41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Ashwin

Exam.	Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Mahanpur Nagarpalika is planning to develop new system for Tourists with all the details of their monumental structures, tourist attraction places and also cultural programs offering restaurants within the municipality. They have also plan to integrate entry tickets booking and purchasing through web as well as through app similar as the online movie ticket purchasing. Imagine you are one of the software engineer working on the project. With clear statement of your assumptions on the system environment and specifications about the system, prepare the followings:
   i) The list of system quality attributes including both functional and non-functional requirement of the systems. [6]
   ii) Complete data models with illustrative model diagram. [6]
2. a) Explain how software cost estimation is done using function point oriented and object point oriented methods. [5]
   b) What is software crisis? Explain with the help of example? [5]
3. Why architecture is important to drive software development? Explain 2 tier and 3 tier architecture with example. [3+3]
4. Explain CMMI model to evaluate the maturity of a software development. [8]
5. a) What are the benefits and problem of software reuse? What factors need to be taken care of while software reuse planning? [5]
   b) What are software quality measures? Why SQA is important? Explain. [5]
6. a) What is software verification? Clarify its role in ensuring the correctness of software implementation. [5]
   b) Compare and contrast the Black Box and White box testing in V and V process. [5]
7. Write short notes on: [3×4]
   i) Requirement elicitation and analysis
   ii) COCOMO and the variants
   iii) Modular decomposition styles
   iv) Pattern generator
8. Compare the following: [4×3]
   i) Client-server versus distributed object architecture
   ii) User requirements versus system requirements
   iii) Change management versus version management
   iv) Process model versus data model

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INSTITUTE OF ENGINEERING
Examination Control Division
2074 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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1. a) "Walking on water and developing software from specification are easy if both are frozen". Justify this statement. [5]

   b) Assume that you are the technical manager of software development organization. A client approached for a software solution. The problem stated by client have uncertainties which lead to loss if not planned and solved. Which model do you suggest for his project? Justify. Explain that model with its pros and cons. [5]

2. a) What is requirement engineering? Explain its steps. [4]

   b) For better healthcare facilities in remote areas, Ministry of Health (MOH) launches Telemedicine project. Through this project expert doctor from central hospital can examine patient in remote places through video conferencing. MOH propose to maintain central server to hold all patient records and medical history. Also system should able to manage routine of doctors, appointments and follow ups. Assume that you are technical lead of this project, answer the following questions.

   (i) list out all functional and non-functional requirement of the systems [6]

   (ii) Make project Feasibility Report [6]

3. A customer presents a cheque to a clerk. The clerk checks a database containing all account numbers and make sure whether the account number in the cheque is valid, whether adequate balance is there in the account to pay the cheque and whether the signature is authentic. Having done these the clerk gives the customer a token. The clerk also debits the customer account by an amount specified on the cheque. If the cash cannot be paid due to an error on the cheque, the cheque is returned. The token number is returned on the top of the cheque and it is passed on to the cashier. The cashier calls out the token number and the customer go to cash counter with the token. The cashier checks the token number, takes customer signature, pays cash, enter cash paid in a database called daybook and files the cheque.

   Prepare physical and logical DFD. [8]

4. What are software quality measures? Explain in details about staged CMMI model. [2+6]

5. a) Discuss the differences between verification and validation. [4]

   b) Compare and Contrast [4]

   (i) Unit testing and Integration testing
   (ii) Alpha testing and beta testing

6. a) An application has following: 10 low external inputs, 8 high external outputs, 13 logical files, 17 interface files, 11 average external inquires and complexity adjustment factor of 1.10. What are the unadjusted and adjusted function point counts? [5]

   b) Explain component-based software engineering (CBSE) process. [5]

7. What is COCOMO? Using standard method, estimate cost of software construction process of Q.N.3. State your assumption clearly before calculating the cost estimate. [8]

8. Write short notes on followings: [3×4]

   a) Distributed Object architecture
   b) Modular decomposition
   c) Hard and soft real time system
   d) Formal Technical Review and Inspection for QC

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42 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Shrawan

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is software crisis and what is its reason? Describe evolutionary model, in brief, explaining how it reduces crisis problem. [8]
2. In a particular school, there are various departments. There are various instructors and are having direct employment from corresponding departments. Students are admitted to school and later they choose their subject study program offered through various departments. The instructors are assigned for particular subject teaching task. Each department has a HOD to coordinate to overall activities, including class and lab scheduling processes. Students have to seat in for semester end exams as a final evaluation process. Assessment with 'NQ' status students are NOT allowed for final exam. At least after 8 semesters of such final evaluations, students with clearance form department, including HOD approval, students become ready for graduation".

