SOLUTIONS

SECTION A

SOLUTION 1

A.

The state of the list after 2nd Swap is:

[13, 14, 17, 30, 3]

The state of the list after 3rd Swap is:

[13, 14, 17, 3, 30]

The state of the list after 4th Swap is:

[13, 14, 3, 17, 30]

The state of the list after 5th Swap is:

[13, 3, 14, 17, 30]

The state of the list after 6th Swap is:

[3, 13, 14, 17, 30]

B.

```
void sort(int a[]){
    var n = a.Length;   // Length of the array a
    int tempVar;
    for (int indx1=0; indx1<=a.Length-2;indx1++){
        for(int indx2=0; indx2<=a.Length-2; indx2++){
            if (a[indx2]>a[indx2+1]){
                tempVar = a[indx2+1];
                a[indx2+1] = a[indx2];
                a[indx2] = tempVar;
            }
        }
    }
}
```

SOLUTION 3

A.

Negotiation is a process in which an issue is resolved in a way that is beneficial for both the parties involved. This is achieved by setting a goal and the parties agreeing to work toward achieving a mutually beneficial outcome. As an example, if you are an engineering department, you might find that a project is worth approximately $1000, and the project team wants to spend $10,000 to complete the project. Negotiation can be used to achieve the goal.

The concept of the win-win solution is not new. In fact, the concept of win-win has been around for a long time. The concept of win-win is a concept of negotiation. Negotiation is the process of coming to mutual agreement on a solution to a conflict.

When negotiating with the software engineer during the requirements engineering activity, the business analyst should explain the “win-win” outcome. This outcome is when both the business analyst and the software engineer feel as if they have won. The business analyst should define the “win-win” outcome to mean that the requirements are clear, complete, and well-specified, but also meets the business needs. The software engineer should define the “win-win” outcome to mean that the software meets the business needs, but also meets the technical needs.

The win-win context of negotiation is when you both feel like you have won. This is the opposite of the zero-sum context.

The parties involved in a negotiation are generally very easy to handle and quite often there are genuine and substantial contrasts sitting behind a conflict. The way that every individual sees the issue might be impacted by many elements, like their qualities, convictions, status, obligations, and social foundation.

Attempt to keep the discussion gracious and try not to ascribe fault. When everybody realizes that their advantages have been thought of, they are bound to be responsive to various perspectives.

In simple words, it is an outcome which is beneficial for both the parties involved. This situation is hard to achieve as negotiations during the engineering activity also leads to differences of interest.

The best negotiations call for a 'win- win' result. This is when the developer wins by operating at practical and achievable deadlines and budgets whereas the client wins by getting the product or the system satisfying his need.

B.

During the requirements engineering phase of a project, you have spent a lot of time trying to convince the customer to agree to every demand that you have as a developer. Inevitably,

there are going to be some demands that you can't agree to, no matter how hard you try. But does that mean that you failed as a negotiator? Not at all.

When you're negotiating with the customer during the requirements engineering activity, your goal is to come to an agreement about what features will be built. You have a set of requirements that are fixed in stone. The customer, on the other hand, can change their mind at any time. They don't have to agree to your every demand.

The key to a successful negotiation during the requirements engineering phase is to come to an agreement that is "win-win" for both of you. There are two ways that you can approach this. The first is to come to an agreement that is exactly what you want. The second is to find a solution that is close to what you want, but that the customer is willing to compromise on.

A few qualities of master negotiators could be that are able to cultivate their contacts of negotiation and develop strategic alliance with care. A master cultivator has to be incredibly well prepared as to any question by the client. We have to understand a customer's mind and behavioural activity. This will lead us to negotiate with them properly.

If a negotiator manages to convince the customer to agree to every demand that he has made, and also maintaining positive relationships in the process then that could basically mean he has succeeded as a negotiator, which is not as very easy, hence we conclude the person as a master negotiator.

SOLUTION 4

A.

A software testing technique in which the software's functionality is not known is often referred as black box testing. Also there is no requirement of product's internal knowledge in order to perform black box testing.

A software testing technique in which the the used data structures, internal structures, code structure, internal design, and the working of the software is analyzed, is known as White Box testing. White box testing is also known as clear box testing or glass box testing.

