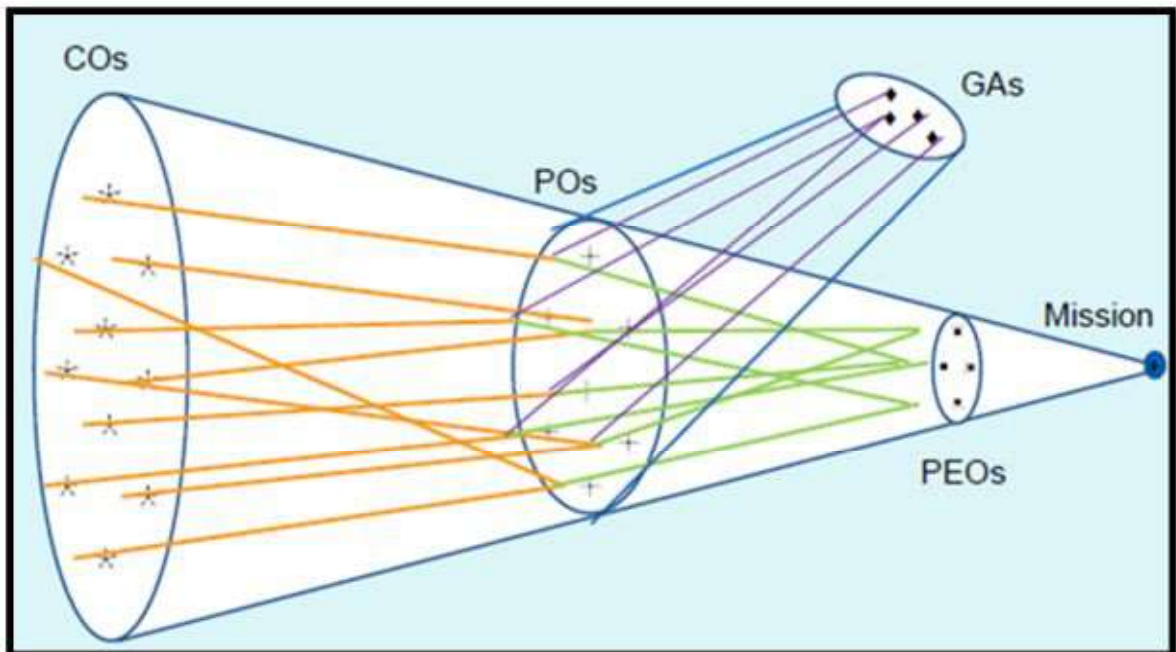
This manual is a reference to help faculty, staff and stakeholders to understand the **Outcome Based Education (OBE)** system implemented at Karmaveer Bhaurao Patil College of Engineering, Satara (KBPCOES). The manual serves as valuable guidelines for the faculty to develop an assessment plan in the process to measure the outcome of the students during their course of study and also after their graduation. The manual outlines the process involved in implementing a curriculum prescribed by the university and content delivery or teaching plan.



➤ Key constituents of OBE:



➤ Correlation : PEOs, POs and Cos :



➤ Definitions

- **Graduates Attributes (Gas)** are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. Gas form a set of individually assessable outcomes of the programme.
- **Programme Educational Objectives (PEOs)** describe the career and professional developments of graduates, which are to be assessed after 2 or 3 years of graduation.
- **Programme Outcomes (POs)** explain the Knowledge, Skills and Attitude that the students are expected to attain upon graduation.
- **Programme Specific Outcomes (PSOs)** are a statement that describes what students are expected to know and be able to do in a specialized area of discipline upon graduation from a program.
- **Course Outcomes (Cos)** outline the course specifications to be acquired by students. Knowledge, Skills and Attitude (KSA) are the three types of behavior elements, also known as educational activities that are selected from Bloom's taxonomy.
- **Course Syllabus (CS)** provides a comprehensive description of a curriculum offered by the respective programme of study from University.
- **Course File (CF)** is a teaching-learning plan developed by the Course Coordinator for a semester.
- **Program Exit Survey (PES)** (Indirect method) is a technique to measure the attainment of POs and PSOs.

Vision, Mission and Quality Policy of Institute

Vision of the Institute:

To be a premier institute enhancing the young minds into globally competent manpower.

Mission of the Institute:

M1: To provide academic excellence for overall development & global employability of students.

M2: To strengthen industry institute interaction for mutual benefits & entrepreneurship.

M3: To promote innovation and research for catering the needs of society at large.

M4: To inculcate social as well as ethical values amongst employees and students

➤ **Quality Policy of Institute:**

QP1: Develop a quality system for conscious and consistent actions to improve the academic and administrative performance of the Institution.

QP2: Ensure timely, efficient and progressive performance of academic, administrative and financial activities.

QP3: Ensure relevance and quality of academic and research programs.

QP4: Optimization and integration of modern methods of teaching and learning.

➤ **Core Values of Institute:**

CV1: Loyalty and Integrity

CV2: Honesty and Sincerity

CV3: Strive to Educate Joyfully

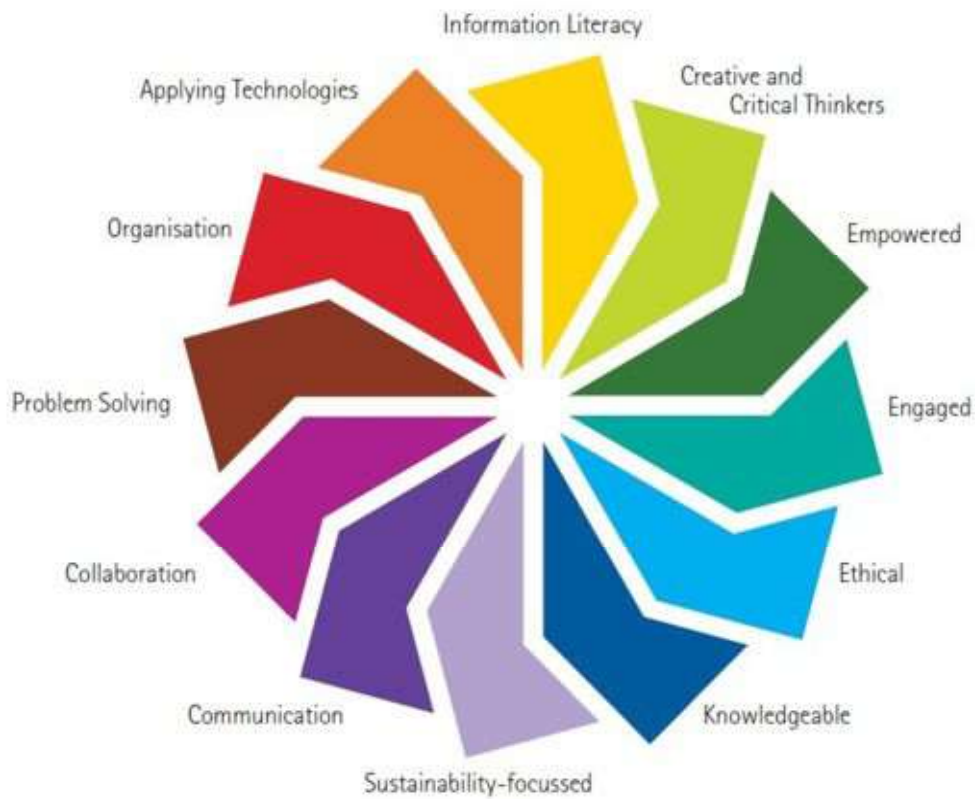
CV4: Cooperation, Respect Ethics

CV5: Fairness and Equality

➤ **Program Outcomes :(Graduate Attributes)**

POs are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability attitude and behavior that students acquire through the program.

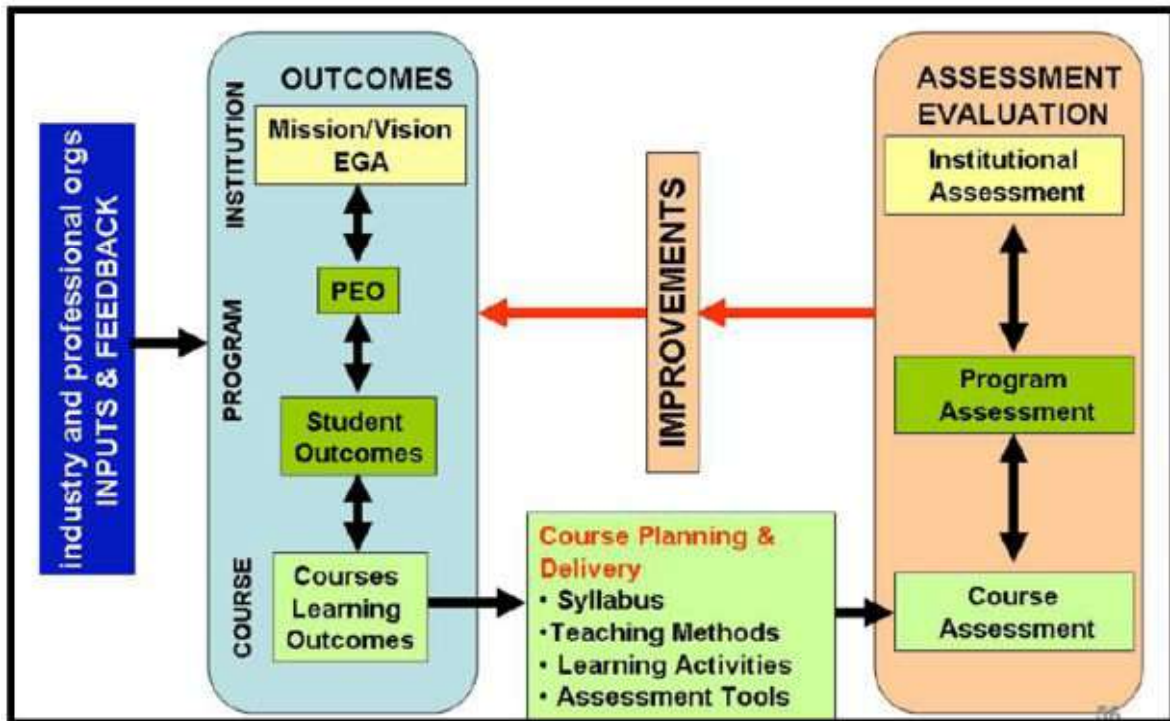
The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of an engineering graduate.



NBA has defined the following twelve POs for an engineering graduate. These are inline with the Graduate Attributes as defined by the Washington Accord:

- **Engineering Knowledge**
- **Problem Analysis**
- **Design- Development of Solutions**
- **Conduct Investigations of Complex Problems**
- **Modern tool usage**
- **Engineer and Society**
- **Individual and Teamwork**
- **Communication**
- **Environment and Sustainability**
- **Ethics**
- **Project management and Finance**
- **Life-long learning**

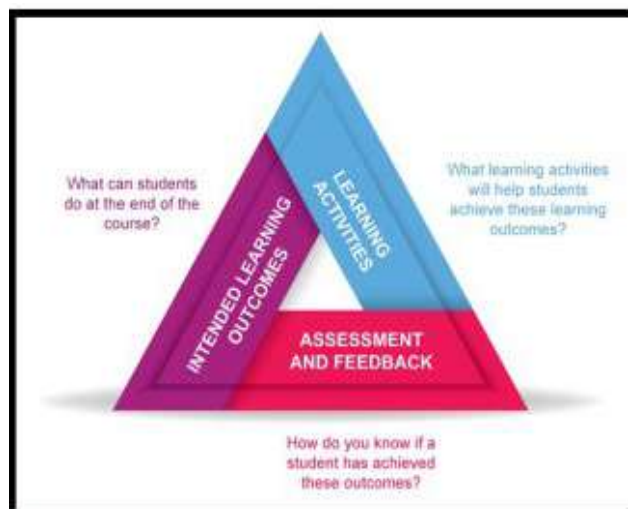
➤ OBE Framework of the Institute



Course Plan using Outcome Based Approach :

A **course plan** is a guided planning of the components of the course. This help in providing a check of various components in terms of the course outcomes. The cardinal principle behind the OBE process is constructive alignment.

