

KATHMANDU UNIVERSITY
End Semester Examination
June, 2019

Mark scored: _____

Level : B.E/B. Sc.
Year : IV

Course : COMP 486
Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date :

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate answer.

1. What is survivability?
 - a. A property that reflects the system can deliver services whilst under hostile attack.
 - b. A property that reflects the extent to which the system can deliver services whilst under compromise state.
 - c. A property that reflects the extent to which the system can deliver services whilst under hostile attack.
 - d. A proper that reflects the extent to which the system can deliver sub systems whilst under hostile attack.

2. Why is V & V process used?
 - a. Because they are effective in discovering residual errors in the system.
 - b. Because they are effective in finding errors in the system.
 - c. Because they are effective in discovering residual errors in the sub systems
 - d. Because they are effective in discovering design errors in the system.

3. If you remove 60% of product defects, then what will be the improvement in reliability?
 - a. 70%
 - b. 3%
 - c. 33%
 - d. 7%

4. What is failure?
 - a. Failures are outcomes of system errors that are derived from faults in the system.
 - b. Failures are a usually a result of sub-system errors that are derived from faults in the system.
 - c. Failures are a usually a result of system designs that are derived from errors in the system.
 - d. Failures are a usually a result of system errors that are derived from faults in the system.

5. What is fault tolerance?
 - a. It is development techniques that are used that either minimizes the possibility of mistakes or trap mistakes before they result in the introduction of system faults.
 - b. It is verification and validation techniques that increase the probability of detecting and correcting errors before the system goes into service are used.
 - c. It is run-time techniques that are used to ensure that system faults do not result in system errors and/or those system errors do not lead to system failures.
 - d. It is verification and validation techniques that decrease the probability of detecting and correcting errors before the system goes into service are used.

6. What will be the MTBF if a system operates for 9 hours in a shift, 4 failures occurred?
 a. 3 hrs b. 4 hrs c. 5 hrs d. 2 hrs
7. Which of the following statement(s) is/are true?
 a. If the MTBF has increased after a preventive maintenance process this indicates a clear improvement in the quality of your processes.
 b. If the MTBF has decreased after a preventive maintenance process this indicates a clear improvement in the quality of your processes.
 c. If the MTBF has increased after a preventive maintenance process this indicates a clear problem in the quality of your processes.
 d. If the MTBF has increased after a software process this indicates a clear improvement in the quality of your processes.
8. Why is Markov Model used?
 a. To model x systems, when it's less important to consider the covering factor and the repair and/or maintenance process.
 b. To model complex systems, when it's important to consider the covering factor and the repair process.
 c. To model simplex systems, when it's important to consider the covering factor and the repair and/or maintenance process.
 d. To model complex systems, when it's important to consider the covering factor and the repair and/or maintenance process.
9. Where is FTA used?
 a. In the fields of safety engineering and reliability engineering to understand how systems can fail
 b. In the fields of requirement engineering and reliability engineering to understand how systems can fail.
 c. In the fields of security and reliability engineering to understand how systems can fail.
 d. In the fields of safety engineering and hardware engineering to understand how systems can fail.

10. What is the equivalent logical statement of Figure 1?
 a. $(A \vee (B \vee C)) \wedge (C \vee (A \wedge B))$
 b. $(A \vee (B \vee C)) \wedge (C \vee (A \wedge B))A$
 c. $A(A \vee (B \vee C)) \wedge (C \vee (A \wedge B))$
 d. $(A \vee (B \vee C)) \wedge (C \vee (A \wedge B))AA$

11. What is process ageing?
 a. It is a time frame for software activeness.
 b. It is a terminating point of the software performance.
 c. It is a starting point for the maintenance.
 d. It is a gradual degradation of application performance, over time, that may lead to premature program termination.

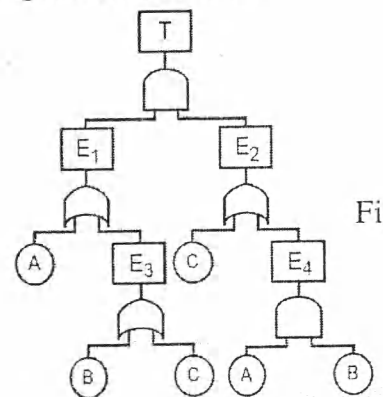
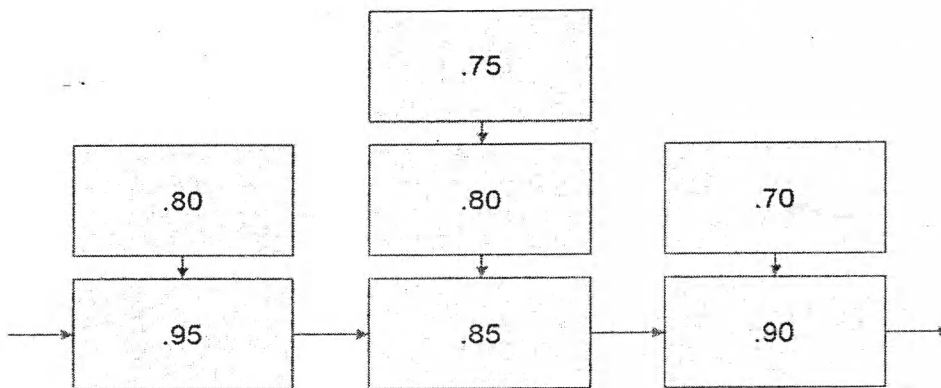