   Now, answer the followings. [5+5+5]

   i) Prepare the list of processes and agents
   ii) Draw the DFD for graduation and associated processes
   iii) Depict the relationship between instructor, HOD and Department
3. Differentiate between thin client model and thick client model. Describe multiprocessor architecture for software. [3+5]
4. a) Explain the role of real-time operating system. [6]

   b) Justify the statement "Advantages of reuse are lower costs, faster software development and lower risks." [4]
5. Compare and contrast: (a) alpha and beta testing (b) black box and white box testing (c) unit and integration testing. [8]
6. Give a suitable definition of software quality and briefly describe the rationale for your definition. Explain with quality attributes for software. [2+3+3]
7. What is the difference between version and release? Explain why we need Software Configuration Management (SCM). [2+4]
8. "Validation examines the dynamic behavior of software system". Explain this with an example. [5]
9. Write short notes on: [4×3]

   i) COCOMO
   ii) Component based software engineering
   iii) Non-functional requirements

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INSTITUTE OF ENGINEERING
Examination Control Division
2073 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Supermandu Maha Nagarpalika is planning to introduce public transportation system with GPS based online vehicle tracking and smart card based payment system. Imagine, you are one of the software engineer working on that project. With clear statement of your assumptions on the system environment and specifications about the system, prepare the followings:
   i) The project Feasibility report [6]
   ii) Complete process models including context and two DFDs of level 2. [2+2+2]
2. What are the characteristics of good software? Explain waterfall model for software development. Also justify why this model is not suitable when we need to deliver important functionalities of software in short time period. [2+2+2]
3. a) "Component based software engineering is a reuse-based approach to defining and implementing loosely coupled components into system." Justify the statement. [4]
   b) Explain why it may be necessary to design the system architecture before specification are written? Explain in detail about distributed object architecture with suitable example? [3+3]
4. How do CMM standard differ from that of ISO standards? Explain in detail about all the levels in CMM? [4+4]
5. a) What are the good and bad aspects of LOC and FP based estimation models? [5]
   b) What makes the client fat or thin? Explain from model perspective. [5]
6. Explain alpha testing and beta testing of your software product? Prepare a checklist for software code inspection. [6+4]
7. Write short notes: [3×4]
   i) Adaptor components for components integration
   ii) Software version, variant and release
   iii) Requirements discovery through prototyping
   iv) SQA plan
8. Compare the following: [3×4]
   i) Baselines versus Codeline in configuration management
   ii) Unit testing versus integration testing
   iii) Inspection versus review in software quality management
   iv) Real-time versus batch operating system

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Kartik

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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1. What are typical software characteristics? What do you mean by software crisis? Elaborate. [4+4]
2. What are the reasons for software runways? Explain how both the waterfall model of the software process and prototyping model can be accommodated in the spiral process model. [2+6]
3. What is a behavior model? How does it differentiate from data model of the same system? Explain with examples and model. [3+3+2]
4. How many levels are there in CMM? Explain in detail about all the levels. [2+5]
5. Why software quality standards are needed? What are the metrics for software project size estimation? Discuss cyclomatic complexity with suitable example. [2+3+3]
6. Compare and contrast Verification with Validation. What do you mean by critical systems? How does partitioning augments in V and V process? Explain with example. [4+2+2+2]
7. "Survival of the fittest" is valid to software industry in today's competitive market. Explain the statement in the context of issues modern software configuration management must address nowadays. [8]
8. Differentiate between functional testing and structural testing. A web enabled system with a robust back-end database estimated to be of about 200 KLOC when complete. Assuming the system will work in semidetached mode; calculate the effort required per month, the development time, average number of staff required and he productivity rate. Consider COCOMO-2 for reference. [5+3]
9. Compare the following: [3×5]
   i) Client server vs Distributed object architecture
   ii) Real time vs Non-real time operating system
   iii) Walk through vs Inspection in testing process