The white box testing's working process are as follows:

Step 1> Input: Requirements, Functional specifications, design documents, source code.

Step 2> risk analysis is performed in order to guide the entire process.

Step 3> **Proper test planning:** In order to cover entire code test cases are designed.

Step 4> final report of the testing process is prepared.

Equivalence partitioning is part of black box testing process in which the inputs are grouped based on their similarity. Numerous equivalent classes are prepared by partitioning the input domain, this is done in order to make sure that each and every member belonging to aclass works in a similar way. For example if in a particular class a test cases leads to an error then every test cases should result to the same kind of error.

The equivalence partitioning is carried out in two steps which are as follows.

Step 1> Equivalence class identification: In this step input domain is partitioned into two sets of values which are invalid values and valid values.

Example: In case the valid range of values lie between 0 to 100, then 106 can be selected as a invaid value and 67 is a valid value.

Step 2> Test cases generation

(i) At first unique number is assigned to invalid and valid set of inputs.

(ii) Test cases are written or generated in order to cover all invalid and valid test cases.

B.

(i)Validation testing goals ensures that all functional requirements are satisfied, whereas Acceptance testing goals are designed to help the customer in the validation of all their requirements.

(ii) acceptance testing goals is generally used when the software is made for a customer, but this is not true for validation testing.

(iii) Validation testing is process of evaluating software at the end of the development process development process or during the development process on the other hand acceptance testing is performed at prototyping stage so as to make sure whether the software protype is same as we are expecting.

(iv) Validation technique is a type of dynamic testing where as acceptance testing is static testing.

SECTION B

SOLUTION 5

A.

The four generic activities in all software processes are:

Software Specification- This is the main requirement in engineering. This activity defines the main functions of any software process. This also includes in details all the constraints that surround them.

Software design and implementation- This activity revolves around the software which has to be designed and programmed. This involves designing a structure of the software that will realize its specifications. This also involves translation of this particular structure designed into a program which is executable. Therefore, the activities of designing a software and implementing the software are related very closely.

Software verification and validation- The software must comply with the required specifications. The software must also meet the needs of the customer. Validation will involve whether or not the right product is being built, which means that the product built is in accordance with the customer's needs. Verification involves whether or not the way in which the product is built is correct.

Software Evolution- This activity involves the maintenance of the software. This involves modification of the software in accordance with the changing needs of the customers and the market. The software developed must be flexible in nature so that it changes accordingly.

B.

Two generic process models are: the waterfall model and the incremental development.

The Waterfall Model- This is a model which is driven by a plan. This model involves a separate phase of specification and certain distinct phase of specification. This model also involves designing a software, implementing the software designed, testing the software designed and maintenance of the software designed. The advantage of the waterfall model is that due to the simplicity of the model it is very easily understandable and very easy to use. The disadvantage of this model is that the real-world application of this model is very less, this is mainly used for engineering projects where large systems are required.

Incremental Development Model- This is a model where the process of development of a software where the requirements are divided into many modules of the cycle of software development. This model can be used where its uses are easily understandable and clearly defined. This model has certain advantages such as the cost of changes is comparatively low, getting frequent feedback from the customer is easy and the speed of delivery is faster. The disadvantages of the incremental development model include that the process is not very visible, which means that the manager needs deliverables regularly to check the progress. The stricture of the system declines with each new increment that are being added.

SOLUTION 6

A.

The digital era have allowed companies of various size, types to benefit from an external payroll which is provided as a software service. However it is important to detect key risks associated with it.

Advantages

1. Time and energy saving

Payroll is generally considered as a time consuming tasks in this regard the service helps in easy calculation and monitoring of payroll. It helps in generating accurate pay slips and its helps in automation of tasks such as reporting data storing and overall calculation. Altogether, such system enables the company's employees to focus on the appropriate tasks.

2. Minimum expenses

There are too many hidden costs in the ordinary payroll system which requires special attention, time, and expense. It also helps in quantifying the hidden as well as the visible costs.

3. Accuracy

Every externally linked payroll service have a team of experts to help the organization maintain accuracy and credibility of the entire activities. Moreover, the company would be able to calculate the deductions more accurately and consistently. This also means that the taxes would be calculated and paid on time.

