NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA

END SEMESTER SPRING - 2017

ANSWER ANY TEN QUESTIONS

All Parts of a question should be answered at one place.

All question carry equal marks

SUBJECT: Software Engineering	DEPT. CODE: CS 412
FULL MARKS : 50	Duration of Examination: 3 Hours

[1] Explain the Putnam resource allocation model. Explain the Putnam model as an empirical software effort estimation model? What are the limitations of this model? Assuming the Putnam model, with **S**=100,000 , **C**=5000, $\mathbf{D_o}$=15, Compute development time and manpower development .

[2] What is Software Productivity? How productivity is related to Difficulty? Derive a furmula to compute the productivity? A stand alone project for which the size is estimated at 12500 LOC is to be developed in an environment such that the technology factor is 1200. Choosing a manpower build up $\mathbf{D_o}$=15, Calculate the minimum development time, total development man power cost, the difficulty, the peak manning, the development peak time, and the development productivity.

[3] Explain the COCOMO-II in detail. What are the 4 types of categories of projects are identified by COCOMO-II? Describe various stages of COCOMO-II. Which stage is more popular and why?

[4] What is manpower build up for a project and how it is computed? Consider a large-scale project for which the manpower requirement is **K**=600 PY and the development time is 3 years 6 months. (a)Calculate the peak manning and peak time. (b) What is the manpower cost after 1 year and 2 months? (c) Calculate the difficulty and manpower build up ?

[5] Discuss typical software risks. What are risk management activities? How staff turnover problem affects software projects?

[6] Define module coupling and explain different types of coupling. What problems are likely to arise if two modules have high coupling?

[7] With the help of **Halstead's software science,** explain the use of token count to estimate the effort and difficulty **.** For a program with number of unique operators η_1**=20** and number of unique operands η_2**=20** , Compute the following: (i) Program volume (ii) Effort and time (iii) Program length (iv) Program level.

[8] Write a C program for the calculation of roots of a quadratic equation? List out the operators and operands and also calculate the values of software science measures like Software Metrics η**, N,V, E,** and λ .

[9] What is Software Reliability ? What are the different Software Failure Mechanisms? Explain the bathtub curve for Software Reliability? What are the difference between hardware and software bathtub curves ?

[10] What are various type of risks encountered in a typical software project? What are the the top five risk factors that threaten projects in different applications?

[11] What is modularity? List the important properties of a modular system. Define module coupling and explain different types of coupling

[12] Discuss the **basic execution time model** of software reliability. How $\Delta\mu$ and $\Delta\tau$ can be calculated. Assume that the initial failure intensity is 6 failures/CPU hr. The failure intensity decay parameter is 0.02/failure. We assume that 45 failures have been experienced. Calculate the current failure intensity.

[13] Explain the Logarithmic Poisson execution time model. Find out the relations for the additional number of failures and additional execution time. Assume that the initial failure intensity is 20 failures/CPU hr. The failure intensity decay parameter is 0.02/failures. We have experienced 100 failures up to this time. (i) Determine the current failure intensity. (ii) Calculate the decrement of failure intensity per failure. (iii)Find the failures experienced and failure intensity after 20 and 100 CPU hrs. of execution. (iv)Compute the additional failures and additional execution time required to reach the failure intensity objective of 2 failures/CPU hr.

[14] The software development organization developing real time software has been assessed at technology factor of 2200. The maximum value of manpower build up for this type of software is $\mathbf{D_o}$=7.5. The estimated size to be developed is **S**=55000 LOC.

[a] Determine the total development time, the total development manpower cost, the difficulty and the development peak manning.

[b] The development time determined in (a) is considered too long. It is recommended that it be reduced by two months. What would happen?
