Tutorial 1 Project Management Concept

Question 1

Syntax Tech Company provides software consultancy services to business clients, it focuses on selling accounting software. The company consists of 4 different departments: sales and marketing, customer services, information technology (IT) and finance. Each staff will be assigned to a department according to his or her area of specialization and expertise. The sales and marketing department consists of 3 staff, 2 staff work in the customer service department, while 3 staff work in the finance department and 3 experienced staff work in the IT department. Each department is supervised by a functional manager and each functional manager in turn reports to the Chief Executive Officer (CEO).

Suggest a suitable organizational structure for the Syntax Tech Company and construct an organizational structure diagram.

Question 2

You are a project manager of an online education management system developed for a local college. After communicating with the customer for collecting requirements, the following scope is defined: the system will be used to manage communication between lecturer and students, uploading and downloading learning materials (such as tutorial questions, lecture notes, assignments specifications), make announcement, and assessing students' assignments.

Construct a *Work Breakdown Structure* (WBS) for the online education management system using an outline numbering format. Assume that you have chosen the *Waterfall software process model*.

Question 3

T-Shirts2U is a small company, which supplies and manufactures customized t-shirts. Since 2022, this company has experienced a tremendous increase in its orders volumes. However, the current system that is partially automated is unable to keep up to pace its growth: it is unable to keep track of the orders and customer information efficiently, it is unable to provide accurate information to the management on which item promotions are more profitable and there have been mistakes in some of the order fulfillments and payment. Assume that you have been contracted by T-Shirts2U to develop a new ordering system for the company that will solve the stated problems. The project should be completed within 16 weeks and the budget should not exceed RM150,000.

Discuss **TWO (2)** important factors that should be considered to assure the success of the above project. Give reasons to support your answer.

Question 4

The T-Shirt2U company is required to spend RM18000 for a new server in order to support the Online Ordering System. Web hosting will cost about RM4500. The project manager had purchased 3 new desktop computers with a total of RM9000. Software and licensing fees are required to be used by IT developers, Software Engineers, and Database Administrators with a fee of RM3000.
The project is estimated to bring benefits in the following years.
Benefit for year 1 is RM18500, year 2's benefit is RM19500 and benefit for year 3 is RM20000.

a) Identify the payback period for the project and provide a reason to support your answer.
b) Calculate Net Present Value (NPV) for the project by using a rate of 12% based on 4 decimal places. Show the details of your working.
c) Compute Return on Investment (ROI) in ONE decimal place based on answer in part b).
d) Do you think the project is beneficial to be carried out? Provide **ONE (1)** justifications to support your answer.

Question 5

Using a 10% discount rate, calculate the *Net Present Value (NPV)* and *Return on investment (ROI)* for Project X and Project Y. Based on your calculations, suggest the most profitable project. Show your calculation to justify your answer (round up discount factor to 4 decimal points).

Discount Rate: 10%					
Project X	Year 0	Year 1	Year 2	Year 3	**Total**
Costs	100,000	50,000	40,000	30,000	-
Discount Factor	1				
Discounted Costs	100,000				
Benefits	0	100,000	120,000	100,000	-
Discount Factor	1				
Discounted Benefits	0				
NPV					
ROI: Use discounted value					

Discount Rate: 10%					
Project Y	Year 0	Year 1	Year 2	Year 3	**Total**
Costs	100,000	70,000	60,000	20,000	-
Discount Factor	1				
Discounted Costs	100,000				
Benefits	0	100,000	150,000	90,000	-
Discount Factor	1				
Discounted Benefits	0				
NPV					
ROI:					

Comment:

Tutorial 2: PROJECT PLANNING, CONTROL & PROCESS MODELS

Question 1

Case Study: Beamscope Canada, Inc.

Beamscope Canada, Inc. is an electronics distributor located in Scarborough, Ontario. In their manual order processing system, when a customer called to place an order, the clerk would scribble it down, run down the hall to the credit check guys and flip through files and folders to see if their credit was okay. The clerk would then run to see whether Beamscope actually had the item in stock and then go back to the telephone to confirm the order. There were two PCs at the company and they were doing $93 million (Canadian dollars) worth of business. The phone orders were manually routed to the warehouse, where they would sit for at least a week. Plus, it was hard to know what was actually in the warehouse and where it was. It took Beamscope five to seven days to ship an order and very often, there were mistakes made with the orders. In addition, products were collecting dust at Beamscope's physical warehouses. It also took a long time to compile reports for senior management and by the time the reports were printed, the information was already outdated.