4. Enables hassle-free transactions and actions ‘

Companies on such payroll system need not worry about the important deadlines for processing payroll on time. The team consisting of experts will do the job.

5. Compliance issues can be resolved

The need for frequent changes and modifications because of the existing legislations and regulations would be easily handled.

Disadvantages

1. Loss of control

As the system will be handled by a team of experts, handing over such sensitive task to the third party could mean losing some control in terms of processes and information accessibility.

2. Threats relating to confidentiality

It would be very difficult to ensure that the critical information are secured by the third party. For this reason, the company have to invest time, energy, and money for establishing data protection policies and agreements with the third party.

3. Requires coordination and guidance

It is very risky to handover such critical task without guidance. The company needs to treat the experts like the in-house employee and provide them with relevant feedback and information. This would mean spending significant time with such experts to ensure that the desired results are achieved.

4. Chances of errors

One such relevant error is observed in case of delays caused in pay check delivery. The employees would not receive the required information to process their pay checks in time.

5. Cyber insecurity

As the entire process is enabled by the modern technology, there are chances of data breach and cyber threats. It could be in the form of malware, ransom threats, and fraud among other things.

B.

Based on the various potential disadvantages a company might face using the external payroll service, it is important to choose the right payroll outsourcing provider in the following manner:

a. As a software engineer, it would be important to integrate my offerings with the business and their visions. For this reason, it is important to ensure a well-organized,

structured, and commitment to ensure quality performance. It is also important to cheek loopholes for leakages such as delays and loss of data.

b. It is also important to provide the company, world-class technological infrastructure to help them scale. The technology must be of such nature that would benefit both the employees and the employer.
c. Moreover, it is important to address the IP related framework. Legal protection, logical security, and physical security of the processes and systems must be ensured.
d. The system must be consistently tested and verified for avoiding any significant loopholes.

C.

A risk management plan is a document that describes the process that a business will go through to identify, analyse, and control business risks. This plan should be implemented and followed by all business units to ensure that all risks are identified and managed in a consistent manner. Be sure to tailor the plan to your specific business needs. For example, if your business processes are subject to different types of risks, such as natural disasters and cyber security breaches, then a separate plan should be developed for each.

A risk management plan will support in minimizing the influence of the risk that can sabotage our cash flow or damage the brand.

The first thing I would ask of a risk management plan would be a list of potential risks that this business might face. It could include things like natural calamities-flood, contamination. Risks can also include economic risks (market fluctuations), Compliance Risk, Security Risk, Financial risks, reputation risks, and operational risks.

The second thing that a risk management plan will need to have will be an estimate of these risks. Detailed investigation of each risk, assessing the risks, estimating the severity and the likeliness of it happening.

The third thing in making our risk management plan is to reduce or eliminate the possible risks where it is possible to do so. You could add company policies, be aware of the business environment, the competition, and make sure to follow the legal regulations properly, improving the security system as so forth.

The fourth thing in drafting a risk management plan includes assigning of tasks. To have clear and brief directions will be the simplest response in case of risks.

The fifth thing is to develop contingent plans. Contingency plans are plans over events that may or may not happen. Being equipped for it beforehand can allow us to minimize the damages. It is basically a 'Plan B' for risks that cannot be avoided wholly. Our contingency plans will be based on the type, size, extent, and product or the business.

The sixth thing to making of our risk management plan would be to communicate this plan in the previous step to the people connected in the business. This can include staff,

contractors, and suppliers. This can be done through phone, text or emails. Training our staff for the potential risk is important.

The last thing is to monitor and keep an eye for new risks. We live in an ever-changing environment and risks keep on emerging. Monitoring risks will help us be practical and ever-ready and develop our strategies accordingly.

A good risk management plan will include five items, definitions, presumptions, structure detailing risk breakdown, impact, and cost and schedule. Presumptions mean assumptions that might support the cost of our project. It can include milestones, and a required skill set, and expertise. The risk breakdown structure is a list of potential risks. The impact matrix is probability into impact. Cost and Schedule in the form of contingent events, ranging from low, medium to high, and could be as complicated as a statistical analysis.