Question Paper

Exam Date & Time: 09-Dec-2023 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

VII Semester B.Tech Degree (IT/CCE) End Semester Examination Software Reliability (ICT 4055) PE-VII

Software Reliability [ICT 4055]

Marks: 50

1)

2)

3)

Duration: 180 mins.

Descriptive Questions

Answer all the questions.

Section Duration: 180 mins

A prediction system A in which the mean time to next failure (based on the exponential model) will (5) be the average of the 2 previously observed failure times. Apply this prediction system to the data given in Table 1. Generate the predictions for i values from 1 to 10. Repeat the procedure for system B in which the mean time to next failure will be the average of the 3 previously observed failure times. Tabulate the results for i=1 to 10, as i, t_i, T_i, λ_i,u_i for both systems. Show steps and formula used wherever applicable. Which system is preferred? Why?

Table 1. Failure time Data

	Failure no	1	23	34	5	6	7	8	9	10	
	Execution time between successive failures in secs	30	4 2	2 8	220	160	70	50	40	200	
В)	Construct a simple Goal Question Metric(GQM) tree improving the portability of the software. What are the softwares?	cori ie ac	res dva	por nta	nding .ges (to th of us	ne p ing	rod this	uce in s	r's goal of system	(3)
C)	Calculate availability measures for the following:										(2)
	a) A system has a mean time between failure (MTBF) of 1000 hours and a mean time to repair (MTTR) of 5 Hours. What is the inherent availability of the system A _I ?								ime to repair		
	b) A system has a mean time between maintenance action (MTBMA) of 200 hours, a F_c of $\frac{1}{2}$, a F_p of 1 and M_{CT} of 2 hours and M_{PT} of 1 hour (F_c = no. of corrective actions/1000 hrs, F_p = no. of preventive actions/1000 hrs, M_{CT} and M_{PT} are mean active time for corrective and preventive maintenance respectively). What is achieved availability A_A ?										
A)	Develop an operational Profile for Employee information system. It is observed that it takes 1hr to design and run one test, 2% of the tests reveal faults, takes 1hr to correct each fault. The total testing time allocated is 400hrs. From this information find the total number of tests to be performed and also number of tests required to test each feature specified in the operational profile.										
B)	What are the different types of reliability testing used testing is useful in improving reliability of e-commerce	d in p e we	oreo ebs	dict site	tion a	analy	sis?	? Di	scu	ss how regression	(3)
C)	With a suitable example, show how McCabe's cyclo	mati	c n	um	ber c	an b	e u	sed	as	a software metric.	(2)
A)	Discuss the causes for the software failures and app Trial data shows that 140 items failed during a test w What will be the failure rate and mean time to fail (M	oroad vith a TTF	che a to ;)? /	s to tal Als	o ach oper o find	nieve rating d the	a fi g tim reli	ully ne o abil	dep f 1 ity c	endable system. million hours. of the product	(5)

after 1000 hours.

- B)
- Write any two differences between cohesion and coupling metric used in measurement. Findthe (3) system cohesion and system coupling found in the graph shown in Fig.1



Fig.1

- C) Illustrate the usage of state hierarchy model (SHY) with respect to web usage. (2)4) What are the advantages of function point count over line of code(LOC)? Compute both the (5)unadjusted (assign the scale simple - 3, average - 4 and complex - 10) and adjusted function-point count (assign the scale irrelevant-0, essential-5) for the following spelling checker system. State A) any assumptions made. A spelling checker system checks all words in a document by comparing them to a list of words in the internal dictionary and an optional user defined dictionary. After processing the document, it sends a report on all misspelled words to a standard output. On request from user, it shows number of words processed on a standard output. On request from user, it shows number spelling errors detected on a standard output. Requests can be issued at any point in time while processing the document file. B) Differentiate between white box testing and black box testing (3)C) Discuss any two usability measures as per ISO 9126 standard (2)5) What is the importance of the software reliability growth models in software reliability (5)measurements? Explain in detail steps, how Goel-Okumoto basic execution model can be used to find the no. of defects predicted at time t, the total number of residual errors and the reliability factor A) for all the 5 observations(representing them in a tablar form), if the total expected errors are 200 and the observations considered corresponding to times between testing are: 10,20,30,40,50 (months) and the defect reduction rate is 0.05.
 - B) For the following C program, determine i) number of operators (μ1), ii) number of operands (μ2), iii) (3) the program length in terms of the total number of occurrences of operators (N1) and operands (N2), iv) estimate program length v) program volume and vi) program vocabulary

#include< stdio.h>
main()
{ int a ;
scanf ("%d", &a);
if (a >= 180)
if (a < 200) printf ("180 < a< 200 %dn" , a);
else printf ("a >= 200 %dn" , a);

else printf ("a < = 180 %dn" , a);}

C) Write any two techniques used to improve prediction accuracy. It is required to produce a device (2) having a reliability of at least 95% over a period of 500hr. Estimate the maximum permissible failure rate and minimum MTBF.

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