Constructive Alignment is the basic principle in OBE approach. Here the curriculum, teaching and learning activities and assessments are all directed towards the intended learning outcomes of the course. The emphasis of constructive alignment is on the learner. This approach places the students in the center of learning activity and teaching is



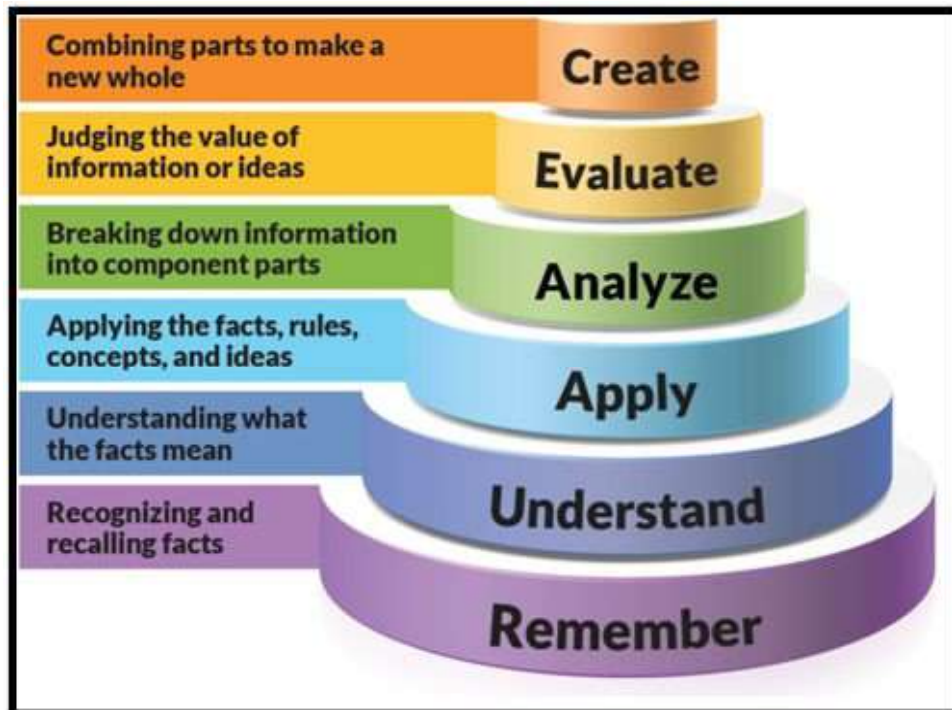
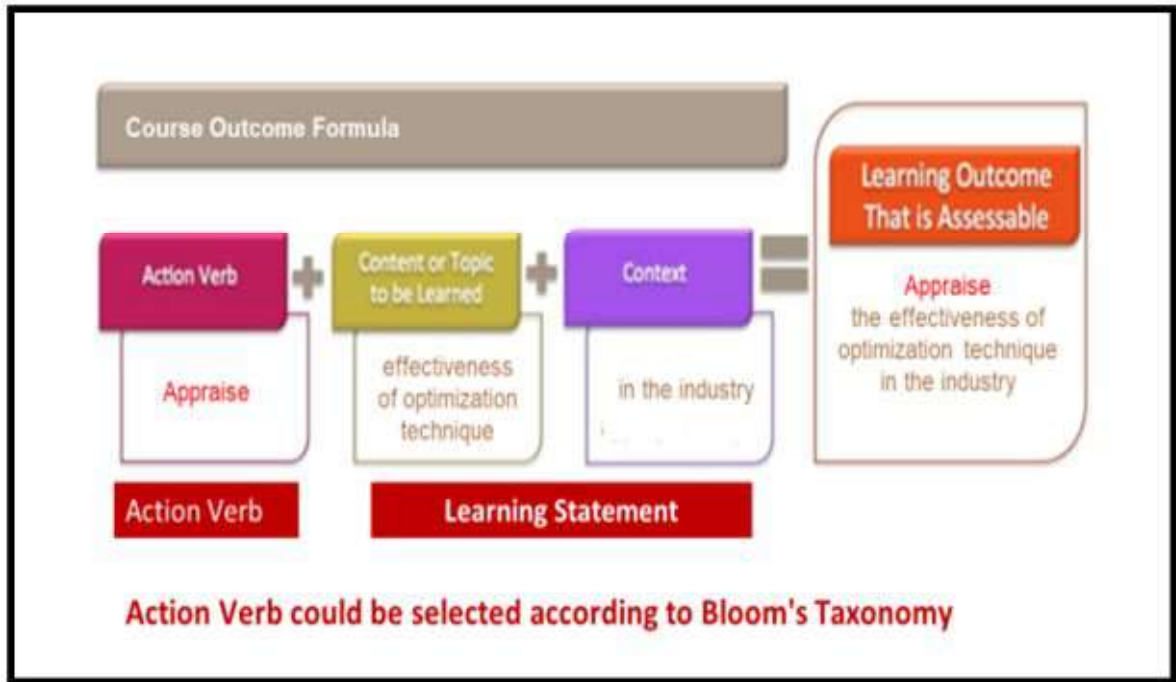
considered as just a catalyst for learning. The teacher's role here is to create an environment suitable for learning and get the students engage in learning activity. The figure shown here illustrates the constructive alignment.

➤ **Course Outcomes (COs):**

Course Outcomes are the statements that help the learners to understand the reason for pursuing the course and help him to identify what he will be able to do at the end of the course. Every Course leads to some Course Outcomes. The CO statements are defined by considering the course content covered in each module of a course. For every course there may be 5 or 6 CO's. The CO's are defined by every course coordinator once the course is allotted to him/her. The CO statements are well defined with the use of appropriate action verbs in Blooms Taxonomy.

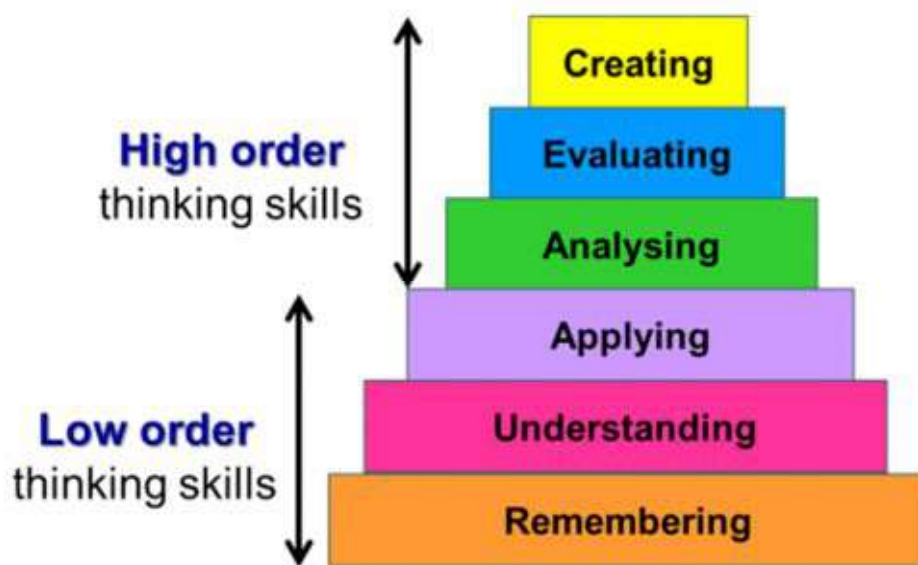
While writing COs the following points should be addressed:

| | |
|-------------------|--|
| Specific | Is there a description of precise behavior and the situation it will be performed in? Is it concrete, detailed, focused and defined? |
| Measurable | Can the performance of the outcome be observed and measured? |
| Achievable | With a reasonable number of efforts and application can the outcome be achieved? Are you attempting too much? |
| Relevant | Is the outcome important or worthwhile to the learner or stakeholder? Is it possible to achieve this outcome? |
| Time-Bound | Is there a time limit, rate, number, percentage or frequency clearly stated? When will this outcome be accomplished? |

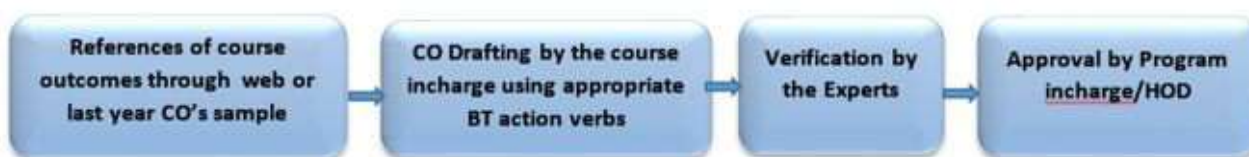


Action Words for Bloom's Taxonomy

| Knowledge | Understand | Apply | Analyze | Evaluate | Create |
|------------------|-------------------|--------------|----------------|-----------------|---------------|
| define | explain | solve | analyze | reframe | design |
| identify | describe | apply | compare | criticize | compose |
| describe | interpret | illustrate | classify | evaluate | create |
| label | paraphrase | modify | contrast | order | plan |
| list | summarize | use | distinguish | appraise | combine |
| name | classify | calculate | infer | judge | formulate |
| state | compare | change | separate | support | invent |
| match | differentiate | choose | explain | compare | hypothesize |
| recognize | discuss | demonstrate | select | decide | substitute |
| select | distinguish | discover | categorize | discriminate | write |
| examine | extend | experiment | connect | recommend | compile |
| locate | predict | relate | differentiate | summarize | construct |
| memorize | associate | show | discriminate | assess | develop |
| quote | contrast | sketch | divide | choose | generalize |
| recall | convert | complete | order | convince | integrate |
| reproduce | demonstrate | construct | point out | defend | modify |
| tabulate | estimate | dramatize | prioritize | estimate | organize |
| tell | express | interpret | subdivide | find errors | prepare |
| copy | identify | manipulate | survey | grade | produce |
| discover | indicate | paint | advertise | measure | rearrange |
| duplicate | infer | prepare | appraise | predict | rewrite |
| enumerate | relate | produce | break down | rank | role-play |
| listen | restate | report | calculate | score | adapt |
| observe | select | teach | conclude | select | anticipate |
| omit | translate | act | correlate | test | arrange |
| read | ask | administer | criticize | argue | assemble |
| recite | cite | articulate | deduce | conclude | choose |
| record | discover | chart | devise | consider | collaborate |
| repeat | generalize | collect | diagram | critique | collect |
| retell | give examples | compute | dissect | debate | devise |
| visualize | group | determine | estimate | distinguish | express |
| | illustrate | develop | evaluate | editorialize | facilitate |
| | judge | employ | experiment | justify | imagine |
| | observe | establish | focus | persuade | infer |
| | order | examine | illustrate | rate | intervene |
| | report | explain | organize | weigh | justify |
| | represent | interview | outline | | make |
| | research | judge | plan | | manage |
| | review | list | question | | negotiate |
| | rewrite | operate | test | | originate |
| | show | practice | | | propose |
| | trace | predict | | | reorganize |
| | transform | record | | | report |
| | | schedule | | | speculate |
| | | simulate | | | structure |
| | | transfer | | | support |
| | | | | | validate |



➤ **Process to maintain quality of CO:**



➤ **Development of Course Plan:**

A course plan (Lecture and Practical Plan) is a guided plan of the components of the course. This help in providing a check of various components in terms of the course outcomes.

