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06ME762

Seventh Semester B.E. Degree Examination, Dec.09/Jan.10
Engineering System Design

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.**
2. Missing data may be suitably assumed and clearly stated.

PART – A

- 1 a. What is designing? Explain design by evolution with an example. (10 Marks)
- b. With the flow diagram, explain morphology of design. (10 Marks)
- 2 a. Explain the preliminary need statement. (04 Marks)
- b. Write at least one need statement for
 - i) Satellite and
 - ii) Photocopying machine. (04 Marks)
- c. Explain the four important factors to be considered during analysis of need. (12 Marks)
- 3 a. What is creativity? Explain the creative process by considering five step-by-step orderly process. (10 Marks)
- b. What is morphological analysis? Conduct morphological analysis of a kerosene stove for kitchen. (10 Marks)
- 4 a. Describe the five different stages in preliminary design. (10 Marks)
- b. Explain the concept of tolerance and standardization, with an example, in detailed design. (10 Marks)

PART – B

- 5 a. Explain the concept of utility, with an example. (04 Marks)
- b. A company produces four different designs of pens. Their performance is summarized as follows:

Performance parameter→ Design ↓	Writing time between refills (in minutes)	Nib life (in months)	Cost in Rs.	Writing pressure
A	35	24	10	0.30
B	15	30	08	0.20
C	65	20	20	0.40
D	30	18	12	0.25
Minimum acceptable value	10	15	20	0.20

Assign proper weights to the quality dimensions and determine which design gives the maximum utility. (16 Marks)

- 6 a. Explain bath tub curve with the sketch. (04 Marks)
 b. Determine the reliability of an equipment having an operating period of 40 hours and MTBF of 60 hours. If the reliability has to be improved by 25%, what percentage charge in MTBF is required? (08 Marks)
 c. Calculate the reliability of the system shown in Fig.6(c).

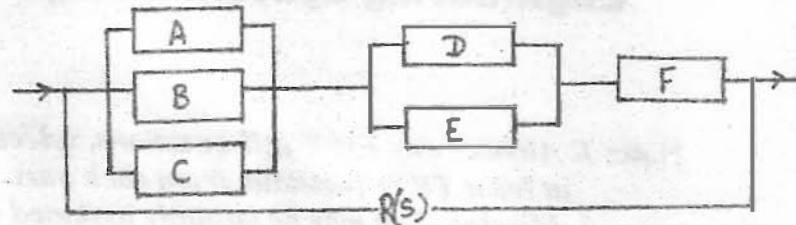


Fig.6(c).

$R(A) = 0.75$ $R(B) = 0.68$ $R(C) = 0.82$ $R(D) = 0.91$ $R(E) = 0.87$ $R(F) = 0.89$.

(08 Marks)

- 7 a. Describe with a sketch the components of break even analysis. (04 Marks)
 b. Explain fixed costs and variable costs. (06 Marks)
 c. Products P and Q which serve as food for cattle in different amounts of nutritive ingredients N_1 and N_2 , are to be provided to cattle in certain specified quantity. The products also contain an ingredient N_3 which is harmful, if present in excessive quantity. The following table gives the data.

Ingredient	Amount present in product		Minimum or maximum amount needed in units
	P	Q	
N_1	9	3	45 minimum
N_2	1	4	16 minimum
N_3	2	2	20 maximum

If the prices of P and Q per unit are Rs.20/- and Rs.40/- respectively; find the optimum product mix of the food with prescribed ingredient contents using graphical method.

(10 Marks)

- 8 a. With the sketch, explain man – machine interaction cycle. (08 Marks)
 b. Explain any three purposes of display in designing a machine. (06 Marks)
 c. Explain three essential things for the proper design of controls. (06 Marks)
