B.TECH. SEM -VI MECHANICAL 2014 COURSE (CBCS) :
WINTER - 2017
SUBJECT: ELECTIVE-I: RELIABILITY ENGINEERING

Day: **Friday** Time: **10.00 AM TO 01.00 PM**
Date: **24/11/2017** **W-2017-2230** Max. Marks: 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat labeled diagrams **WHEREVER** necessary.
4) Assume suitable data wherever necessary

Q.1 **a)** What is the relationship between MTTF and reliability? **(05)**
b) Draw and explain a specimen 'Bath Tube' curve. **(05)**

OR

Q.1 **a)** Following table shows the rest results for 100 components tested simultaneously. **(10)**

Operating time (hrs)	0	10	20	30	40	50	60	70	80	90	100
No. of surviving components	100	90	81	73	66	60	55	50	45	41	37

Evaluate: Hazard rate, failure density function and reliability and plot these functions against time.

Q.2 Explain following distribution: **(10)**
i) Binomial Distribution
ii) Log normal distribution

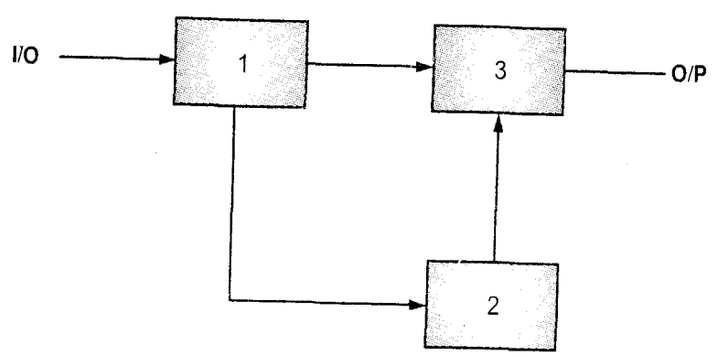
OR

Q.2 A system has a constant failure rate of 10^{-3}/hr. what is probability that system will fail before t = 1000 hr. Determine the probability that it works at least 1000 hr. **(10)**

Q.3 Explain system reliability model in parallel configuration. **(10)**

OR

Q.3 For the system shown in fig. Calculate the reliability using tie set and cut set theory. **(10)**



P. T. O.

Q.4 Explain the following: **(10)**
i) Inherent availability
ii) Operational availability
iii) Achieved availability

OR

Q.4 A system consists of three units connected in series, with reliability $R_1 = 0.70$, $R_2 = 0.80$ and $R_3 = 0.90$. It is desired that the reliability of system be 0.65. How should this be apportioned among three units? **(10)**

Q.5 What is FEMA? Explain the procedural steps involved in FMECA. **(10)**

OR

Q.5 Write short notes on: **(10)**
i) Symbols for fault tree construction
ii) Repair versus replacement

Q.6 Find the reliability and the corresponding central factor of safety of a system for which **(10)**
$\mu_S = 103.45 N/mm^2$, $\mu_L = 69 N/mm^2$, $6_S = 20.7\, N/mm^2$ and $6_L = 6.9\, N/mm^2$.

If i) S and L follow normal distribution
ii) S and L follow log normal distribution

OR

Q.6 Write short note on: **(10)**

a) Highly Accelerated stress screening(HASS)
b) Accelerated Life Testing (ALT)

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