The main aspects that are included in a course plan (lecture Plan) are:

- Lecture contents
- Lecture objectives
- Lecture outcomes
- Planned & Actual Date of the Lecture
- Teaching Pedagogy used
- Mapping of Lecture to CO,PO & PSO
- Remarks if any

➤ **CO-PO Mapping and CO-PSO Mapping:**

The final assessment in an OBE approach is the estimation of the level of attainment of POs and PSOs. These outcomes are estimated from the estimates of all COs of the entire program. Hence every Course Outcomes (COs) is mapped onto the respective POs and PSOs in terms of the strength of mapping.

The various correlation levels are:

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” indicates there is no correlation.

The various correlation levels are well justified by every course teacher who prepares CO-PO-PSO Mapping and justification document for the respective course allotted.

- **Reference: Lecture Plan Format in Appendix**

Course Delivery using Outcome based approach:

Use various pedagogical tools to measure COs. Defining pedagogical tools while teaching subjects add to the learning effectiveness depending upon the profile of the learner.

| | |
|---|--|
| <ul style="list-style-type: none">➤ Small Group Discussion➤ Problem based Learning➤ Group Activities / Project work➤ Assignments.➤ Case Studies➤ Concept mapping / mind mapping➤ Tutorial worksheets➤ Collaborative learning | <ul style="list-style-type: none">➤ Inquiry – based Learning➤ Simulation and Gaming➤ Writing with peer review➤ Debates and Discussions➤ Random Calling➤ Snow balling / syndicate groups➤ Team based learning➤ Buzz Groups |
|---|--|

➤ **Outcome Based Assessment :**

The final assessment in an OBE approach is the estimation of the level of attainment of POs and PSOs. These outcomes are estimated from the estimates of all COs of the entire

program. Hence every Course Outcomes (COs) should be mapped onto the respective POs and PSOs in terms of the strength of mapping.

➤ **CO assessment process for various courses in the curriculum:**

Assessment is one or more processes, carried out by the department, that identify, collect, and prepare data to evaluate the achievement of programme educational objectives and programme Outcomes. The CO assessment tools are divided into two methods as follows:

Direct Methods: Basically displays the student's knowledge and skills from their performance. It can be determined from the performance of the students in all the relevant assessment instruments – like internal assessments, assignments, quiz and final university examination. These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning.

The assessment process considers the marks scored in In semester evaluation and End semester evaluation.

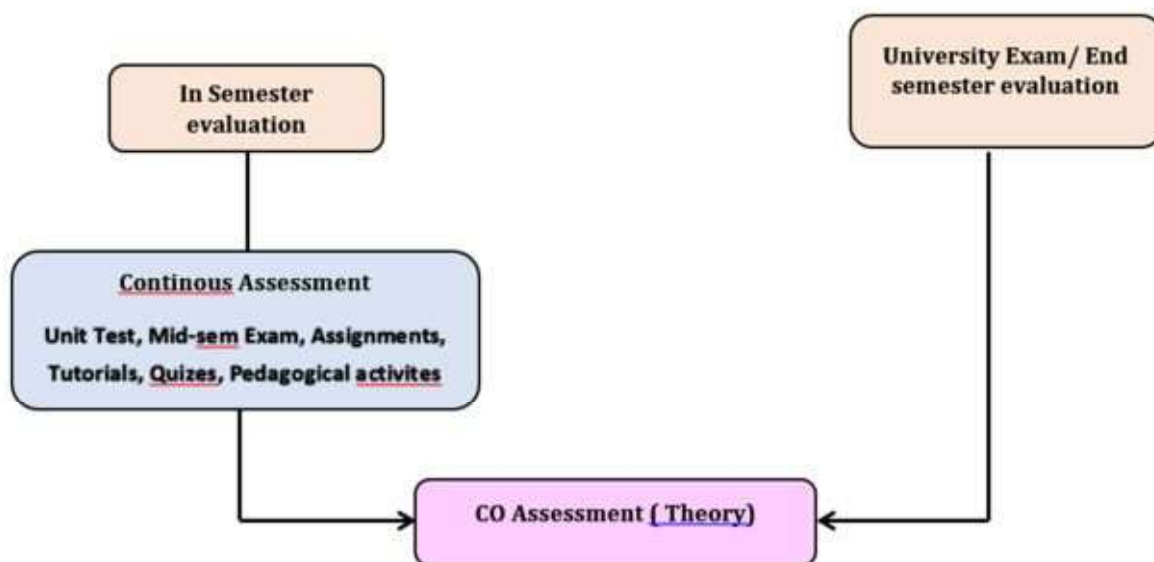
- For assessment process, Assignments, Tutorials, Quizzes, are given to the students to induce self learning, analyzing the learning level for theory courses . For practical courses, level of completion of experiments is examined through the completion of record.
- For all theory courses the continuous assessment (Unit Test, Mid semester Exam, Assignments, Tutorials, Pedagogical activities, Quizzes) and for Practical courses (Completion of Lab Manuals & Project Based Learning) is considered for in semester evaluation.
- For project evaluation, assessment process considers the marks scored in Project Phase I and Project Phase II. Evaluation of both internal and external examinations is based on the set rubrics. The total marks obtained in all in semester assessment processes for theory courses is out of 40.
- For university examination, all assessments of a course will be done on absolute marks basis i.e. End semester evaluation out of 60.

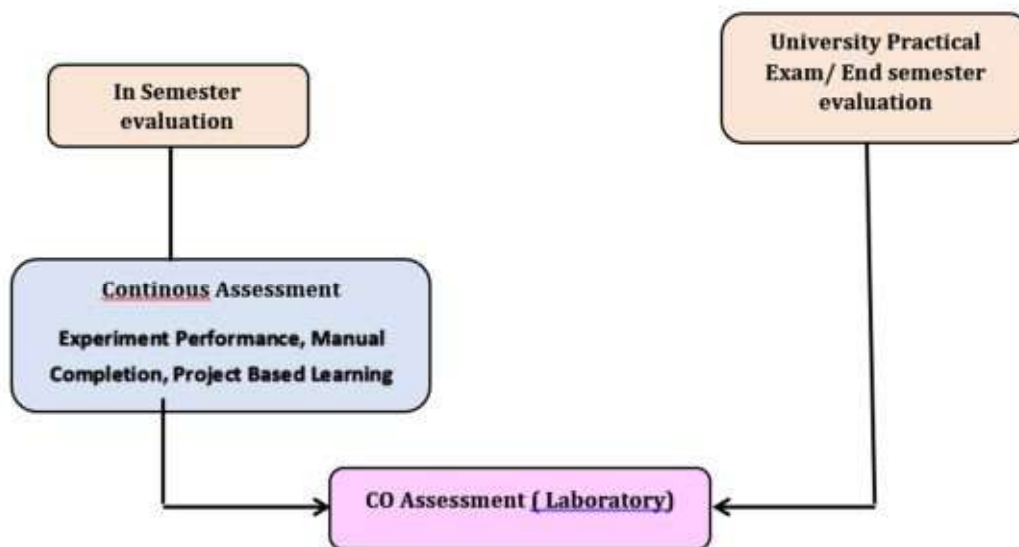
Indirect Methods: It encompasses surveys and interviews originated from stakeholders from the view point of student's learning. Their feedback about students' knowledge or skills is the basis of indirect assessment of students.

| Sr. No. | Direct Assessment | Method Description |
|----------------|---|---|
| 1 | Internal Assessment Test | The internal assessment marks of a theory paper are based on Unit test conducted approximately after completion of one Unit. A mid semester test is conducted after completion of fifty percent of syllabus. Also course wise some quizzes, class tests are conducted. Overall performance in all the tests is evaluated in the form of continuous assessment. |
| 2 | Theory Assignments/ Tutorials | Theory assignments are given to the students to assess their ability in problem solving, modern technology usage, analysis etc. which can be performed individually or on team basis. In general, several assignments are to be given for each theory subject and finally the average performance has been evaluated. |
| 3 | Exhibition Skills | This particular criterion is based on the individual performance of a student in relation to his/her skills in seminar presentation, Project Based learning Presentation or participation in Pedagogical activities. |
| 4 | Theory Semester Examination | At the end of each semester, final semester examination is being conducted by the university and the answer scripts are evaluated by the university appointed examiner. On the basis of the credit achieved by the students in the above mentioned examination matrices are being generated for the final assessment of the batch of a particular year. |
| 5 | Lab Assignments and Semester Examination | Lab experiments are considered as one of the assessment parameter for evaluating student's ability to perform in the following aspects in a cumulative aspect viz., Procedure/Algorithm, Timely completion of lab assignments, Evaluation of experiment, Continuous performance and Overall maintenance of lab manual/journal. Finally, students appear for the semester practical examination. Practical Exam based on theory questions, experimentation and viva |

| | | |
|---|----------------------------|--|
| | | voce are conducted. |
| 6 | Industrial Training | Each student has to undergo a four weeks of summer training and has to submit an individual report/ completion certificate from the supervisor of the concerned training company, research institute or Lab. The students present their training work in the department and their performances are evaluated by the departmental teachers. |
| 7 | Seminar and project | The internal assessment marks for seminar and projects are assessed on the basis of their exposure and activity to a variety of research works in order to enrich the academic experience. This in turn improves their skills in presentation and makes them competent in facing discussion/questions on various topics in a public forum within and outside the Department. |

| Sr. No. | Indirect Assessment | Method Description |
|---------|--|---|
| 1. | Exit Feedback: Survey Questionnaire | A thorough introspective report is prepared on the basis of cumulative information provided by the final year students while passing out. |





➤ **CO-Attainment:**

Target values considered for Attainment Calculation:

Theory Course:

1) In Semester Evaluation (Continuous Assessment):

- Attainment Level 1: **50%** students scoring more than 75% marks out of the relevant maximum marks.
- Attainment Level 2: **60%** students scoring more than 75% marks out of the relevant maximum marks.
- Attainment Level 3: **70%** students scoring more than 75% marks out of the relevant maximum marks.

2) End Semester Evaluation (University Exam Result):

- Attainment Level 1: **50%** students scoring more than 65% marks out of the relevant maximum marks.
- Attainment Level 2: **60%** students scoring more than 65% marks out of the relevant maximum marks.
- Attainment Level 3: **70%** students scoring more than 65% marks out of the relevant maximum marks.

