

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2952

Roll No.

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**B.Tech.**

(SEM. VIII) EVEN THEORY EXAMINATION 2012-13

**PRODUCT DEVELOPMENT**

Time : 3 Hours

Total Marks : 100

Note :- Attempt all questions.

1. Attempt any four of the following : (5×4=20)
  - (a) Explain in brief the following, in relation to product development :
    - (i) Core benefit
    - (ii) Generic product, and
    - (iii) Augmented product.
  - (b) Differentiate between convenience goods, shopping goods and speciality goods. Give examples of each type.
  - (c) Explain what is meant by design by evolution. Describe the design evolution of modern writing system.
  - (d) Describe the typical product life cycle. Explain the various phases of the cycle.
  - (e) What are the sources of new product idea. Give a list of some of the common methods of idea generation.
  - (f) Briefly describe the scope of the following :
    - (i) Technical feasibility
    - (ii) Economic feasibility
    - (iii) Financial feasibility.

2. Attempt any **two** of the following : **(10×2=20)**

(a) Prepare a check-list for need analysis study.

A family car is required to carry four persons with total purchase cost not exceeding ₹ 1.00 Lac. Carry out a need analysis giving important specifications and standards of performance.

- (b) (i) Discuss how work-place layout can be developed from ergonomic considerations.  
(ii) How is ergonomics applied to design of displays and controls ?
- (c) Explain the difference between design by innovation and design by evolution. Give examples.

Which of the following designs are design by evolution ?

- (i) Power tiller for farming  
(ii) Pitcher made by potter  
(iii) Bullock cart  
(iv) Electric shaver

Give supportive argument for your choice.

3. Attempt any **two** of the following : **(10×2=20)**

(a) A morphological table, for the design of a liquid-ink writing equipment, has been prepared as below :

Design Parameter	Possible Choices			
	1	2	3	4
A. Ink reservoir	Rigid Tube	Collapsible Tube	Fibrous material	—
B. Filling Mechanism	Partial Vacuum	Capillary	Fibrous material	Pour ink into reservoir
C. Writing Point	Split nib-capillary feed	Ball point viscous ink	Point of fibrous material-capillary feed	—

- (i) Prepare a Compatibility matrix for the above and prepare a list of compatible combinations.

- (ii) Indicate if you can obtain a fresh design idea from this study.
- (b) Explain what is the difference between decision making under risk and uncertainty. With the help of suitable examples explain the following :
- (i) utility based decision making
  - (ii) regret based decision making
  - (iii) decision tree for decision making
  - (iv) Hurwicz criterion based decision.
- (c) The annual fixed cost for a product is Rs. 20,000/- whereas the annual profit is ₹4,000.00. Average monthly sales is 82 pieces. A new design is being planned with additional investment of ₹ 8,000.00 to be returned in 2 years. The new design is expected to increase the P/V ratio by 5%. What is the sales value of the new design if (i) net profit remains constant (ii) the new profit is equal to ₹4,800/- ?

4. Attempt any **two** of the following : **(10×2=20)**

- (a) (i) Explain the term "Availability of a System". What steps can be taken to improve the system availability ?
- (ii) With the help of suitable examples discuss the various design methods for increasing the reliability of products.
- (iii) A system has 3 components. It has been found that at least 2 out of the 3 components (sub systems) should be operative for the system to work successfully. Reliability of sub-system is 0.90. Calculate the system reliability.

- (b) What are the objectives of analyzing the man-machine system ?

Consider a system with a number of identical machines having same running time and identical service requirements. Estimate the number of machines a single operator can attend. The following data is available :

	<u>Time</u>
Insert a piece	0.6 min
Removing finished piece	0.3 min

	<u>Time</u>
Inspect the part	0.5 min
File burr and set aside	0.2 min
Walk to next machine	0.05 min
Wage paid	₹ 30/hour
Machine running time	3.95 mins
Burden rate	₹ 48/hr.

(c) Discuss the role of computers in design process and manufacturing.

5. Attempt any **two** of the following : (10×2=20)

(a) How will you analyze quality costs ? What costs are associated with quality ? Give examples.

(b) Discuss the basic elements of QFD. With the help of a suitable example construct the QFD matrix and explain how this would help in obtaining a new design of the product.

(c) List out the important uses of time study.

The time study of a job was undertaken and the following data was recorded :

Job element	Cycles				
	1	2	3	4	5
	element Time (mins) →				
1	0.16	0.12	0.33	0.15	0.24
2	0.60	0.60	0.60	0.60	0.60
3	0.33	0.50	0.35	0.37	0.35
4	0.50	0.50	0.50	0.50	0.50

Note : Elements 2 and 4 are machine controlled.

– Operator rating 110%

– Personal allowance 30 min/day

Unavoidable delay 20 min/day

Fatigue – 10% of the actual working time

1 shift = 8 hrs/day

Compute the standard time for each job and shift output standard.