The senior management at Beamscope envisioned a new system that not only takes on order entry but also features a radio frequency bar-code system for inventory control, electronic data interchange and a data warehouse for decision support. In the new web-based system, customers can place orders themselves, check the status of previous orders and download product literature. If an item is temporarily out of stock, the system will suggest a substitute or put the customer on a list for back orders. The system will also allow users to browse 120,000 square feet of shelves holding 8,500 different products in the company's two warehouses. In addition, the new system is directly tied into United Parcel Service, Inc.'s electronic shipping system.

Well-defined objectives should be *specific*, *measureable*, *achievable*, *relevant*, and *time- constrained* (SMART). Consider the following initial objectives for Beamscope's project to develop a new system that automates their order processing, inventory and warehousing:

- to implement the new system on time and within budget;
- to design a system that is user-friendly;

Do these TWO (2) objectives fulfil the *SMART* criteria? Justify your answer. In addition, provide examples of well-defined objectives for each of the above initial objectives.

Question 2

Your team has been assigned to handle the Beamscope's project; duration is 24-months with a high-budget project. The user requirements for the system are still uncertain but the company has committed to a few departmental managers to be highly involved and provide consultation for this project. In addition, the scale of the project is large and it entails the use of a new technology your team is unfamiliar with.

Consider which software process model would you propose for the above project: Rapid Application Development or Spiral model? Justify your answer.

Question 3

Everything goes well until the tenth month of the project. The team seems slowed down and demotivated although all the team members are seniors and experts in their professions. You have tried to motivate the team with various corrective actions such as training, introducing incentives, reducing workload, reassigning tasks, encouraging the team, and even increasing the supervision. Nevertheless, the project is still behind schedule.

a) Identify **ONE (1)** previous corrective action that should NOT be applied on this team.

b) Suggest and explain **TWO (2)** other possible corrective actions to motivate the team to get back on schedule.

Question 4

For **part a) and b),**

Include your comment on the project's status based on the calculated results.

You are required to show the working in your calculation.

a) You are managing a project A with 12th month's durations and now you are in 10th month. The planned value (PV) for the 10th month is RM110,000. The actual cost (AC) of this project is RM115,000 with 80% of the work actually completed and the budget at completion for this project is RM 150,000.

  i) Calculate the followings for the above project:

- Earned Value (EV)
- Schedule Variance (SV)
- Cost Variance (CV)
- Cost efficiency
- Schedule efficiency

  ii) Propose **ONE (1)** suitable technique for assigning the earned value (EV) to the project's progress against the tasks.

b) Given the following information in table 1: Project A progress

Activity	Estimated Duration (month)	Estimated Cost(RM)	Status	Earned Value
P	1	20,000	50%	
Q	3	20,000	80%	
R	2	30,000	80%	
S	4	40,000	70%	
T	4	45,000	60%	
U	4	55,000	0	
V	2	20,000	0	
Total	20	230,00	-	

You are managing a project with 20th month's durations and now you are in 10th month. The actual cost (AC) spent for 10 months is RM 95,000. The budget at completion (BAC) for project A is RM230,000.

i) Calculate the Earned Value (EV), Schedule Variance (SV) and Cost Variance (CV) for the projects.

ii) Based on the results calculated on part b) i), propose and explain **ONE (1)** corrective action to ensure the project's success.

Question 5

This project consists of activities as listed based on Table-1.

Activity name	Activity Description	Duration(in weeks)	Predecessor
A	Project Planning	2	None
B	System Planning	3	A
C	System Analysis I (Preliminary Investigation)	3	B
D	System Analysis II (System Specifications)	4	B
E	Web-based User Interface Design	3	C
F	Database Design and Programming	5	C, D
G	Web-based Programming and Coding	6	E, F
H	System Testing	3	G
I	System Training	3	H
J	System Implementation	2	I

Table-1: Project activities for Beamscope's project

Program Evaluation and Review Technique (PERT) Chart also known as network diagram.

a) Draw a PERT Chart based on Table-1 with activity name, duration and predecessor.

b) Based on PERT Chart that you had drawn in part a), answer the following question

- Estimate the duration to complete the project in weeks. Show your working.
- Identify the critical path in the PERT Chart by labelling the activities' name with relationship, dependency and duration.

Tutorial 3: Quality Management & Assurance

Question 1
A quality team is employed to assess the software quality before the deployment of new Ordering System of T-Shirt2u Company. Briefly describe **THREE (3)** important activities that should be carried out by the quality team for the project.

Question 2
Refer to the case study in Tutorial 2 Question 1,
Suggest ONE (1) software quality attribute for *Beamscope's project (ordering and inventory control system).* Provide an explanation on how the suggested attribute will affect the proposed system.

Question 3
Visit this website: https://www.infoq.com/articles/create-culture-quality, read the article.

Recommend and elaborate on **TWO (2)** actions to be carried out to create a quality culture in a software development company.