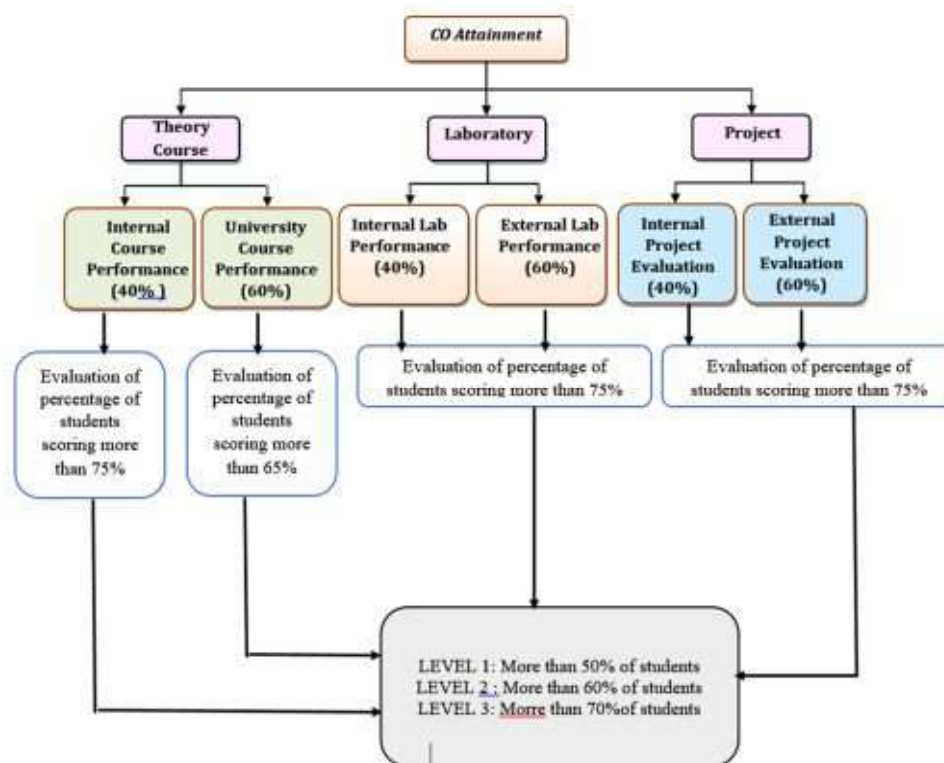
Laboratory Courses/seminar/Industrial field trainings/Project:

3) In Semester Evaluation (Continuous Assessment):

- Attainment Level 1: **50%** students scoring more than 75% marks out of the relevant maximum marks.
- Attainment Level 2: **60%** students scoring more than 75% marks out of the relevant maximum marks.
- Attainment Level 3: **70%** students scoring more than 75% marks out of the relevant maximum marks.

4) End Semester Evaluation (University Exam Result):

- Attainment Level 1: **50%** students scoring more than 75% marks out of the relevant maximum marks.
- Attainment Level 2: **60%** students scoring more than 75% marks out of the relevant maximum marks.
- Attainment Level 3: **70%** students scoring more than 75% marks out of the relevant maximum marks.



Flowchart for attainment of Course Outcomes measuring tool

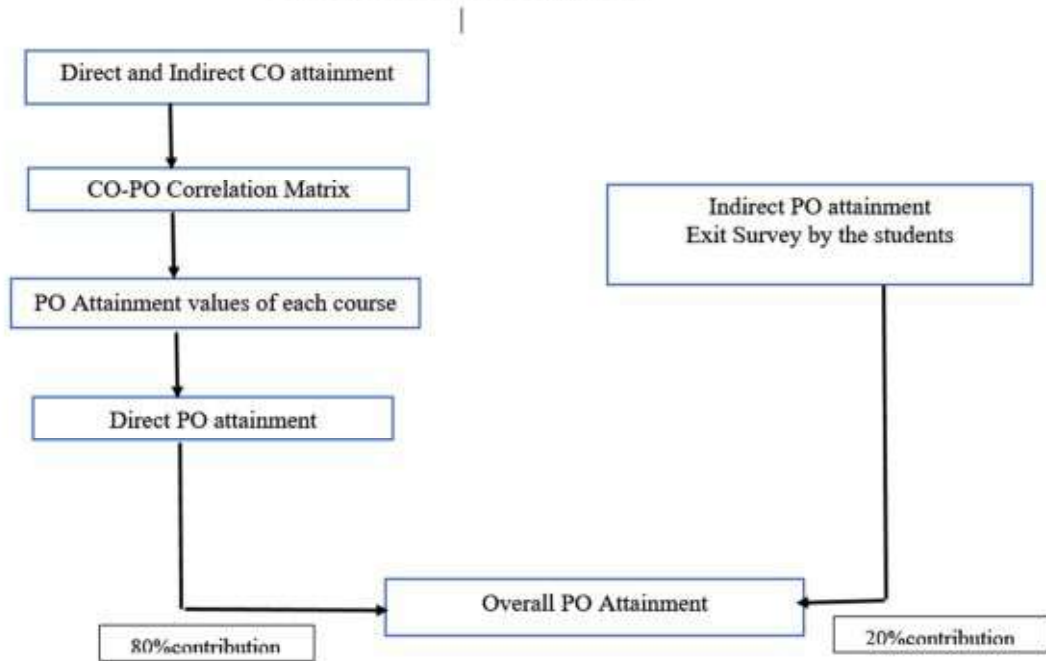
➤ **Attainment of Program Outcomes and Program Specific Outcomes:**

The assessment tools and process for the POs and PSOs attainment are done following an exhaustive procedure for all subjects. The curriculum courses are marked as professional core, free elective, professional electives of different modalities of execution such as theory courses, practical courses, design based courses, industrial training, seminar, projects, etc. encapsulate basic sciences and humanities. The CO versus PO matrix is developed for each course by making and using CO and PO statements. Each course module is split into around six course outcomes (CO's) and qualitative and quantitative analysis is done for every student as per the rubrics, the criteria of which are mainly developed by departmental faculty members.

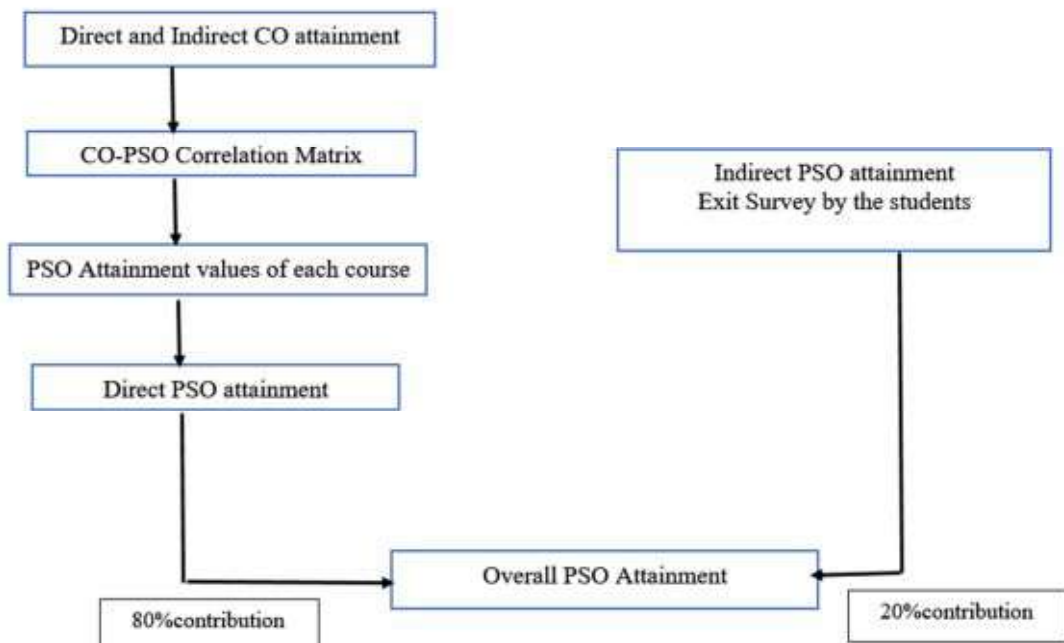
For each course, around six (06) potential outcomes (statements) are defined in terms of action verbs using Bloom's taxonomy to describe the different levels of performance indicators of an incumbent (graduate). These CO statements are subsequently applied and studied thoroughly to map with the PO's by different levels. Thus, CO v/s PO matrix is done for one course. Similar exercises are carried out to consider all courses [from 1st year, 1st semester courses to 4th year, 8th semester courses] and finally an overall Rank order correlation matrix of CO v/s PO is made for the complete B. Tech programme. The PSOs of B. Tech are derived from the POs and therefore similar process is adopted for developing CO v/s PSO correlation matrix.

Overall Attainment is calculated considering 80% of direct assessment and 20% of indirect assessment.

Framework of overall PO Attainment



Framework of overall PSO Attainment



➤ **Mechanism to support students for the achievement of PO's:**

Following initiatives involves content beyond the syllabus:

- Industrial Visits
- Industry Expert Lectures
- Guest Lectures
- Memberships in Professional societies
- Conferences and seminars organized and participated by students
- Communication skills improvement courses and programs

As evident from above, both Traditional and Innovative Techniques are used to ensure the attainment of course objectives and outcomes. To reinforce the content taught, formative assessment is done regularly through assignments and technical Quizzes, etc., and project work in industry, industrial training/ internships are organized for students.

Mapping Questions with Course Outcomes at appropriate levels of Bloom's Taxonomy and maps it with assessments:

Course coordinators Ensure to frame questions using Bloom's Taxonomy verbs from different Bloom's Taxonomy levels for the in semester tests (unit tests and Mid semester exam).

Reference: Sample question paper format in Appendix.

Measuring the performance of the students against the PO threshold for each semester:

This can be attained by taking course outcomes reports from each course Instruction team, and identify the levels of expectations fixed, level of learning actually took place and the gaps therein. Thereby propose necessary remedial actions to fill the gap in regard to each course and each student of the course.

➤ **CODE OF PROFESSIONAL ETHICS:**

Institute Principal

- Provide inspirational and motivational value-based academic and executive leadership to the college through policy formation, operational management, optimization of human resources and concern for environment and sustainability.

- Conduct himself/herself with transparency, fairness, honesty, highest degree of ethics and decision making that is in the best interest of the college.
- Act as steward of the College's assets in managing the resources responsibility, optimally, effectively and efficiently for providing a conducive working and learning environment.
- Promote the collaborative, shared and consultative work culture in the college, paving way for innovative thinking and ideas.
- Endeavour to promote a work culture and ethics that brings about quality, professionalism, satisfaction and service to the nation and society.
- Adhere to a responsible pattern of conduct and demeanor expected of them by the community.
- Manage their private affairs in a manner consistent with the dignity of the profession.
- Discourage and not indulge in plagiarism and other non-ethical behavior in teaching and research.
- Participate in extension, co-curricular and extra-curricular activities, including the community service.
- Refrain from allowing considerations of caste, creed, religion, race, gender or sex in their professional endeavor.
- Maintain contact with the guardians, their students; send reports of their performance to the guardians whenever necessary.

➤ **Code of conduct for faculty**

General

1. A person who chooses teaching as a career, assumes the obligation to conduct himself or herself at all times in accordance with the highest standards of the teaching profession, aiming at quality and excellence in work and conduct, setting an example which will command the respect of the pupils, the parents and colleagues.

2. Teaching, in its true sense, is not mere instruction but influence. The lecturer's duty is not merely to communicate knowledge in specific subjects but also to help students grow to their fullest potential and unfold their personality. In this responsible task what matters most is the personal example of the lecturer.

