



First Semester 2019-20
Comprehensive Examination

Course Name: Product Design

Course Code: DE G531

Date & Time: 12/12/2019 (14.00 – 17.00)

Weightage: 20% (40 Marks)

PART-B (Open Book)

Note:

- Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
- All parts of a question should be answered consecutively. Each answer should start from a fresh page.
- Assumptions made if any, should be stated clearly at the beginning of your answer.

Q1. The Gadget Corporation limited produces three products, A, B and C, all made from the same material. Until now, they used traditional costing method to allocate overhead to its products. The company has decided now to use activity based costing system. Information for three products for the last year is as follows: [10]

	A	B	C
Production and sales volumes (units)	15000	12000	18000
Selling price per unit (\$)	7.50	12	13
Raw material usage (kg) per unit	2	3	4
Direct labour hours per unit	0.1	0.15	0.2
Machine hours per unit	0.5	0.7	0.9
Number of production runs per annum	24	28	42
Number of deliveries to retailers per annum	48	30	62

The price for raw materials remained constant throughout the years at \$ 1.20 per kg. Similarly, the direct labour cost for the whole workforce was \$ 14.80 per hour. The annual overhead costs were as follows:

Machine set up costs (\$)	26550
Machine running costs (\$)	66400
Procurement costs (\$)	48000
Delivery costs (\$)	54320

Calculate

- (i) Cost per unit for products A, B and C under traditional costing method. (Note: use direct labour hours as the basis for apportionment).
- (ii) Cost per unit of each product using activity based costing
- (iii) Using your calculation from (i) and (ii) above, explain how activity based costing may help to improve the profitability of each product.

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Q2. Designer would like to develop a modified pencil holder pouch product. The targeted customer for pencil/pen holder pouch is school and college students. Perform following design activities.

- (i) Develop a House of Quality (HOQ) for pencil/pen holder pouch (consider at least six customer requirements). [6]
- (ii) Perform concept screening for selected different concepts as shown in Figure 1. Justify the selection. [6]



Figure 1: Different selected concepts for pencil/pen holder pouch

Q3. Gopal would like to select a smartphone based on criteria such as camera (Megapixel), internal memory (Gigabytes), battery capacity (mAh), style, and cost (rupees). Initially, he has chosen four different phones namely; Samsung Galaxy M30s, Xiaomi Mi A3, OPPO K3 and Vivo U10 for comparison based on above criteria. Apply Multiple-criteria decision-making (MCDM) method and rank the order of selection. Also, discuss drawbacks of selected MCDM method. [12]

Q4. Discuss the ethics and consensuses in the following situation:

You have been on the job for nine months as an assistant research engineer working with a world-famous authority on heat transfer. It is an ideal job, because you are learning a great deal under his sympathetic tutelage while you pursue an advanced degree part-time. You are asked to evaluate two new flame-retardant paints A and B. Because of late delivery of some constituents of paint A, the test has been delayed and your boss has been forced to make a tentative recommendation of paint A to the design group. You are asked to make the after-the-fact tests “for the record.” Much to your surprise, the tests show that your boss was wrong and that formulation B shows better flame resistance. However, a large quantity of paint A already has been purchased. Your boss asks you to “fudge the data” in favour of his original decision, and since there is reasonable possibility that your data were in error, you reluctantly change them to favour his decision. Discuss the ethical action.

[6]