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**DEPT: MECHATRONICS ENGINEERING**

**COURSE: SOFTWARE ENGINEERING**

 1. Discuss in details not more than one page the relationship between Software Engineering and Mechatronics Engineering

**Software engineering** is a detailed study of engineering to the design, development and maintenance of software. Software engineering was introduced to address the issues of low-quality software projects. Problems arise when a software generally exceeds timelines, budgets, and reduced levels of quality. It ensures that the application is built consistently, correctly, on time and on budget and within requirements. The demand of software engineering also emerged to cater to the immense rate of change in user requirements and environment on which application is supposed to be working. A software product is judged by how easily it can be used by the end-user and the features it offers to the user. An application must score in the following areas:-  
1) Operational: -This tells how good a software works on operations like budget , usability, efficiency, correctness ,functionality , dependability , security and safety.  
2) Transitional: - Transitional is important when an application is shifted from one platform to another. So, portability, reusability and adaptability come in this area.  
3) Maintenance: - This specifies how good a software works in the changing environment. Modularity, maintainability, flexibility and scalability come in maintenance part.

**Mechatronics engineering** is a multidisciplinary branch of engineering that focuses on the engineering of both electrical and mechanical systems, and also includes a combination of robotics, electronics, computer, telecommunications, systems, control, and product engineering. As technology advances over time, various subfields of engineering have succeeded in both adapting and multiplying. The intention of mechatronics is to produce a design solution that unifies each of these various subfields.

These are very different majors, but have some overlap in the area of embedded systems, robotics, real-time systems and control, and computer hardware. With software you are focusing on software systems; with mechatronics you are focusing on electro-mechanical systems. Mechatronics touches more areas, but software on its own is massive (software touches almost all new technologies).An embedded system is a computer system a combination of a computer processor, computer memory, and input/output peripheral devices that has a dedicated function within a larger mechanical or electrical system. It is embedded as part of a complete device often including electrical or electronic hardware and mechanical parts. Because an embedded system typically controls physical operations of the machine that it is embedded within, it often has real-time computing constraints. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors manufactured are used in embedded systems.

Modern embedded systems are often based on microcontrollers (i.e. microprocessors with integrated memory and peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in a certain class of computations, or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP).

2. Explain the following and how they relate a) computer science, computer engineering and software engineering. Not more than two pages.

**Computer science** is the study of computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information. The discipline of computer science includes the study of algorithms and data structures, computer and network design, modelling data and information processes, and artificial intelligence.

**Computer Engineering** is defined as the discipline that embodies the science and technology of design, construction, implementation, and maintenance of software and hardware components of modern computing systems and computer-controlled equipment. Computer engineering has traditionally been viewed as a combination of both computer science (CS) and electrical engineering (EE).

**Software engineering** is the application of principles used in the field of engineering, which usually deals with physical systems, to the design, development, testing, deployment and management of software systems. The field of software engineering applies the disciplined, structured approach to programming that is used in engineering to software development with the stated goal of improving the quality, time and budget efficiency, along with the assurance of structured testing and engineer certification.

Some differences between them:

Computer science deals with the basic structure of a computer and is more theoretical. Hence, it is more malleable in terms of specialization, with the emphasis on math and science.

Software engineering, however, is a field concerned with the application of engineering processes to the creation, maintenance, and design of software for a variety of different purposes. A software engineer designs customized applications per the requirements of an organization.

A computer engineer is a professional who combines computer science with electrical engineering to build new computers and computer systems.