(a) Every faculty member shall by precept and example, instill in the minds of the pupils entrusted to his/her care following values:-

- Values of patriotism.
- Respect for law and order.
- Feeling of universal brotherhood and tolerance for all religions.
- Spirit of co-operation and social service.

(b) Every faculty member has an immense responsibility towards pupils. He/ she must: -

- Be impartial in his/her relations; be sympathetic and helpful to slow learners. Aim to improve physical, mental and moral well being of pupils leading to overall personality development.
- Ensure that pupils do not take part in active politics.
- Promote freedom of thought and expression coupled with discipline and dignity.

(c) Every faculty member should be above board in his/her personal conduct. He/She should:

-

- Be temperate and sober in habits. He/she should scrupulously avoid chewing of betel leaves, smoking and such other undesirable habits in the presence of students and within the precincts of the institution. Have an exemplary moral character. His/hers dealings with the members of the other sex in the institute or outside it, should not be such as would cause reflection on his/her character or bring discredit to the Institute.
- Be neat & clean and dressed in a dignified manner.
- Abide by the rules and regulations of the Institute and show due respect to the constituted authority and diligently carry out instructions issued to him/her.
- Be punctual in attendance and all work related to class work and any other work or duty assigned to him/her by the Principal.
- Consider institute Property and funds as if placed in trust with him/her and shall exercise the same prudence and care, as he/she would do in respect of his/her own property or funds.
- Promote dignity and Solidarity of his/her profession.
- Be polite and courteous towards parents and guardians.

(d) A faculty member must Not : -

- Divulge confidential matters related to the institution.

- Be a member of any political party or indulge in activities either openly or in camera in support of any such party.
- Be a member of the State or Central Legislature. He/She shall resign his/her job before Standing for election as a candidate.
- Indulge in or encourage any form of malpractice connected with examinations or other institute activities.
- Undertake private tuition of Students of the institute. Extra coaching organised in the institute campus after the institute hours will not be considered as “Private Tuition”. Engage himself/herself in any commercial activity or as a selling agent/ canvasser for any publishing firm or trader in institute campus.
- Represent his/her grievances if any, except through proper channel, nor will he/she canvass any non-official or outside influence or support in respect of any matter pertaining to his/her service in the institute.
- Accept or permit any member of his/her family or any other person acting on his/her behalf to accept any gift from any pupil, parent or any person with whom he/she has come into contact by virtue of his/her position in the institute.
- Notes 1. The expression “gift” shall include free transport, boarding, lodging or other service or any other pecuniary advantage when provided by any person other than a near relation or personal friend having no office dealings with him/her.
- Notes 2. A casual meal, fifth or other social hospitality of a casual nature shall not be deemed to be a gift.
- Notes 3. On occasions, such as weddings, anniversaries, funerals or religious functions when the making of a gift is in conformity with the prevailing religious or social practice, a lecturer may accept gift if the value thereof does not exceed Rs 500/-
- Ask for or accept contribution to or otherwise associate with the raising of any funds or other collections in cash or in kind in pursuance of any object, whatsoever, except with previous sanction of the competent authority.
- Discriminate against any student on the ground of caste, creed, language, place of

origin, social and cultural background or and any of them.

- Neglect in correcting assignments or neglect other duties assigned to him/her by the institute.
- Remain absent from the institute without leave or without the previous permission of the head of the institute. While being present in the institute absent himself/herself (except with the prior permission of the principal) from the class which he/she is required to take/attend.
- Practice or incite any student to practice' casteism, communalism or untouchability. θ Cause or incite any person to cause any damage to institute property.
- Propagate through his/her teaching lesson or otherwise, communal or sectarian outlook or incite or allow any student to indulge in communal and sectarian activities.
- Behave or encourage or incite any student, teacher or other employee to behave in rowdy or disorderly manner in the institute premises.
- Be guilty of misbehavior or cruelty towards any parent, guardian, student, teacher or other employees of the institute.
- Organize or attend any meeting in the institute except where he/she is required, or permitted by the principal of the institute to do so.
- Carry out monetary transactions with the pupils and parents and/ or exploit his/her institute influence for personal ends.
- Indulge in immoral activities. The above code of conduct will also apply to Director, Principal and members of nonteaching staff of the institute.

Appendix:

1. Sample Course Outcomes:

| Sr. No. | Semester | Course Code | Course Title | Course Outcomes: By the completion of course students will be able to | |
|---------|----------|-------------|------------------|---|--|
| 1 | V | BTCOC501 | Database Systems | CO1 | Illustrate evaluation of query construct. |
| | | | | CO2 | Draw schema diagram using relational model for the given information system. |
| | | | | CO3 | Investigate transaction satisfying the ACIDS properties. |
| | | | | CO4 | Identify the normal form of a given relation schema in database schema. |
| | | | | CO5 | Formulate query construct using relational algebra etc. |

1. Sample CO-PO-PSO Mapping:

| Sr. No. | Semester | Course Code | Course Title | C O/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | | | |
|---------|----------|-------------|------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|---|---|---|
| 1 | V | BTCOC 501 | Database Systems | CO1 | 1 | - | - | - | - | - | - | 1 | - | 1 | - | 1 | 1 | - | - | | |
| | | | | CO2 | 1 | - | - | 3 | - | - | - | - | 1 | - | 1 | - | 1 | 1 | - | - | |
| | | | | CO3 | - | - | 3 | - | - | - | - | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| | | | | CO4 | - | 1 | 2 | 3 | - | - | - | - | - | - | 1 | - | 1 | - | 1 | 1 | - |
| | | | | CO5 | 1 | - | - | 3 | - | - | - | - | - | - | 1 | - | 1 | - | 1 | 1 | - |

2. CO Attainment Target Level:

| Course Outcomes with code | Target Level | | | End of term assessment | In terms of % of Students and Marks |
|---------------------------|---------------------|--|--|------------------------|--|
| | Internal Assessment | In terms of % of Students and Marks | In terms of % of Students and Marks | | |
| CO1 | 2.0 | 60% Students scoring more than 65% Marks | 60% Students scoring more than 65% Marks | 2.0 | 60% Students scoring more than 65% Marks |
| CO2 | 2.0 | 60% Students scoring more than 65% Marks | 60% Students scoring more than 65% Marks | 2.0 | 60% Students scoring more than 65% Marks |
| CO3 | 2.0 | 60% Students scoring more than 65% Marks | 60% Students scoring more than 65% Marks | 2.0 | 60% Students scoring more than 65% Marks |
| CO4 | 2.0 | 60% Students scoring more than 65% Marks | 60% Students scoring more than 65% Marks | 2.0 | 60% Students scoring more than 65% Marks |
| CO5 | 2.0 | 60% Students scoring more than 65% Marks | 60% Students scoring more than 65% Marks | 2.0 | 60% Students scoring more than 65% Marks |

3. Sample Lecture Plan:

| Lect. No. | Detailed to be covered | Lecture Objectives | Lecture Outcomes | Date | | Teaching aid/ Pedagogy | Mapping to CO, PO, PSO | Remark |
|-----------|---|---|---|---------|--------|---------------------------|----------------------------------|--------|
| | | | | Planned | Actual | | | |
| 1 | Induction / Orientation Program: Lesson Plan, Evaluation Scheme | To Show & explain entire lesson plan, evaluation scheme for theory & Lab | Student will be able to plan study, prepare to get more marks, | | | | | |
| 2 | 1.1 Database System Applications, Purpose of Database Systems, View of Data, Database Languages, | To understand Database System Applications, Purpose of Database Systems, View of Data, Database Languages, | Student will be able to explain Database System Applications, Purpose of Database Systems, View of Data, Database Languages, | | | PPT | CO2,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 3 | 1.2 Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture | To understand Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture | Student will be able to explain Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture | | | PPT | CO2,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 4 | 1.3 ER model concepts, notation for ER diagram, Constraints, keys, E-R Diagrams, | To understand ER model concepts, notation for ER diagram, Constraints, keys, E-R Diagrams, | Student will be able to draw ER model concepts, notation for ER diagram, Constraints, keys, E-R Diagrams, | | | PPT | CO2,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 5 | 1.4 Mapping Cardinality, Concepts of Super Key, candidate key, primary key, | To understand Mapping Cardinality, Concepts of Super Key, candidate key, primary key, | Student will be able to illustrate Mapping Cardinality, Concepts of Super Key, candidate key, primary key, | | | PPT | CO2,PO1, PO4,PO8, PO10,PO12,PSO1 | |

| Lect. No. | Detailed to be covered | Lecture Objectives | Lecture Outcomes | Date | | Teaching aid/ Pedagogy | Mapping to CO, PO, PSO | Remark |
|-----------|--|---|---|---------|--------|---------------------------|----------------------------------|--------|
| | | | | Planned | Actual | | | |
| 6 | 1.5 weak entity sets, Codd's rules, Extended ER model, Generalization, Aggregation, | To understand weak entity sets, Codd's rules, Extended ER model, Generalization, Aggregation, | Student will be able to explain weak entity sets, Codd's rules, Extended ER model, Generalization, Aggregation, | | | PPT | CO2,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 7 | 1.6 Reduction of an ER diagrams to tables. | To understand Reduction of an ER diagrams to tables. | Student will be able to perform Reduction of an ER diagrams to tables. | | | PPT, White board | CO2,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 8 | 2.1 Structure of Relational Databases, Database Schema, Keys | To understand Structure of Relational Databases, Database Schema, Keys | Student will be able to explain Structure of Relational Databases, Database Schema, Keys | | | PPT | CO2,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 9 | 2.2 Fundamental Operations, | To understand Fundamental Operations, | Student will be able to explain Fundamental Operations, | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO1 | |
| 10 | 2.3 Additional Relational Algebra Operations, | To understand Additional Relational Algebra Operations, | Student will be able to explain Additional Relational Algebra Operations, | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO1 | |
| 11 | 2.4 Extended Relational Algebra Operations.-1 | To understand Extended Relational Algebra Operations.-1 | Student will be able to explain Extended Relational Algebra Operations.-1 | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO1 | |
| 12 | 2.5 Extended Relational Algebra Operations.-2 | To understand Extended Relational Algebra Operations.-2 | Student will be able to explain Extended Relational Algebra Operations.-2 | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO1 | |
| 13 | 2.6 Tuple relational calculus,-1 | To understand Tuple relational calculus,-1 | Student will be able to explain Tuple relational calculus,-1 | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO1 | |

