Outcome Based Education and NBA Accreditation

Deficiencies of Traditional Education / Output based Education

- Output measured is: Performance of students in terms of their grades or percentage of marks.
- Lack of emphasis on skills needed in jobs.

Outcome-Based Education (OBE)

- Engineering graduates are assessed by their:
  - **Knowledge (Theory, concepts and fundamentals)**
  - **Skills (Soft skills, interpersonal skills, analytical skills)**
  - **Behaviour (Attitude and Values)**

- Outcome based education (OBE) is a student-centered instruction model that focuses on measuring student performance through outcomes.

- Key constituents of Outcomes Based Education :

  Program Educational Objectives (PEO)

  Program Outcomes (PO) and Program Specific Outcomes (PSO)

  Course Outcomes (CO)

Outcome Based Education (OBE)

- OBE is a process designed to reflect the achievement of high order learning rather than accumulation of course credits.

- OBE is implemented through:
  - Curriculum Restructuring/Revision
  - Innovative/Flexible Delivery Method
  - Variety of Assessment & Evaluation Methods
  - Collection of Evidences
  - Continuous Quality Improvement

Stake holders of an Institute

1. Students
2. Faculty
3. Support Staff
4. Industry and Employers
5. Parents
6. Government
7. Society

What stakeholders look for

1. Infrastructure, Buildings and Facilities
2. Faculty, Teaching Learning
3. Industry Interaction, Brand
4. Employability, Placement record
5. What students can do after graduating??
6. Whether institute provides all that is necessary for a confident engineer of tomorrow, prepare a 21st Century engineer

Accreditation

- What is accreditation?
  - It Assures Program Quality
  - Recognition by the stakeholders
  - Branding
  - Washington accord :
    - India a signatory nation
  - Recognition of graduates globally
- What it is not ….
  - Not a award system (Gold, Silver, 1,2,3,..)
  - Not an Investigation of a complaint
  - Not a *Regulatory Process.*
  - Not an Audit
  - Accreditation is not even a ranking system.

Need of Accreditation for Engineering Programs

- In many countries:
  - No person is allowed to practice unless he is a professional engineer
  - Graduate engineers to register before taking up employment as an engineer
- *International Mobility (Washington Accord)*
  - The Washington Accord: Agreement that establishes equivalence of other countries' accredited professional engineering programs.
  - Accredited Engineering Programs Graduates are recognized by other signatory countries – *Possible employment as engineers in those countries without further examinations.*
  - Established in 1989

Need of Accreditation for Engineering Programs

- Accreditation provides assurance that a college or university program meets the quality standards of the profession for which that program prepares its graduates.

- *National Board of Accreditation (NBA) – INDIA*

- Accreditation Board for Engineering and Technology (ABET) - US

About NBA (*National Board of Accreditation)*

- Established in the year 1994 under Section 10 (u) of AICTE Act.
- NBA became Autonomous in January 2010
- In April 2013 NBA became completely independent of AICTE, administratively as well as financially.
- NBA Accreditation process is now outcome based under two categories
  - Tier-I and Tier-II institutes
  - Tier-I is applicable to autonomous institutes

Vision, Mission Statements

Vision statement is dream of where one wants the Institute to be and inspires all the stake holders

- *Vision of CVR College of Engineering:*
  - *To be a State of the Art Institution of Engineering in pursuit of excellence, in the service of society.*
- *Vision of Department of CSE*
  - *Towards a Global Knowledge Hub, striving continuously in pursuit of excellence in Education, Research, consultancy and Technological services to the society.*

Vision, Mission Statements

Mission statements are actionable statements that guide the stake holders to act

Mission of the CVR College of Engineering:

1. To excel in providing quality education at under graduate and graduate levels.
2. To encourage research and innovation.
3. To provide infrastructure and facilities to meet the latest technological needs.
4. To establish Centers of Excellence through active interaction with industry.
5. To nurture students towards holistic development with human values and ethics

Vision, Mission Statements

Mission statements are actionable statements that guide the stake holders to act

Department of CSE Mission:

- **M1:** To produce the best quality Computer Science & Engineering professionals by imparting quality training, hands on experience and value education.
- **M2:** To strengthen links with industry through partnerships and collaborative developmental works
- **M3:** To attain self-sustainability and overall development through Research, Consultancy and Development activities
- **M4:** To extend technical expertise to other technical institutions of the region and play a lead role in imparting technical education.
- **M5:** To inculcate work ethics and commitment in students for their future endeavors to serve the society.

Program Educational Objectives (PEO)

- Program Educational Objectives (PEOs) are broad statements that describe the expected achievements of graduates within first few years of their graduation from the program.

- The PEOs, may be guided by global and local needs, vision of the Institution, long term goals etc.

- The PEOs must be consistent with the Vision and Mission of the Computer Science and Engineering Department

PEO of B.Tech CSE Program

- **PEO 1: Employability:** Computer Science & Engineering graduates will acquire capability to apply their knowledge and skills to solve various kinds of computational engineering problems.
- **PEO 2: Professionalism**: Graduates will inculcate professional attitude, inter-disciplinary approach, ethics and ability to relate computer engineering issues with social awareness.
- **PEO 3: Managerial skills:** Graduates will possess managerial skills to face challenges in the profession by working harmoniously in a team with effective communication skills.
- **PEO 4: Continuous learning:** Graduates will continue to learn and adapt in a world of constantly evolving technologies and pursue research towards academic excellence.
- **PEO 5: Adaptability:** Graduates of Computer Science & Engineering will have soft skills to adapt to the diverse global environment.

Program outcomes (POs)

- POs are statements about the knowledge, skills and attitudes (attributes) the graduate of a formal engineering program should have

- NBA defined 12 POs for B.Tech Program.

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Program outcomes (POs)

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Program outcomes (POs)

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Program outcomes (POs)

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

- Define the specific skills obtained by the students on completing the program. There are 4 PSOs defined for CSE Program.

1. **PSO 1: Software Development Skills**: Analyze a problem, design an algorithm, define the computing requirements and implement it through logical and programming skills.
2. **PSO 2: Professional Skills**: Architect, evolve and integrate a working model, leading to secure software product development to meet the evolving needs of the industry and open source environments.
3. **PSO 3: Interdisciplinary Skills**: Understand software engineering practices and hardware integration for developing solutions to real world problems over multi-disciplinary domains.
4. **PSO 4: Industry Readiness:** Use theoretical and practical concepts of various domains to realize new ideas and innovations for pursuing research, entrepreneurship, employment and higher studies.

Course Outcomes (COs)

- Course=Subject

- Course Outcomes are statements clearly describing the meaningful, observable and measurable knowledge, skills and/or dispositions students will learn in this course.

- Course Outcomes clearly identify what the student will know and be able to do after successfully completing the course – the essential knowledge, abilities, and attitudes that constitute the basic learning needed by a graduate of this course.

Web services and Cloud computing

Course Outcomes: At the end of the course, the student is able to

- **CO1**: Acquire the basic knowledge on Service Oriented Architecture and fundamentals of SOAP & WSDL in defining Web Services.
- **CO2**: Learn about ROA and ReST based Web Services.
- **CO3:** Understand the basics of Cloud Computing and explore cases studies like Amazon Cloud, Google App Engine, and Micosoft Azure.
- **CO4:** Learn about Virtualization and case studies like Xen-Para Virtualization, VMWare Full Virtualization.
- **CO5:** Learn about Federation, Presence, Security and Privacy in the Cloud and also know about the challenges faced in the Cloud.

Thank You