UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, April/May 2018

Course: MREQ 821- Quality & Reliability Engineering Program: M.Tech.(Rotating Equipment) Time: 03 hrs.

Semester: II

Max. Marks: 100

Instructions:

S. No.		Marks	CO
Q 1	Define reliability. Explain its role in quality control and improvement	4	CO1
Q 2	What are the steps involved in reliability allocation? What are the methods for improving reliability in design phase?	4	CO3
Q 3	Consider a system with 10 identical components connected in parallel. If the system reliability is 0.96, how poor can the components be?	4	CO2
Q 4	Compare and illustrate Juran's and corsby philosophy of quality management.	4	CO5
Q 5	What are the factors affecting Product life?	4	CO4
	SECTION B		
Q 6	Discuss elaborately the basic seven questions to be answered in implementing Reliability Centered Maintenance (RCM).	10	CO4
Q 7	The outside diameter of a part used in a gear assembly is known to be normally distributed with a mean of 40 mm and standard deviation of 2.5 mm. The specifications on the diameter are (36,45), which means that part diameters between 36 and 45 mm are considered acceptable. The unit cost of rework is \$0.20, while the unit cost of scrap is \$0.50. If the daily production rate is 2000, what is the total daily cost of rework and scrap?	10	C05
Q 8	A system consists of 5 independent components all connected in series, their failure rates are 0.0005, 0.0004, 0.0003, 0.0002 & 0.0001 per hour respectively. The specified failure rate of the series system is 0.002 per hour. Calculate the value of the failure rate to be allocated to each component.	10	CO3
Q 9	Describe the life cycle of a product. What probability distributions would you use to model each phase? OR Explain the 14 principles of Deming's philosophy of management.	10	CO3

SECTION A

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Q 10	The faile 0.0064/h (a) V (b) I c (c) S	ure rates are a nour. Find the What is the me f you had a c components, h	as follows: (reliability o ean time to f choice of in ow would y omponent E 000 hours. V	0.0005, 0.00 of the system failure of the nproving system rou proceed? B is a standby	05, 0.0003, 0 after 1000 ho system? stem reliabilit y component.	0008, 0.00 ours. by by modif	al distribution. 104, 0.006 and fying any two liability of the		CO3
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Construct a failure mode analysis flow chart and analysis the data of a centrifugal pump and wind turbine (Failures shall be assumed on your own)	20	CO5
OR		
will have to wait more than 40 minutes? More than 50 minutes?		
interested in reducing the average waiting time to 30 minutes by employing more mechanics. If the plan is successful, what proportion of the customers		
(d) The service manager is developing a promotional program and is		CO4
(c) Find the 26 control limits.	10	
time is normal, find the percentage of customers who will not have to wait more than 50 minutes.		
(b) Assuming that the process is in control and the distribution of waiting time is normal, find the percentage of sustemars who will not have to wait		
(a) Find the \dot{X} and \ddot{R} control limits		
$\sum_{i=0}^{n} 10000, \sum_{i=0}^{n} 10000$		
$\sum_{i=0}^{25} \dot{X} = 1000 , \sum_{i=0}^{25} \dot{R} = 250$		
process is repeated for 25 days. The summary data for these observations are		
From these four observations, the sample average and range are found. This		
dealers. They select four customers randomly each day and find the total time that each customer has to wait (in minutes) while his or her car is serviced.		
customers have to wait while having their car serviced with one of the		
(b) A major automobile company is interested in reducing the time that		