| Lect. No. | Detailed to be covered | Lecture Objectives | Lecture Outcomes | Date | | Teaching aid/ Pedagogy | Mapping to CO, PO, PSO | Remark |
|-----------|--|---|---|---------|--------|---------------------------|----------------------------------|--------|
| | | | | Planned | Actual | | | |
| 14 | 2.7 Tuple relational calculus,-2 | To understand Tuple relational calculus,-2 | Student will be able to explain Tuple relational calculus,-2 | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO | |
| 15 | 2.8 Domain relational Calculus, | To understand Domain relational Calculus, | Student will be able to explain Domain relational Calculus, | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO | |
| 16 | 2.9 calculus vs algebra, | To understand calculus vs algebra, | Student will be able to explain calculus vs algebra, | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO | |
| 17 | 2.1 0 Computational capabilities. | To understand Computational capabilities. | Student will be able to explain Computational capabilities. | | | PPT, White board | CO1,PO1, PO8,PO10, PO12,PSO | |
| 18 | 3.1 Overview of SQL, SQL Data Definition, Basic Structure of SQL Queries, | To understand Overview of SQL, SQL Data Definition, Basic Structure of SQL Queries, | Student will be able to explain Overview of SQL, SQL Data Definition, Basic Structure of SQL Queries, | | | PPT, White board | CO5,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 19 | 3.2 Additional Basic Operators, Set Operations, Null Values, Aggregate Functions, | To understand Additional Basic Operators, Set Operations, Null Values, Aggregate Functions, | Student will be able to explain Additional Basic Operators, Set Operations, Null Values, Aggregate Functions, | | | PPT, White board | CO5,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 20 | 3.3 Nested Subqueries, Modification of the Database | To understand Nested Subqueries, Modification of the Database | Student will be able to explain Nested Subqueries, Modification of the Database | | | PPT, White board | CO5,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 21 | 3.4 Join Expressions, Views, | To understand Join | Student will be able to | | | PPT, White board | CO5,PO1, | |

| Lect. No. | Detailed to be covered | Lecture Objectives | Lecture Outcomes | Date | | Teaching aid/ Pedagogy | Mapping to CO, PO, PSO | Remark |
|-----------|--|--|--|---------|--------|---------------------------|---------------------------------------|--------|
| | | | | Planned | Actual | | | |
| | Transactions, Integrity Constraints, | Expressions, Views, Transactions, Integrity Constraints, | explain Join Expressions, Views, Transactions, Integrity Constraints, | | | board | PO4,PO8, PO10,PO12,PSO1 | |
| 22 | SQL Data Types and Schema, Authorization, | To understand SQL Data Types and Schema, Authorization, | Student will be able to explain SQL Data Types and Schema, Authorization, | | | PPT, White board | CO5,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 23 | Assessing SQL from Programming Language, JDBC, ODBC, Embedded SQL, Functions and Procedures, Triggers, | To understand Assessing SQL from Programming Language, JDBC, ODBC, Embedded SQL, Functions and Procedures, Triggers, | Student will be able to explain Assessing SQL from Programming Language, JDBC, ODBC, Embedded SQL, Functions and Procedures, Triggers, | | | PPT, White board | CO5,PO1, PO4,PO8, PO10,PO12,PSO1 | |
| 24 | Features of good relational designs, | To understand Features of good relational designs, | Student will be able to explain Features of good relational designs, | | | PPT, White board | CO4,PO2, PO3,PO4, PO8,PO10, PO12,PSO1 | |
| 25 | Functional dependencies, | To understand Functional dependencies, | Student will be able to explain Functional dependencies, | | | PPT, White board | CO4,PO2, PO3,PO4, PO8,PO10, PO12,PSO1 | |
| 26 | Normal forms, First, Second, | To understand Normal forms, First, Second, | Student will be able to explain Normal forms, First, Second, | | | PPT, White board | CO4,PO2, PO3,PO4, PO8,PO10, PO12,PSO1 | |
| 27 | Third normal forms, | To understand Third normal forms, | Student will be able to explain Third normal forms, | | | PPT, White board | CO4,PO2, PO3,PO4, PO8,PO10, PO12,PSO1 | |

| Lect. No. | Detailed to be covered | Lecture Objectives | Lecture Outcomes | Date | | Teaching aid/ Pedagogy | Mapping to CO, PO, PSO | Remark |
|-----------|--|---|---|---------|--------|---------------------------|--|--------|
| | | | | Planned | Actual | | | |
| 28 | 4.5 BCNF, | To understand BCNF, | Student will be able to explain BCNF, | | | PPT, White board | PO12,PSO 1 | |
| 29 | 4.6 Functional Dependency Theory, Multivalued Dependencies, | To understand Functional Dependency Theory, Multivalued Dependencies, | Student will be able to explain Functional Dependency Theory, Multivalued Dependencies, | | | PPT, White board | CO4,PO2, PO3,PO4, PO8,PO10, PO12,PSO 1 | |
| 30 | 4.7 Fourth Normal Form, | To understand Fourth Normal Form, | Student will be able to explain Fourth Normal Form, | | | PPT, White board | CO4,PO2, PO3,PO4, PO8,PO10, PO12,PSO 1 | |
| 31 | 4.8 Database Design Process | To understand Database Design Process | Student will be able to explain Database Design Process | | | PPT, White board | CO4,PO2, PO3,PO4, PO8,PO10, PO12,PSO 1 | |
| 32 | 5.1 File Organization, Ordered Indices, | To understand File Organization, Ordered Indices, | Student will be able to explain File Organization, Ordered Indices, | | | PPT | CO1,PO1, PO8,PO10, PO12,PSO 1 | |
| 33 | 5.2 B+tree Index files, | To understand B+tree Index files, | Student will be able to explain B+tree Index files, | | | PPT | CO1,PO1, PO8,PO10, PO12,PSO 1 | |
| 34 | 5.3 B Tree Index File, Static Hashing, Dynamic Hashing, | To understand B Tree Index File, Static Hashing, Dynamic Hashing, | Student will be able to explain B Tree Index File, Static Hashing, Dynamic Hashing, | | | PPT | CO1,PO1, PO8,PO10, PO12,PSO 1 | |

| Lect. No. | Detailed to be covered | Lecture Objectives | Lecture Outcomes | Date | | Teaching aid/ Pedagogy | Mapping to CO, PO, PSO | Remark |
|-----------|--|---|---|---------|--------|---------------------------|-----------------------------|--------|
| | | | | Planned | Actual | | | |
| | | Hashing. | Hashing. | | | | I | |
| 35 | 5.4 Overview, Measures of Query Cost, Selection Operation, | To understand Overview, Measures of Query Cost, Selection Operation, | Student will be able to explain Overview, Measures of Query Cost, Selection Operation, | | | PPT | CO1,PO1, PO8,PO10, PO12,PSO | |
| 36 | 5.5 Evaluation of relational algebra expressions, | To understand Evaluation of relational algebra expressions, | Student will be able to explain Evaluation of relational algebra expressions, | | | PPT | CO1,PO1, PO8,PO10, PO12,PSO | |
| 37 | 5.6 Query Optimization, Query equivalence Rules, Join strategies. | To understand Query Optimization, Query equivalence Rules, Join strategies. | Student will be able to explain Query Optimization, Query equivalence Rules, Join strategies. | | | PPT | CO1,PO1, PO8,PO10, PO12,PSO | |
| 38 | 6.1 Transaction Concept, A simple Transaction Model, | To understand Transaction Concept, A simple Transaction Model, | Student will be able to explain Transaction Concept, A simple Transaction Model, | | | PPT | CO3,PO3, PO8,PO10, PO12,PSO | |
| 39 | 6.2 Transaction Atomicity and Durability, | To understand Transaction Atomicity and Durability, | Student will be able to explain Transaction Atomicity and Durability, | | | PPT | CO3,PO3, PO8,PO10, PO12,PSO | |
| 40 | 6.3 Transaction Isolation, ACID Properties, | To understand Transaction Isolation, ACID Properties, | Student will be able to explain Transaction Isolation, ACID Properties, | | | PPT | CO3,PO3, PO8,PO10, PO12,PSO | |
| 41 | 6.4 Serializability Concurrency Control Techniques: Lock based Protocols, | To understand Serializability Concurrency Control Techniques: Lock | Student will be able to explain Serializability Concurrency Control Techniques: Lock | | | PPT | CO3,PO3, PO8,PO10, PO12,PSO | |

| Lect. No. | Detailed to be covered | Lecture Objectives | Lecture Outcomes | Date | | Teaching aid/ Pedagogy | Mapping to CO, PO, PSO | Remark |
|-----------|--|--|--|---------|--------|---------------------------|--|--------|
| | | | | Planned | Actual | | | |
| 42 | 6.5 Deadlock handling. Multiple Granularity, | based Protocols, To understand Deadlock handling. Multiple Granularity, | based Protocols, Student will be able to explain Deadlock handling, Multiple Granularity, | | | PPT | CO3,PO3, PO8,PO10, PO12,PSO I | |
| 43 | 6.6 Time stamp-Based Protocols, Recovery System | To understand Time stamp-Based Protocols, Recovery System | Student will be able to explain Time stamp-Based Protocols, Recovery System | | | PPT | CO3,PO3, PO8,PO10, PO12,PSO I | |

4. Course Outcome Evaluation Plan:

| Course Outcome | Unit Test-1 | Unit Test-2 | Mid Sem Exam | Assignment | End Sem Exam |
|----------------|-------------|-------------|--------------|------------|--------------|
| Weightage | 20 | 20 | 20 | 10 | 60 |
| CO1 | 5 | - | - | - | - |
| CO2 | 10 | - | - | - | - |
| CO3 | - | 10 | - | - | - |
| CO4 | - | 10 | - | - | - |
| CO5 | 5 | - | - | - | - |

In Semester Evaluation-Attainment:

| Attainment Level | Student Marks | Calculation |
|------------------|---------------|--|
| 1 | 75 | 50 % of students scored more than 75% of marks |
| 2 | 75 | 60 % of students scored more than 75% of marks |
| 3 | 75 | 70 % of students scored more than 75% of marks |

End Semester Evaluation-Attainment:

| Attainment Level | Student Marks | Calculation |
|------------------|---------------|--|
| 1 | 65 | 50 % of students scored more than 65% of marks |
| 2 | 65 | 60 % of students scored more than 65% of marks |
| 3 | 65 | 70 % of students scored more than 65% of marks |

5. Course Attainment Calculation Sheet:

Course Code: BTCOC501 Semester: V
 Course Name: Database System
 Credits: 4
 Batch: 2019-20
 Faculty: Mr. Uchale B. S.

| Assessment Tool | Unit Test 1 | | | | Mid Sem Exam | | | Unit Test-2 | Assignment | End Sem Exam |
|-------------------------|-------------|-----|-----|-----|--------------|-----|-----|-------------|------------|--------------|
| | Q-1 | Q-2 | Q-3 | Q-4 | Q-1 | Q-2 | Q-3 | | | |
| Question | 5 | 5 | 5 | 5 | 5 | 10 | 5 | - | - | - |
| Marks | | | | | | | | 20 | 10 | 60 |
| Related to CO | CO1 | CO2 | CO2 | CO5 | CO4 | CO2 | CO5 | CO-3 to CO4 | CO1 to CO5 | CO1 to CO5 |
| PRN | | | | | | | | | | |
| =51627020171124510002"" | 4 | 5 | 5 | 4 | 2 | 8 | 4 | 16 | 10 | 38 |
| =51627020171124510005"" | 4 | 3 | 5 | 4 | 2 | 3 | 4 | 11 | 7 | 30 |
| =51627020171124510006"" | 4 | 5 | 5 | 4 | 2 | 8 | 4 | 14 | 10 | 36 |
| =51627020171124510007"" | 4 | 2 | 5 | 4 | 5 | 8 | | 11 | 9 | 29 |
| =51627020171124510008"" | 3 | 2 | 3 | 1 | 4 | 7 | 2 | 15 | 9 | 29 |
| =51627020171124510009"" | 4 | 1 | 3 | 4 | 4 | 8 | 4 | 16 | 10 | 30 |
| =51627020171124510010"" | 4 | 1 | 3 | 1 | 6 | 3 | 2 | 4 | 10 | 21 |
| =51627020171124510011"" | 4 | 2 | 2 | 4 | 4 | 7 | | 9 | 7 | 17 |
| =51627020171124510012"" | 4 | 3 | 2 | 5 | 4 | 8 | | 14 | 9 | 28 |
| =51627020171124510013"" | 4 | 2 | 4 | 5 | 4 | 4 | 4 | 12 | 7 | 36 |
| =51627020171124510015"" | 4 | 3 | 4 | 4 | 4 | 8 | 2 | 12 | 10 | 33 |
| =51627020171124510016"" | 4 | 2 | 3 | 5 | 5 | 8 | 2 | 12 | 10 | 29 |
| =51627020171124510017"" | 4 | 3 | 4 | 5 | 3 | 8 | 2 | 16 | 9 | 33 |

| | | | | | | |
|------------------------------------|-----|----|----|----|-----|----|
| No. of Students above 75%/65% | 61 | 34 | 38 | 38 | 43 | 9 |
| % of students above 75%/65% | 71 | 40 | 45 | 45 | 50 | 11 |
| Attainment Level is | 3 | 0 | 0 | 0 | 1 | 0 |
| CO Attainment through ISE is | 1.2 | 0 | 0 | 0 | 0.4 | - |
| CO Attainment level through ESE is | 0 | 0 | 0 | 0 | 0 | |
| Final Attainment | 1.2 | 0 | 0 | 0 | 0.4 | |