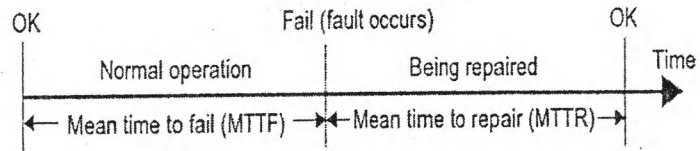
Figure 1

12. Suppose a system has 100 integrated circuits. The defective probability is .001 and the integrated circuits are independent. The product operates only if all the integrated circuits are operational. What is the probability that the product is operational?
 a. 0.90 b. 0.98 c. 0.97 d. 0.99
13. Which one of the following reliability metrics is suitable for the case like: "Appropriate for protection systems where services are demanded occasionally and where there are serious consequence if the service is not delivered" ?
 a. Probability of failure on demand b. Mean time to failure
 c. Rate of occurrence of failures d. Availability
14. What is the reliability of the following?



- a. 0.9500 b. 0.9931 c. 0.9631 d. 0.9531
15. What is the way of reusing abstract knowledge about a problem and its solution?
 a. Dependability b. Reliability c. Portability d. Design pattern
16. What is software rejuvenation?
 a. It is a preemptive rollback of continuously running applications to prevent failures in future.
 b. It is a descriptive rollback of continuously running applications to prevent failures in future.
 c. It is a dynamic rollback of continuously running applications to prevent failures in future.
 d. It is a process of continuously running applications to prevent failures in future.
17. Which of the following statement(s) is/are false?
 a. The dependability in a system reflects the user's trust in that system.
 b. Dependability is a term used to describe a set of related 'non-functional' system attributes – availability, reliability, safety and security.
 c. The availability of a system is the probability that it will be available to deliver services when requested.
 d. The reliability of a system is the probability that system services will be delivered the service agreement.

18. What does the following figure show?



- a. System life cycle
 - b. Computer system life cycle
 - c. The operate-repair cycle of a computer system
 - d. The operate-repair cycle of agile system
19. What is a common isolated-redundancy approach to constructing a mission-critical software system known as?
- a. N-version programming
 - b. Multi programming
 - c. Parallel programming
 - d. Distributed programming
20. What was one of the reasons of Ethiopian air crash?
- a. Incorrect measurement of Angle of Attack
 - b. Correct but not visible Angle of Attack
 - c. Missing Angle of Attack
 - d. Delaying the Angle of Attack

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SECTION "B"
[6Q. × 4 = 24 marks]

Answer *ANY SIX* questions.

