Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2021/2022

COURSE NAME	:	PRODUCT LIFECYCLE MANAGEMENT
COURSE CODE	:	MDC10903
PROGRAMME CODE	:	MDM
EXAMINATION DATE	:	JANUARY/FEBRUARY 2022
DURATION	:	6 HOURS
INSTRUCTION	:	1. ANSWERS **FOUR (4)** QUESTIONS **ONLY** 2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **OPEN BOOK**.

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 **(a)** Give three comparisons between the implementation of the Product Lifecycle Management (PLM) approach with the traditional way in New Product Development (NPD). Please include a scenario in any industry that is related to clear comparisons.

(5 marks)

(b) Kamal is an engineer in the Company of Maju Berhad. The Company Maju Berhad runs the operation as a routine by developing a new Chair model every year. Based on your opinion, appraise in FOUR (4) benefits of using PLM compared to the traditional way for Kamal if the Maju Berhad plans to sustain in industries.

(8 marks)

(c) Megah Jaya is one of the companies that designs and develops smartphones and has been survived for 20 years. Currently, new technologies in the telecommunication sector have been introduced and many new companies have been developed. Based on the product lifecycle phase and the relation of each phase in NPD, justify how PLM can be applied to support the Megah Jaya to survive in the industry among the new coming companies with the new challenging technologies.

(12 marks)

Q2 Quality Function Deployment (QFD) is a structured approach to convert the voice of customers to a technical solution in every stage of the design and delivering process, such as product, part, process, production information.

(a) Safian was given a task by his manager to develop a new Bicycle. As a routine in Safian work scope, he started the task by collecting the required information from the customer. **Table Q2(a)** shows the customer requirements for the future bicycle design. Based on the table, construct the HoQ for the product. You can make assumptions for the value in the benchmarking room.

(13 marks)

(b) Appraise your findings in Q2(a) with the existing product and how the proposed bicycle design supports future needs.

(12 marks)

Q3 **(a)** A Kano model classifies product attributes based on how customers perceive them and their effect on customer satisfaction. Construct the categories of customer requirements for designing a new bicycle recognized by the Kano model and give **THREE (3)** examples of customer requirements for each category.

(10 marks)

(b) Given **TWO (2)** types of a bicycle, classic and modern concepts. Evaluate both types using the Kano model and QFD. Use your answer in Q3(a) as the customer requirements.

(12 marks)

(c) Compare the integration of the Kano model and QFD with the stand-alone method by giving **THREE (3)** benefits and advantages.

(3 marks)

Q4 Megah Berhad produced a men's t-shirt and sold it in several Asia countries. It is made of 100% cotton knit. In the end, the chosen unit was to wear the t-shirt 30 times long enough to require washing, and thus wash it after each time. The lifecycle of the t-shirt thus consists of production, use and 30 times of washing and finally the wasting of it on a landfill.

(a) Evaluate the total lifecycle material inputs of the t-shirt using the data provided in **Table Q4(a).** It is presumed that the washing machine can wash 1,000 times during its lifecycle, ten t-shirts at the same time in the washing machine and the t-shirt will end up on a landfill at the end of its life cycle.

(15 marks)

(b) Evaluate the Material Input Per Service unit (MIPS) value for the t-shirt.

(5 marks)

(c) Appraise your findings in Q4(b) by recommending the ways to increase material efficiency of the t-shirt.

(5 marks)

Q5 Azman just started a new business in furniture and will open a new office in a month. Azman plans to set up an economical electrical appliance in the office and sell a new chair that gives an immediate profit as a new business.

(a) **Table Q5(a)** shows two alternative light bulbs for the office, a 120-watt incandescent bulb and a 40-watt compact fluorescent bulb. Compare both alternatives in terms of life cycle cost (LCC) for one bulb to work for 30,000 hours and decide which one is better for the office.

(10 marks)

(b) Market research information suggests that the chair should sell 5,000 units at RM24.00. Azman seeks to make a mark-up of 50% product cost. Based on the estimated that the lifetime costs of the chair for design cost is RM25,000.00, the manufacturing cost is RM10/unit, and end-of-life cost is RM10,000.00, evaluate the target cost of the product and the original lifecycle cost per unit.

(10 marks)

(c) If the additional amount of RM5,000 were spent on the design, formulate the maximum manufacturing cost per unit that could be tolerated if the company is to earn its required mark-up.

(5 marks)

- END OF QUESTIONS -

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Table Q2(a): The Customer Requirements for the Future Bicycle Design

No.	User Requirement	Importance Weightage [%]
1	Easy to use	20
2	Able to carry weight 10kg	15
3	Cheap in price	10
4	Low maintenance cost	5
5	Low running cost	5
6	Safe to use	15
7	Light in weight	8
8	Good in design	7
9	Environmental friendly	10
10	No noise	5

Table Q4(a): Database of the t-shirt

Materials of the t-shirt			
Materials and components	Weight/product (kg)	Waste/product (kg)	MI Factor (kg/kg)
Sewing thread (cotton)	0.255	0.042	22
Colorant and chemicals	0	0.115	1.5
Card labels	0.002	0	15
Neck label	0.002	0	3.6
Product label	0.004	0	3.6
Cutting plastic	0	0.001	5.4
Packing materials of the t-shirt			
Materials and components	Weight/product (kg)	Waste/product (kg)	MI Factor (kg/kg)
Bobbin	0	0.05	3
Wooden platform	0	0.016	2.2
Cardboard	0	0.014	3
Hangers	0.038	0	7
Electricity consumption in the production of the t-shirt			
Electricity (public)	Electric Energy Input (kWh)	MI Factor (kg/kWh)	
Knitting	0.311	0.41	
Dyeing and finishing	0.252	0.41	
Cutting and sewing	0.022	0.41	

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Table Q4(a): Database of the t-shirt (continue)

Other energy consumption in the production of the t-shirt			
Source of energy	Weight (kg)	MI Factor (kg/kg)	
Natural gas	0.455	1.3	
Transports in the production of the t-shirt			
Mode of transportation	Distance (km)	Weight of transported goods (t)	MI Factor (kg/tkm)
Truck, incoming	3548	0.000455	1
Truck, outbound	3548	0.000421	1
Materials of a washing machine			
Material	Weight/product (kg)	MI Factor (kg/kg)	
Steel	30.5	7	
Copper	1.55	500	
Aluminium	2.0	85	
Iron	10	5.6	
Transports of a washing machine			
Mode of transportation	Distance (km)	Weight of transported goods (t)	MI Factor (kg/tkm)
Truck transport	750	0.092	1
Electricity consumption in the production of a washing machine			
Electricity (public)	Electric Energy Input (kWh)	MI Factor (kg//kWh)	
Electricity	55	0.41	
Electricity consumption caused by the washing of the t-shirt (in +40°C, 30 times)			
Electricity (public)	Electric Energy Input (kWh)	MI Factor (kg//kWh)	
Electricity	9.81	0.41	
Waste disposal of the t-shirt			
Waste disposal	Weight/product (kg)	MI Factor (kg//kg)	
Landfill deposit	0.482	1.1	

Table Q5(a): Alternatives of light bulb for the office

Light Bulb Type	Bulb cost per unit (RM)	Life expectancy per unit (hours)	Cost per kWh of electricity (RM)
120-watt incandescent bulb	2.00	1000	9.00
40-watt compact fluorescent bulb	80.00	10,000	9.00