**Subject Area Exam – Process**

1. How does software differ from the artifacts produced by other engineering disciplines?

Answer (Section 1.1):

Software is both a product and a vehicle for delivering a product. As a product, software is an information transformer. As a vehicle for delivering a product, software serves as a basis for computer control, communication, and creation of other programs.

1. How do software characteristics differ from hardware characteristics?

Answer (Section 1.2):

Software is developed, not manufactured. Software does not wear out. Most software is custom built, not assembled out of components.

1. List three areas in which process models may differ from one another.

Answer (Section 2.2):

* Overall flow and level of interdependencies among tasks
* Degree to which work tasks are defined within each framework activity
* Degree to which work products are identified and required
* Manner in which quality assurance activities are applied
* Manner in which project tracking and control activities are applied
* Overall degree of detail and rigor of process description
* Degree to which stakeholders are involved in the project
* Level of autonomy given to project team
* Degree to which team organization and roles are prescribed

1. Describe how Polya’s problem solving principles describe the essence of engineering practice?

Answer (Section 2.3):

* Understand the problem (communication and analysis)
* Plan a solution (modeling and design)
* Carry out the plan (code generation)
* Examine the result for accuracy (testing and quality assurance)

1. How are tasks, actions, and activities related to software process models?

Answer (Section 3.1):

A software process is made up of activities. Each activity is defined by a set of engineering actions. Each activity is defined by a task set that indentifies the work items to be completed.

1. How does software team choose the task set for a particular project?

Answer (Section 3.3):

The software chooses the task set based on the characteristics of the team, the project, and the problem to be solved.

1. How can process patterns assist a development team build software products efficiently?

Answer (Section 3.4):

Process patterns are proven solutions to commonly encountered development problems. If developers can recognize that that this is problem seen before they can use a previously known means of solving it, without have to take the time to invent a new solution.

1. Describe the phases of the prototyping model for software development?

Answer (Section 4.1.3):

Requirements are gathered by having the customer and developer meet and identify whatever objectives and requirements they can. Quick design follows, focusing on representation of the software that will be visible to the customer. A prototype is constructed by the developer and evaluated by the customer and used to refine the requirements. Iteration occurs and the prototype is tuned to satisfy the customer's needs.

1. What are the primary advantages of the component-based process model for software engineering?

Answer (Section 4.2.1):

Component-based process models promote software reuse and reusability and can result in: 70% reduction in development cycle times, 84% reduction in project costs, and 70% increase in productivity.

1. Why has the Personal Software Process not been widely adopted by industry?

Answer (Section 2.6.1):

PSP is intellectually challenging and demands a level of commitment (e.g. lengthy and costly training required) that is not always possible to obtain. In addition the required level of measurement is culturally hard for many software practitioners.

1. List the key issues stressed by an agile philosophy of software engineering.

Answer (Section 5.7):

* The importance of self-organizing teams
* Communication and collaboration between team members and customers
* Recognition that change represents opportunity
* Emphasis on rapid delivery of software that satisfies the customer

1. What are the tradeoffs proposes by the “Manifesto for Agile Software Development”?

Answer (Section 5.1):

Individuals and interactions valued over processes and tools

Working software valued over comprehensive documentation

Customer collaboration valued over contract negotiation

Responding to change valued over following a plan

1. Describe the role of customers and end-users on an agile process team?

Answer (Section 5.4):

Customers and end-users participate as full collaborators on agile process teams. They are the source of information used to create use cases and provided needed information on the business value of proposed software feature and functionality. They also provide much needed feedback on operational prototypes during incremental delivery of software increments.

1. List the key attributes of an effective software teams.

Answer (Section 6.3):

* Sense of purpose
* Sense of involvement
* Sense of trust
* Sense of improvement
* Diversity of team member skill sets

1. Describe the strengths and weaknesses of the random paradigm team structure?

Answer (Section 6.4):

The random paradigm depends on the initiative of individual team members. Good when innovation or technological breakthrough is needed. These teams struggle when orderly performance is required.

1. Describe the five values held by XP teams?

Answer (Section 6.5):

Communication – close informal verbal communication among team members and stakeholders and establishing meaning for metaphors as part of continuous feedback

Simplicity – design for immediate needs not future needs

Feedback – derives from the implemented software, the customer, and other team members

Courage – the discipline to resist pressure to design for unspecified future requirements

Respect – among team members and stakeholders