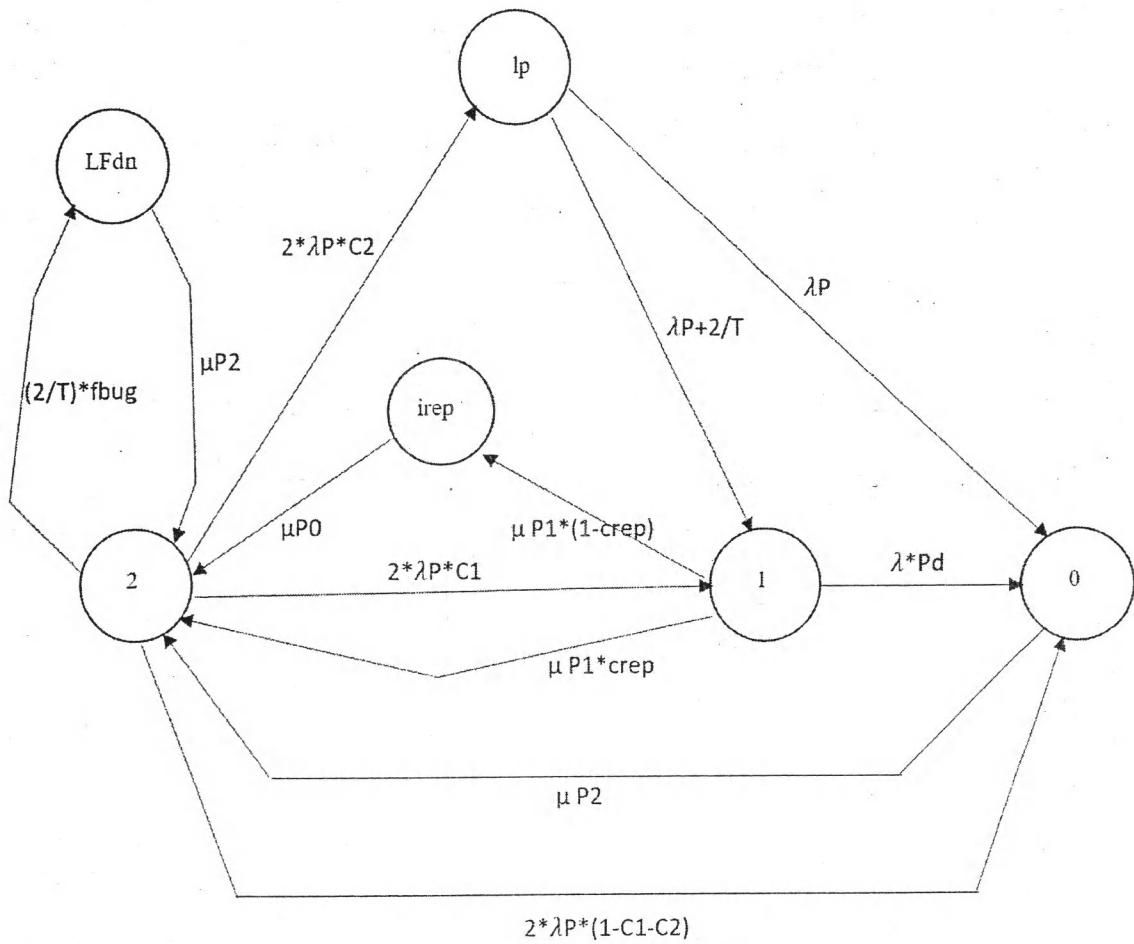
1. Calculate the average cost of unscheduled downtime if MTBF is 12 months and it takes 30 min to recover from unexpected error? [Assumption can be made as required]
2. Why is availability and reliability considered separately? Justify with examples.
3. Is high dependability always desired? Explain.
4. Explain Triple Modular Redundancy with Markov Model.
5. What is the purpose of using fault tree analysis? Explain with examples.
6. Why is software architecture different than software re-engineering? Explain.
7. What is process assurance? Why do we need process assurance?

SECTION "C"
[2Q. × 8 = 16 Marks]

Answer *ANY TWO* questions.

8. Suppose you are hired as a Project Manager of Multinational Software outsourcing company and you are given a task to convince the team members about the benefits and challenges of software reuse. What are the benefits and challenges that you consider and why and how do you convince team members? Explain them in details.

9. Calculate the availability of the following state diagram.



10. What were the main problems of Boeing 737 Max? If you are working in Boeing Company, how do you overcome those problems?

10. At what temperature, the speed of sound in the air will become double of its value at 27°C ?
a. 54°C b. 627°C c. 327°C d. 927°C
11. Reverberation time can't be controlled by _____.
a. temperature b. size of window c. volume of room d. changing carpet
12. What do you call the speed of sound in the study of acoustics?
a. Rhythm b. Tempo c. Pitch d. Frequency
13. One-hundred twenty microbars of pressure variation is equal to _____.
a. 120 dBSPL b. 115.56 dBSPL
c. 41.58 dBSPL d. 57.78 dBSPL
14. A car horn outdoors produces a sound intensity of 90 dB at 10 ft away. At this distance, what is the sound power in watt?
a. 12 W b. 0.12 W c. 0.012 W d. 1.2 W
15. An instrument designed to measure a frequency weighted value of the sound pressure level is known as _____.
a. sound level meter b. transducer
c. sound pressure meter d. sound analyzer
16. What is the increase in sound pressure level if the pressure is doubled?
a. Increases by 6 dB b. Increases by 3 dB
c. Increases by 10 dB d. Increases by 1 dB
17. A 16 KHz sound has how many octaves higher than a 500 Hz sound
a. 2 b. 5 c. 4 d. 8
18. The transmission of sound from one room to an adjacent room, via common walls, floors or ceiling is known as _____.
a. flanking transmission b. reflection
c. refraction d. reverberation
19. A room in which the walls offer essentially 100% absorption, therefore simulating free field conditions is known as _____.
a. Dead room b. Anechoic room
c. Live room d. Closed room
20. Middle ear consists of _____.
a. Malleus, incus and stapes
b. Vestibule, semicircular canals and cochlea
c. Pinna, auditory canal and ear drum
d. Pinna and incus