Design & Technology

Project Management in Design and Manufacturing (4.3c)

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don’t spend too much time on one question

Good luck!

Q1. What is a key advantage of Critical Path Analysis?

A Shows which activities can be delayed without affecting project completion time

B Eliminates all project risks automatically

C Reduces the need for project planning

Q2. How does Scrum achieve flexible, holistic product development?

A Through rigid planning at the start with no changes allowed

B Through iterative sprints with continuous feedback and adaptation

C By following a strict waterfall approach

Q3. What is a disadvantage of Scrum?

A It only works for software projects

B Difficult to implement in projects with fixed regulatory requirements

C Requires teams of exactly 7 members

Q4. What is the primary purpose of Six Sigma?

A To increase project timelines for better quality

B To improve output quality by identifying and removing causes of defects

C To organise work into two-week sprints

Q5. Outline the process of critical path analysis **(4 marks)**

Q6. Explain two ways Six Sigma can improve manufacturing processes **(6 marks)**

1.

2.

Q7. Give **three** features of critical path analysis **(3 marks)**

Q8. Six Sigma is used in manufacturing to identify and remove the causes of defects. Reducing costs is one of the five value targets used in Six Sigma. Give **two** other value targets used in Six Sigma. **(2 marks)**

Q9a. Give the three roles within the scrum team. **(3 marks)**

Q9b. Outline the key features of the scrum process. **(6 marks)**

Answers

Q1. A
Q2. B
Q3. B
Q4. B

Q5.

- Compile a list of all activities/work breakdown structure (1)
- Work out the length of time/duration required for each activity (1)
- Determine the relationships/links between the activities (1)
- Determine specific points of time in the process/milestones/deliverable items (1).

Q6.

- Six Sigma improves quality of products by focusing on quality control (1) aimed at reducing the number of defects (1) from the 1st Sigma at 30% defects to the 6th Sigma at less than 0.001% defects (1)
- Six Sigma reduces the process cycle time (1) by removing errors / unnecessary stages in production (1) for example reducing the number of products that need to be reworked or replaced / inefficient layout of production lines / paperwork being completed that is not needed (1)
- Six Sigma reduces pollution resulting from the process (1) by reducing transportation and travel (1) and reducing production of waste due to product faults / utilising more energy efficient processes (1)
- Six Sigma reduces costs (1) by simplifying processes and steps needed / by using common manufacturing processes for different products (1) therefore reducing setting up time / reducing the amount of capital investment needed (1)
- Six Sigma makes processes as consistent as possible (1) by streamlining processes (1) which reduces the possibilities for defects (1)
- Six sigma improves efficiency / productivity (1) by using DMAIC (Define, Measure, Analyse, Improve, Control) (1) resulting in improved / streamlined use of resources (1)
- Six Sigma is a management tool / methodology (1) where employees become involved in the implementation of quality improvement (1) helps with defect reduction as employees understand the processes involved in the manufacturing of the product (1)

Q7.

- Projects broken down into small 'step by step' stages (1)
- Stage timings/duration shown (1)
- Route of stage completion to subsequent stage starts (1)
- Shows dependencies between activities (1)
- Indication of routes to completion (from shortest to longest) /optimum route to completion (1)
- Concurrent less critical activities (1)
- Identification of activities with most impact on overall completion (1)
- Identification of 'float' (1)
- Key dates or timings (1)
- Links to JIT (1)
- Reduces downtime (1)

Q8.

- Reduce process cycle time / improve speed of production (1)
- Reduce pollution / waste (1)
- Increase customer satisfaction / meet user requirements (1)
- Increase profits (1)

Q9a.

- Product owner (1)
- Scrum master / project leader / project manager (1)
- Developers / development team / designers (1)

Q9b.

- Holistic project management strategy (1)
- Teamwork is at the centre of the process (1)
- Control over the empirical process (transparency, evaluation and adaptation) (1)
- Self-organisation (increases the level of independence of the team) / feedback from workers / daily team meetings / scrum sessions (1)
- Assessment of team performance (1)
- Team goals (1)
- Led by scrum master / leader / project manager (1)
- Collaboration (awareness, clarity and distribution) (1)
- Feedback at every stage (1)

- Value based prioritisation (value and importance to end users and the manufacturer to determine order of completion) (1)
- Timeboxing (allocating and scheduling time to activities) (1)
- Sprints (short release cycles with planning, daily monitoring and reviews) to achieve smaller broken down tasks (1)
- Iterative development (constant/ongoing adjustment and revision of design to create the best product possible) continuous improvement (1)
- Scrum values: commitment, courage, focus, openness and respect (1)
- Consumer feedback to update designs (1)