6. Final CO Attainment :

| Sr. No. | Semester | Course Code | Course Title | Course Outcomes/Program Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | | |
|---------|----------|-------------|------------------|----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|-----|-----|
| 1 | V | BTCOC501 | Database Systems | CO1 | 1.2 | - | - | - | - | - | - | 1.2 | - | 1.2 | - | 1.2 | 1.2 | - | | |
| | | | | CO2 | 0 | - | - | 0 | - | - | - | - | - | 0 | - | 0 | - | 0 | - | |
| | | | | CO3 | - | - | 0 | - | - | - | - | - | - | - | 0 | - | 0 | - | 0 | - |
| | | | | CO4 | - | 0 | 0 | 0 | - | - | - | - | - | - | 0 | - | 0 | - | 0 | 0 |
| | | | | CO5 | 0.4 | - | - | 0.4 | - | - | 0.4 | - | - | - | 0.4 | - | 0.4 | - | 0.4 | 0.4 |
| | | | | | 0.5 | 0 | 0 | 0.1 | - | - | - | 0.4 | - | 0.4 | - | 0.4 | 0.4 | - | | |

7. Sample Question Paper:

| <p style="text-align: center;">Rayat Shikshan Sanstha's Karmaveer Bhaurao Patil College of Engineering, Satara (Affiliated To Dr. Babasaheb Ambedkar Technological University, Lonere)</p> <p style="text-align: center;">Mid Semester Examination – December 2021</p> <p>Course: B. Tech in Computer Science and Engineering Sem: Vth Course Name: Database System Course Code: BTCOC501 Max Marks: 20 Date:- Duration:- 1 Hr.</p> | | | | | |
|---|--|-------|-----|----|-----|
| Instructions to the Students: 1. All questions are compulsory. 2. Assume suitable data if required and mention it. | | | | | |
| | | Marks | CO | BL | PO |
| Q.1 | Multiple Choice Questions | 6 | | | |
| | a. Which of the following is NOT a superkey in a relational schema with attributes V,W,X,Y,Z and primary key VY? 1. VXYZ 2. VWXZ 3. VWXY 4. VWXYZ | | CO2 | 1 | PO1 |
| | b. Consider two relations R1(A,B) with the tuples(1, 5), (3, 7) and R2(A, C) = (1, 7), (4, 9). Assume that R(A,B,C) is the full natural outer join of R1 and R2. Consider the following tuples of the form (A, B, C): a =(1, 5, null), b =(1, null, 7), c = (3, null, 9), d = (4, 7, null), e = (1, 5, 7), f = (3, 7, null), g = (4, null, 9). Which one of the following statements is correct? 1. R contains a, b, e, f, g but not c, d. 2. R contains all of a, b, c, d, e, f, g. 3. R contains e, f, g but not a, b. 4. R contains e but not f,g. | | CO3 | 1 | PO1 |
| | c . SELECT operation in SQL is equivalent to 1. the selection operation in relational algebra 2. the selection operation in relational algebra, except that SELECT in SQL retains duplicates 3. the projection operation in relational algebra 4. the projection operation in relational algebra, except that SELECT in SQL retains duplicates | | CO2 | 1 | PO1 |
| | d. The command to remove rows from a table 'CUSTOMER' is: 1. REMOVE FROM CUSTOMER ... 2. DROP FROM CUSTOMER ... 3. DELETE FROM CUSTOMER WHERE 4. UPDATE FROM CUSTOMER ... | | CO3 | 1 | PO1 |
| | e. Some of these insert statements will produce an error. Identify the statement. CREATE TABLE employee (id INTEGER, name VARCHAR(20),salary NOT NULL);INSERT INTO employee VALUES (1005,Rach,0);INSERT INTO employee VALUES (1007,Ross,);INSERT INTO employee VALUES (1002,Joey,335); | | CO3 | 1 | PO1 |

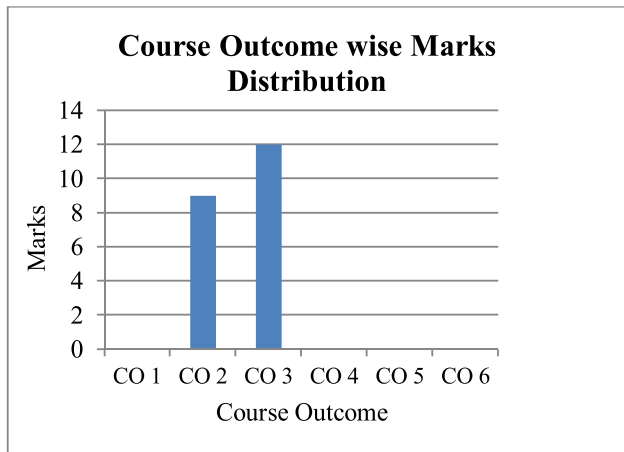
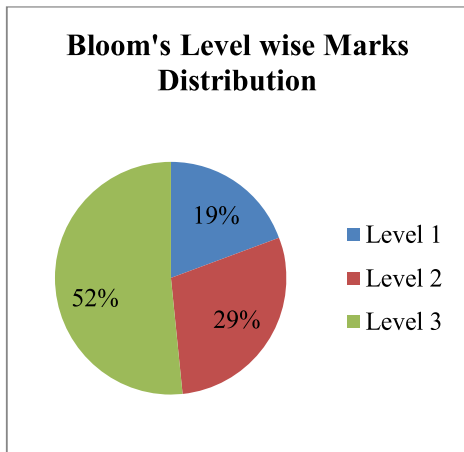
| | | | | | |
|-----|---|---|-----|---|-------------|
| | <ol style="list-style-type: none"> 1. Insert into employee values (1005,Rach,0); 2. Insert into employee values (1002,Joey,335); 3. Insert into employee values (1007,Ross,); 4. None of the mentioned | | | | |
| | <p>f. Aggregate functions can be used in the select list or the _____ clause of a select statement or subquery. They cannot be used in a _____ clause.</p> <ol style="list-style-type: none"> 1. Where, having 2. Having, where 3. Group by, having 4. Group by, where | | CO3 | 1 | PO1 |
| Q.2 | Attempt any two of the following | 6 | | | |
| | a. Define Super Key, Candidate Key and Primary Key. | | CO2 | 2 | PO1 |
| | b. Explain any three relational algebra operators. | | CO2 | 2 | PO1 |
| | c. Write your opinion on expressing power of Safe Relational algebra query and Safe Relational calculus query? Justify your opinion. Explain any extended relational algebra operators. | | CO2 | 2 | PO1 PO10 |
| Q.3 | Attempt any one of the following | 8 | | | |
| | <p>a. Write the following queries in SQL, using the following university schema.</p> <p>classroom(<u>building</u>, <u>room number</u>, capacity) department(<u>dept name</u>, building, budget) course(<u>course id</u>, title, dept name, credits) instructor(<u>ID</u>, name, dept name, salary) section(<u>course id</u>, <u>sec id</u>, <u>semester</u>, <u>year</u>, building, room number, time slot id) teaches(<u>ID</u>, <u>course id</u>, <u>sec id</u>, <u>semester</u>, <u>year</u>) student(<u>ID</u>, name, dept name, tot cred) takes(<u>ID</u>, <u>course id</u>, <u>sec id</u>, <u>semester</u>, <u>year</u>, grade) advisor(<u>s ID</u>, <u>i ID</u>) time slot(<u>time slot id</u>, <u>day</u>, <u>start time</u>, end time) prereq(<u>course id</u>, <u>prereq id</u>)</p> <ol style="list-style-type: none"> 1. Find all instructors earning the highest salary (there may be more than one with the same salary). 2. Find the enrollment of each section that was offered in Autumn 2009. 3. Find the maximum enrollment, across all sections, in Autumn 2009. 4. Find the sections that had the maximum enrollment in Autumn 2009. | | CO3 | 3 | PO1 PO2 |
| | <p>b. Write the following queries in SQL, using the following university schema.</p> <p>classroom(<u>building</u>, <u>room number</u>, capacity) department(<u>dept name</u>, building, budget) course(<u>course id</u>, title, dept name, credits) instructor(<u>ID</u>, name, dept name, salary) section(<u>course id</u>, <u>sec id</u>, <u>semester</u>, <u>year</u>, building, room number, time slot id) teaches(<u>ID</u>, <u>course id</u>, <u>sec id</u>, <u>semester</u>, <u>year</u>)</p> | | CO3 | 3 | PO1 PO2 |

| | | | | |
|--|--|--|--|--|
| <p>student(<u>ID</u>, name, dept name, tot cred) takes(<u>ID</u>, <u>course id</u>, <u>sec id</u>, <u>semester</u>, <u>year</u>, grade) advisor(<u>s ID</u>, <u>i ID</u>) time slot(<u>time slot id</u>, <u>day</u>, <u>start time</u>, end time) prereq(<u>course id</u>, <u>prereq id</u>)</p> <ol style="list-style-type: none"> 1. Consider again the clerk who needs to access all data in the instructor relation, except salary. A view relation faculty can be made available to the clerk. 2. Create a view that lists all course sections offered by the Physics department in the Fall 2009 semester with the building and room number of each section 3. Display a list of all students in the Comp. Sci. department, along with the course sections, if any, that they have taken in Spring 2009; all course sections from Spring 2009 must be displayed, even if no student from the Comp. Sci. department has taken the course section. 4. Suppose that all instructors with salary over \$100,000 receive a 3 percent raise, whereas all others receive a 5 percent raise. | | | | |
|--|--|--|--|--|

BL – Bloom’s Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)

CO- Course Outcome

PO- Program Outcome



Dear Student

The Department of Computer Science and Engineering, Karmaveer Bhaurao Patil College of Engineering, Satara require feedback from our stakeholders i.e. Alumni Members, Employers, parents , students and staff, to gauge whether the B-Tech (Computer Science and Engineering) programme offered by our department is sufficient in preparing the students to be a competent engineer for professional life after their graduation.

