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

PAPER ID : 2952 Roll No.

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 :

	Time
Insert a piece	0.6 min
Removing finished piece	0.3 min

	Time
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.