COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

Reliability & Terotechnology TH   PE(DE) - 14007

Course: B.Tech

Branch: Production Engineering (Sandwich)

Semester: Sem VII

Year: 2014-2015

Max.Marks:60

Duration: 3 Hours   Time:- 2.00 Pm - 5.00pm

Date: 22 NOV 2014

Instructions: MIS No. ☐☐☐☐☐☐☐☐ ☐

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper

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1.	a)	Draw bath tub curve? Explain the various regions in detail?	3
	b)	What is the difference between Failure Rate and Hazard Rate, Explain with an example	2
	c)	Drive the expression of Reliability in terms of Hazard rate and Failure density in integral form?	5
2	a)	What is meant by Availability? Explain types of availability of the system?	
		A system requires reliability value of 0.95 for an operation of 800 Hrs. The availability value over the same period of time is required to be 0.98. Assume constant Hazards for failures and repair, estimate MTBF and MTTR.	5
	b)	How the criticality of the component is obtained using FMECA and RPN? Explain with suitable Example?	5
3	a)	State the assumptions to be made while using AGREE allocation method? Apportion the reliabilities of the subsystem to achieve the system reliability goal of 0.98 for 20 hours. The data available is as under.	

Sub System (i)	Number of Modules (N_i)	Importance Factor (W_i)	Operating Time (t_i) Hrs
1	25	1	20
2	80	0.97	18
3	45	1	20
4	60	0.93	18
5	70	1	20

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b) Explain in brief the role of computers in data acquisition for Condition Monitoring system.

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4 a) For the Block Diagram shown write down the Minimal Tie Sets, Minimal Cut Sets. Using these calculate the reliability of system assuming the elements to be independent and identical?
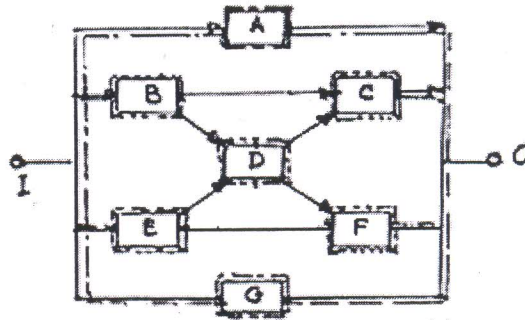
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b) Consider a standby system following exponential distribution with failure rate λ_1 for primary unit and failure rate λ_2 for standby unit and assuming decision switch is 100% reliable. Determine the MTTF for the system. If $\lambda_1 = \lambda_2 = \lambda$ show that MTTF $= 2/\lambda$

3

5 a) Explain the systematic methodology for ferrographic analysis of wear debris, for finding out the trends of wear particle concentration (WPC) and wear Severity Index (W.S.I.)

5

b) Distinguish between Breakdown Maintenance and Preventive Maintenance. State any quantitative method of decision making regarding suitability of Breakdown Maintenance and Preventive Maintenance.

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6 Write short note on **any two** of the following

    a. Reliability Centered Maintenance (RCM)

    b. Vibration Signature Analysis

    c. Constituents of cost in Life Cycle Management

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