The objectives of the survey are:

- (i) To collect the suggestions for reviewing the vision and mission of the department
 - (ii) To gather information on the importance of the Program Educational Outcomes (PEO) and program Outcomes (PO) statements
 - (iii) To gauge our graduates' accomplishments after graduation (PEO) and also to measure their attributes after completing the programme (PO)
-

Name:

Year of admission:

Year of Graduation:

Contact Number:

Email Id:

1. Indicate how well do you agree with mission and vision of the department
 - Strongly disagree
 - Disagree
 - Can't say
 - Agree
 - Strongly agree
2. Indicate how well do you agree with each PEOs as a predicted accomplishment for the degree.

| PEOs | Degree of Relevance | | | | |
|--|---------------------|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| PEO1: Graduates of UG program in CSE will make valuable contributions to design, development and production in the practice of computer science and related engineering or application areas particularly in software systems. | | | | | |
| PEO2: Graduates of UG program in CSE will | | | | | |

| | | | | | |
|---|--|--|--|--|--|
| engage in professional development or post-graduation to pursue flexible career paths amid future technological changes. | | | | | |
| PEO3: Graduates of UG program in CSE will be responsible computing professionals with a sense of societal and ethical values. | | | | | |

1-Least relevant 2- Less relevant 3- Can't say 4- relevant 5- Very relevant

3. Do you suggest any changes in the PEOs? (Specify)

| |
|--|
| |
|--|

4. Indicate how well do you agree with each POs as a predicted accomplishment for this programme.

| POs | Degree of Relevance | | | | |
|---|---------------------|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 1. Engineering knowledge | | | | | |
| 2. Problem analysis | | | | | |
| 3. Design/development of solutions | | | | | |
| 4. Conduct investigations of complex problems | | | | | |
| 5. Modern tool usage | | | | | |
| 6. The engineer and society | | | | | |
| 7. Environment and sustainability | | | | | |
| 8. Ethics | | | | | |
| 9. Individual and team work | | | | | |
| 10. Communication | | | | | |
| 11. Project management and finance | | | | | |
| 12. Life-long learning | | | | | |

1-Least relevant 2- Less relevant 3- Can't say 4- relevant 5- Very relevant

5. Indicate how well do you agree with each PSOs as a predicted accomplishment for the degree.

| PSOs | Degree of Relevance | | | | |
|---|---------------------|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| PSO1: Graduates of UG program in CSE will apply knowledge of programming languages, database systems, data analytics techniques and computer networking to solve real word problems. | | | | | |
| PSO2: Graduates of UG program in CSE will apply knowledge of machine learning and intelligence to identify, formulate and solve complex engineering problems. | | | | | |
| PSO3: Graduates of UG program in CSE will design and develop software using advanced technologies like open source tools, mobile app development platforms, IOT, web technologies and cloud computing | | | | | |

1-Least relevant 2- Less relevant 3- Can't say 4- relevant 5- Very relevant

6. List a few courses that you wish to include in the B.Tech (Computer science and Engineering) programme which you think are important for building up a good career.
7. Do you agree that the course outcomes of this programme help to achieve the PEOs
- Strongly disagree
 - Disagree
 - Can't say
 - Agree
 - Strongly agree

Place:

Name:

Date:

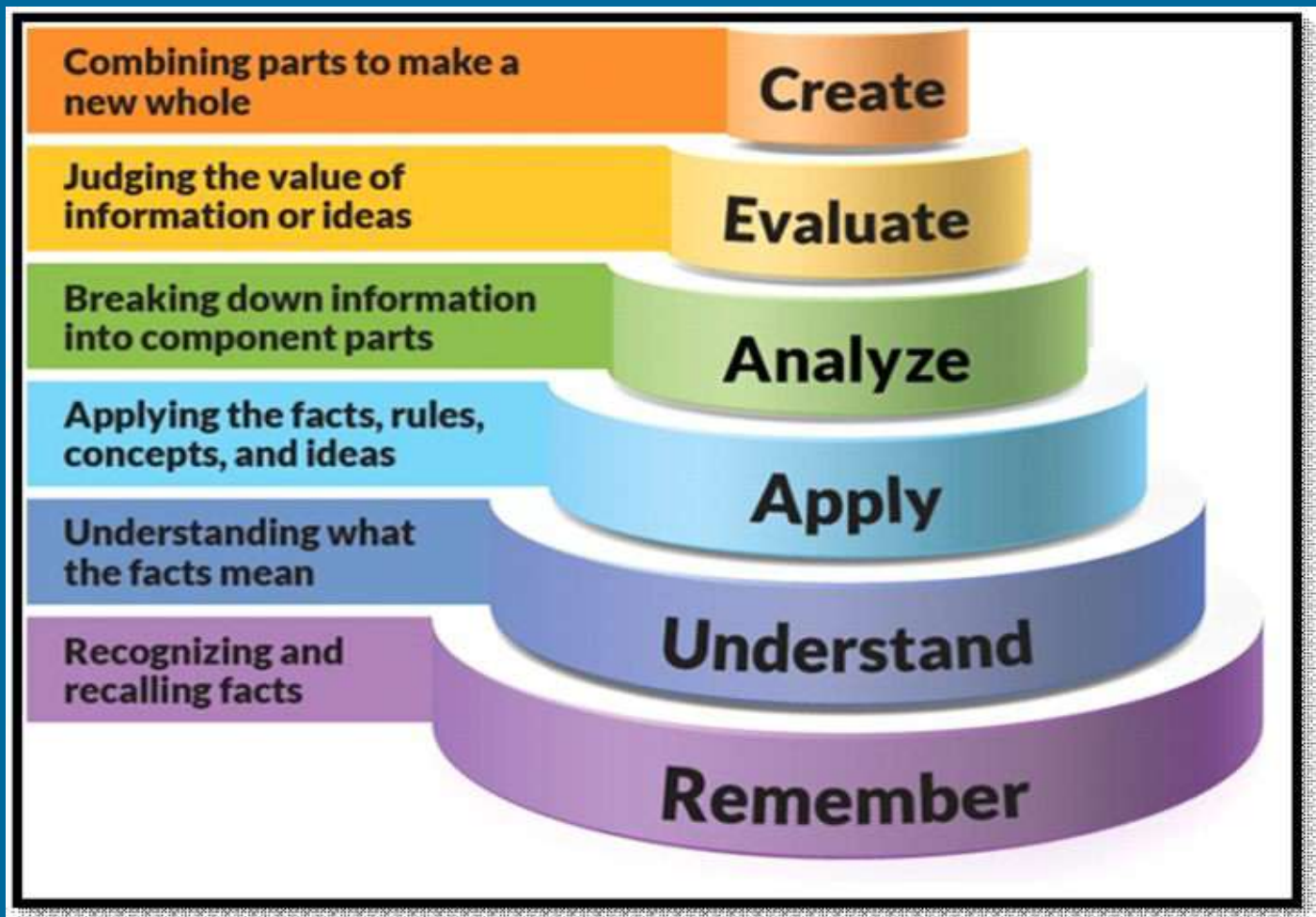
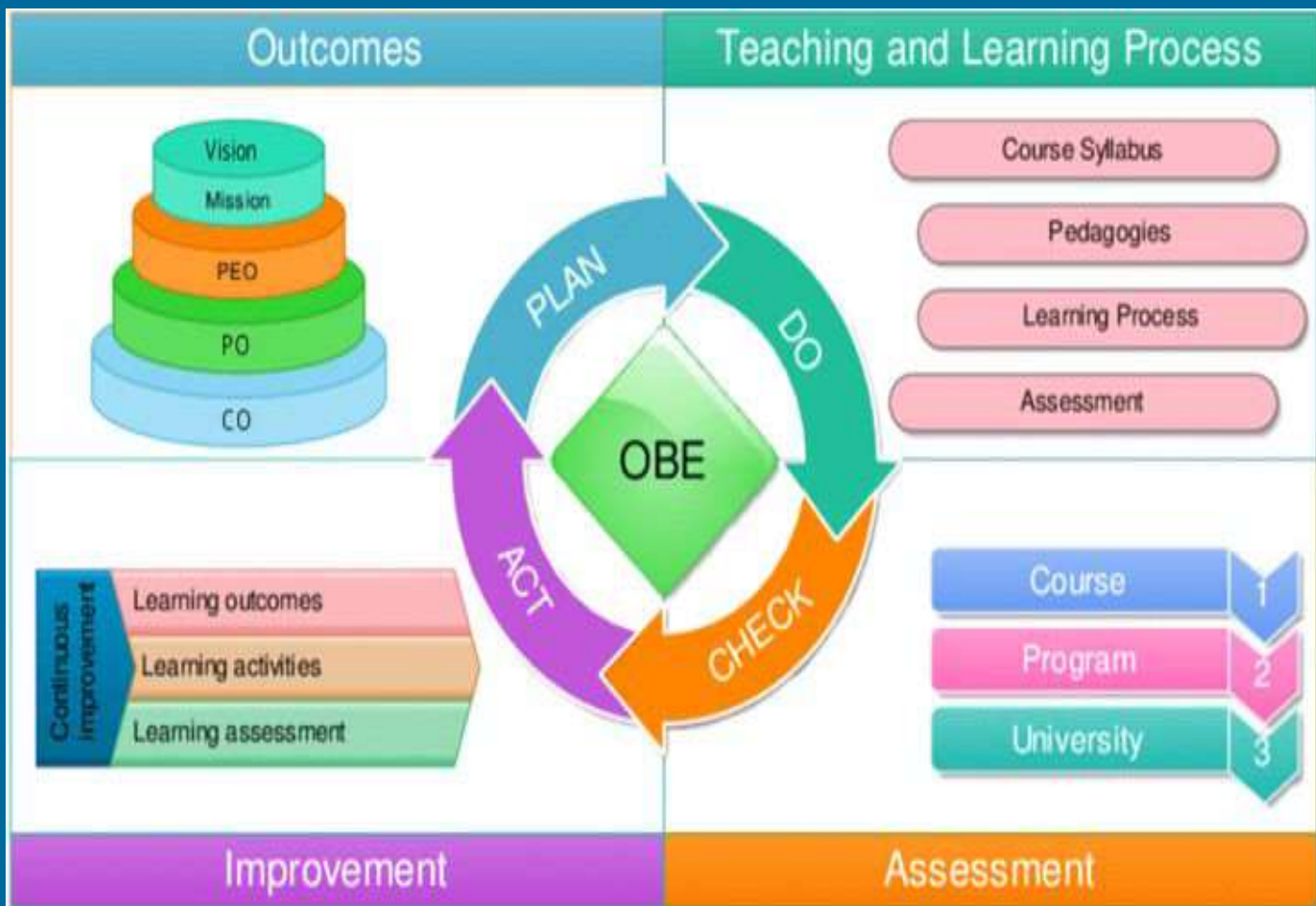
Signature:

The Department of Computer Science and Engineering would like to thank you for your willingness in spending your valuable time to complete this questionnaire.

Your time and effort is much appreciated. After completing the form, please send a scanned copy of the form to hodcse@kbpcoes.edu.in or send the print out version of this form to the address given below.

(N.B: Please refer to the annexure for the details about vision and mission of the department, PEOs, PSOs and POs)

Head of the Department
Department of Computer Science and Engineering,
Karmaveer Bhaurao Patil College of Engineering,
Satara,



KBPCOES



Since : 1983

Rayat Shikshan Sanstha's

Karmaveer Bhaurao Patil College of Engineering, Satara

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