Total No. of Questions : 8]

SEAT No. :

PB-2375

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B.E. (Mechanical)

QUALITY AND RELIABILITY ENGINEERING

(2019 Pattern) (Semester - VIII) (402050A) (Elective - V)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw suitable neat diagrams, whenever necessary.***
2) ***Figure to the right indicate full marks.***
3) ***Assume suitable data if required.***

Q1) a) Explain the term Probability density function (PDF) & Cumulative Distribution Function (CDF). **[8]**

b) Following table shows the results for 1000 components tested simultaneously, Evaluate: Hazard rate, failure density function & Reliability. **[10]**

Operating Time(Hrs)	0	100	200	300	400	500	600	700	800	900	1000
No. of Surviving Components	1000	895	810	730	660	600	545	495	450	410	373

OR

Q2) a) List and compare discrete and continuous probability distributions. **[9]**

b) Draw & explain a specimen “Bath Tub curve”. **[9]**

Q3) a) Explain Cold, Warm & Hot Stand by Redundancy. **[8]**

b) A system have three elements 1, 2 and 3 connected in series with their failure rates of $\lambda 1 = 0.005$, $\lambda 2 = 0.003$, $\lambda 3 = 0.001$ per hour respectively Assuming. mission time of 20 hours and system reliability of 0.95, find the reliability of each subsystem to achieve the desired reliability goal. **[9]**

P.T.O.

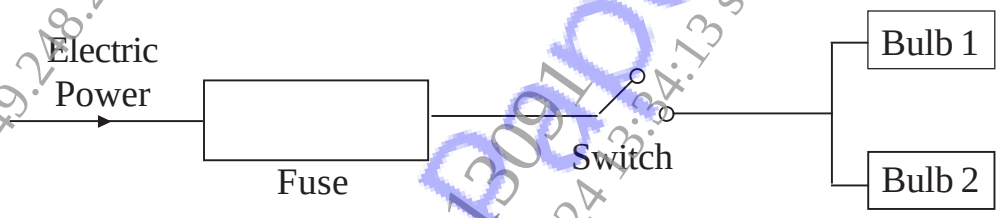
OR

Q4) a) Explain with illustration reliability analysis of series, parallel & mixed configuration systems. **[8]**

b) The four main units connected in series together make an assembly of machine The individual reliabilities of units are 0.70. 0.80, 0.90 respectively. If the reliability is to be increased to a value of 0.65. Explain and find how the reliability of machine should be apportioned among these units with minimum effort technique. **[9]**

Q5) a) Explain methods to determine minimal cut sets. **[9]**

b) A room with two light bulb is operated by a single switch Assuming No light in the room as the top undesirable event construct the fault tree diagram. **[9]**



OR

Q6) a) State the basic concepts of FMEA and FMECA and explain in what way FMECA is different than FMEA. Also, state the basic analysis procedure for FMEA/FMECA. **[9]**

b) Explain Ishikawa diagram for Failure representation with suitable example. **[9]**

Q7) a) What is Maintainability function? Distinguish between Breakdown maintenance and Preventive Maintenance. **[9]**

b) Explain the term Margin of Safety & Factor of safety. **[8]**

OR

Q8) a) Defined availability and maintainability the data for a CNC machine in a plant is as follows. Mean time before failure: 35 Hours Mean time to repair: 10 Hours Administrative logistics Time: 50% of MTTR Calculate operational availability and inherent availability for CNC machine. **[8]**

b) Write a short note on any three. **[9]**

i) High Accelerated Life Testing (HALT)

ii) Mechanical Reliability

iii) Analysis of Failure Time

iv) Highly Accelerated Stress Screening (HASS).

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