Question 4
Refer to the case study in Tutorial 2 Question 1,
Propose **TWO (2)** product standards for Beamscope's software development project and give reasons to support your proposed product standards.

Question 5
The president of Apex College has recently assigned you to manage a new project that is to develop a Face Recognition System (FRS) for enhancing the security in the campus. For implementing the Face Recognition System (FRS), the quality of the software is as important as the quality of hardware. In order to produce high quality software, it is necessary to perform quality management activities. However, performing quality management activities will incur costs.
The cost of quality can be divided into 3 categories:
- Prevention costs
- Appraisal costs
- Failure costs

Using the quality management activities given below, categorised each of them into one of the categories listed above then explain *which category is likely to be most costly to developer.*

Provide training, create prototypes to develop complete requirements, conduct technical review, test system and perform rework to correct errors

Tutorial 4: Software Metrics
QUESTION 1
Refer to the case study in Tutorial 2 Question 1, proposed **TWO (2)** normalized metrics that would be appropriate for Beamscope's project. Provide justifications to support your answers.

QUESTION 2
Referring to Table 1, calculate the *function points (FP)* for the both projects. Show the steps in your calculation. Round up your answer to TWO decimal places.

Table 1: Information domain values for Project A and B

Measurement parameters	Weighting factor	Project A's Count	Project B's Count
Number of inputs	Complex (5)	4	4
Number of outputs	Simple (2)	6	5
Number of inquiries	Average (4)	8	8
Number of files	Average (3)	4	2
Number of external interfaces	Simple (2)	2	1
The adjustment values ∑Fi for both projects		50	40

Function Point formula: Count Total x [0.65 + 0.01∑Fi]

Referring to Table 2, analyze the quality of project A and B using the normalized defects found and pages of documentation. Using Function Point in normalization, show the details of your calculation. Round up your answer to TWO decimal places. Evaluate which project has *higher quality* based on the calculated result. Justify your answer.

Table 2: Defects found and documentation for Project A and B

	Project A's Count	Project B's Count
Defects found	90	70
Pages of documentation	120	130

QUESTION 3
Table 1 shows the size measurement of Project A and B.

Table 1: Project A and B size oriented measures

KLOC is thousand line of code	Non normalized		Normalized with **KLOC**	
	Project A	Project B	Project A	Project B
Programming language used	Java	Java	Java	Java
Total Line of Code (LOC)	306,000	256,000	306	256
Errors	288	233		
Defects	30	20		
Page of Documentation	205	180		

i) Complete the Table 1 column under "Normalized with KLOC" for both projects. Show your workings and round up your answer to 4 decimal points.
ii) Based on your calculations in part i), give a detailed analysis of which project has higher *quality*.

QUESTION 4
Given below are examples of normalised software metrics:

Defects/KLOC	Errors/FP
Cost/LOC	Defects/FP
Errors/person-month	Cost/FP
LOC/person-month	FP/person-month

Point out TWO (2) metrics that can be used for *project control on cost and time*. Explain your answer.

QUESTION 5
Refer to the case study in Tutorial 1 Question 3,
Portability is the key factor in software quality (McCall's Software Quality Factors). Explain and provide ONE (1) example for the portability factor that are related to the project implementation of T-Shirt2u Company. Provide justifications to support your answers.

Tutorial 5: Risk Management

The risk categories are product size (PS), business impact(BU), process definition(PR), customer characteristics(CU), development environment(DE), technology to be built(TE), as well as staff size and experience(ST). Risk management strategy considered as risk acceptance, risk avoidance, risk reduction, risk mitigation, or risk transfer.

Question 1

Project risks can be dealt with by using reactive risk strategy or proactive risk strategy. Explain reactive risk strategy then give an example to highlight why it is a bad strategy. Provide explanation on your answer.

Question 2

Refer to the case study in Tutorial 1 Question 3,
The risk projection show the following information:

Project manager identify 40% of the software components can be scheduled for reuse, it can be integrated into the existing T-Shirt application. The remaining new functionalities will have to be custom developed based on user requirement.

Risk impact: 60 reusable software components were planned and 20 software components would have to be developed from scratch within 6 weeks. The average component is 100 Line of Code (LOC) and the development cost for each LOC is RM12.00.

Risk probability: 60%

a) Calculate the cost impact to develop the 20 software components from scratch.
b) Calculate the Risk Exposure (RE) based on your answer calculated in part a) using a Risk Exposure (RE) metric: *Probability X Cost.*
c) Identify ONE (1) potential risk, which will negatively affect the above software development.

Question 3

Consider the following risk table in table 1: Risk Analysis for category, impact and cost

Risks	Category	Probability of Occurrence (10 to 100)	Cost	Risk Exposure
Unstable database	TE	50%	4,000	
Inadequate software architecture	PR	30%	3,000	
Syntax errors caused by members	ST	60%	5,000	
Constant changes in requirements	PS	20%	3,000	

*Impact values: 1 – negligible   2 – marginal   3 – critical   4 – catastrophic

Using a Risk Exposure (RE) metric: Probability X Cost.

a) Calculate the risk exposure for each risk, rank the risks according to their priority (i.e., from highest to lowest risk exposure). Show working in your calculation.
b) Propose **ONE (1)** *risk management strategy* for the highest risk exposure that you identified in part a).

Question 4

Refer to the case study in Tutorial 2 Question 1 & 2, you are required to

a) Identify the **TWO (2)** risks projection for the Beamscope project from *different categories* and *impact value* for each risk.
b) For each of the risks that you identified in part a),
   - Identify and explain the category that the risk belongs to.
   - Illustrate the impact to this project should the risk occur.
   - Propose a suitable risk mitigation monitoring and management actions for each risk.

   Risk log format as shown below:

Risk name	Category	Impact	Risk Mitigation, Monitoring, Management activities	Impact values:
			Mitigation: Monitoring: Management:	1 – negligible, 2 – marginal, 3 – critical , 4 – catastrophic

Tutorial 6 – Software Process Improvement

Question 1

Refer to the case study in Tutorial 1 Question 3,
Identify **TWO (2)** factors should be considered when carrying out software process improvement to the Ordering System of T-Shirt 2U company.

Question 2

You (as a project manager) are measuring a software process to solve a schedule issue which is to *shorten the development time of a programmer.* It was found that software development time always takes longer than planned. There are 2 main areas that might contribute to the issue: time required to finalize product requirements with customers and requirement changes. Hence, you have identified 3 metrics in measuring these 2 areas which are time taken for communication with customer, number of communication with customer and pages of requirement documentation.

On the other hand, you also found that your top management does not agree with your findings and thus will not support your software improvement process (SPI) efforts financially. Seeing that the management is not supportive, your colleagues appeared less cooperative in giving you feedback when you tried to collect the data for process analysis.

a) Construct a Goal-Question-Metric paradigm to illustrate the software process improvement goal as *shorten the development time.*
- Formulate TWO (2) questions to assess the given goal.
- Provide TWO (2) appropriate software metrics for each question you have listed. Explain how the metric applied for each question.

b) You have decided to carry out the process change of SPI. Identify **TWO (2)** difficulties that you might face.

Question 3
Refer to the case study in Tutorial 1 Question 3,
Discuss any **TWO (2)** possible changes that you may implement to achieve software process improvement for the T-Shirt2U project.

Question 4
Refer to the case study in Tutorial 2 Question 1,
During the execution of the project, the senior management at Beamscope finds that it is quite difficult to trace the progress of the project.
Propose the **TWO (2)** most significant **process attributes** that the senior management has to consider during the Software Process Improvement (SPI) activity with the major goal to *improve the project's progress visibility.*

Tutorial 7: Software Configuration Management

Question 1
In the context of version management, describe the relationship between *codelines* and *baselines* of software development.

Question 2
System release is a version of a software system that is distributed to customers or users.
a) Discuss **TWO (2)** factors that you should consider during release management.
b) Identify important components needed when releasing a new version of software to users, explain your answer.

Question 3
One of the change management activities is to approve the change requests from stakeholders. Discuss the factors that influence the decision on whether a change request should be approved

Question 4
Briefly explain **FOUR (4)** activities of software configuration management. Illustrate the relationship of activities in the configuration management with the aids of a diagram.

Tutorial 8: System Dependability & Critical System

Question 1
Suggest **TWO (2)** ways to assure *safety* in safety-critical systems. Give an example for each of your suggested answers.

Question 2
Consider the following scenario:
"The Food and Drug Administration (FDA) has approved the first automated insulin-delivery system. This represents a step toward a called artificial pancreas that could automatically regulate blood sugar levels for people who have diabetes. The device made by the manufacturer Medtronic has been approved to treat people with Type 1 diabetes who ages 14 and older."
(Source: https://www.livescience.com/56305-automated-insulin-delivery-device-approved.html)

Safety is an important dependability dimension; suggest **TWO (2)** appropriate *safety requirements* to the insulin-delivery system.

Question 3
Give and describe **TWO (2)** examples of critical systems, which include a *mission-critical* system and a *business-critical* system. For each system that you have given, assess which dimension of system dependability is the most important. Provide justifications to support your answer.

Question 4
Refer to the case study in Tutorial 1 Question 3,
Senior management considers *reliability* dimension is important in the T-shirt2u's project implementation. Evaluate **ONE (1)** important reliability metric that can be applied to the T-shirt2u's ordering system operations. Provide a justification with an example to support your answer.