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Exam.	Regular		
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Subject: - Software Engineering *(CT601)*

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1. What do you mean by prototype? What are the risks if the prototyping becomes uncontrolled? Explain RAD in brief. [1+3+3]
2. Briefly discuss all the activities to be carried out in problem definition and feasibility analysis. [6]
3. Draw TWO DFD diagrams for simple e-commerce site based order processing system. Assume all necessary and required specifications on your own and state them clearly first.[2+4+4]
4. Explain how is real time OS and software different from non-real time OS and software? [6]
5. In theory, formal verification could be automated if the original specification is stated completely and precisely. Why is this hard to achieve in practice? Explain. [8]
6. The CMM rates software companies according to how well they identify and manage their software processes onto the 5 different levels. Explain any three out of these five levels. What advantages are there for a company to move up to the top level? [8]
7. Lines of code (LOC) and function point counts (FPC) are two measures of the size of a system. Explain advantages and disadvantages of using these two metrics for measuring systems. [3+3]
8. Mention the situations in which the software reuse is recommended. What do you mean by design pattern? [4+2]
9. What are the reasons behind the modern tendency toward the use of Component based Software Engineering? [5]
10. What are the main objectives of configuration management and version control? What is code line and baseline inversion management? [3+3]
11. Compare the followings: [3×4]
    i) Black-hole vs. miracle in DFD
    ii) Consistency vs. completeness in requirements engineering
    iii) Traceability vs. Adaptability in reviewing steps
    iv) Alpha vs. Beta testing

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INSTITUTE OF ENGINEERING

Examination Control Division

2071 Shawan

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
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1. Explain why the waterfall model of software development is not an accurate reflection of software development activities. Explain better alternative model. [10]
2. Give your view on requirement engineering and requirement specification. [10]
3. What is behavior modeling in systems analysis process? Illustrate with a sample model diagram of any web-based transaction portal system. [5]
4. Explain the versioning process in the context of configuration management with all the associated components. [5]
5. How the modular decomposition concept is practiced in system design processes? Illustrate with your own example of a second level DFD. [4+6]
6. What specific considerations are to be made while designing typical software to be operated in real-time environment? Explain. [5]
7. Prepare a brief notes on design pattern with statement of their benefits. [5]
8. What is verification planning? Why such planning is required? What are the different steps involved in it? Explain. [8]
9. What is exception and error testing in the context of system implementation? [5]
10. What is COCOMO? Illustrate the calculation with an appropriate example. [5]
11. Write Short notes on: (any three) [4×3]
    a) Software testing metrics
    b) CMM level
    c) Statistical quality assurance
    d) CBSE

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Exam.	Regular		
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Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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1. Why it is so difficult to gain a clear understanding of what the customer wants? What are the guidelines for the requirement elicitation process? [4+4]
2. Explain details about current model of software process. Explain why the waterfall model of the software process is not an accurate reflection of software development activities. [4+4]
3. Read the case mentioned hereunder carefully and: [5+3]
   a) Make DFD level 1 for the system
   b) What do you mean by DFD balancing in the given case?

   A customer visits an online movie portal. He chooses DVD movies from three different categories: Sci-Fi, Classical and Romantic and places the order for the same. He is supposed to be able to make online payment using his bank details. Upon successful transaction he is expected to receive confirmation through his e-mail.
4. Explain why it may be necessary to design the system architecture before specifications are written. Explain client-server architecture with appropriate example. [4+5]
5. How do real-time software and operating system differ from non-real time software and operating system? Describe Data Acquisition System. [4+4]
6. What are the benefits of CBSE? How closely code generation feature of case tools are associated with CBSE? Explain. [3+5]
7. How does the SEI CMM ensure quality aspects of any complex software under development? What are the differences between ISO and CMM? [4+3]
8. What is COCOMO? Calculate COCOMO effort, development time in calendar month, average staffing and productivity for project of application program that is estimated to be 49,200 lines of code. [3+5]
9. Establish the chronology among component, release unit and integration testing. Also write distinctive notes on their testing. [3+4]
10. Write short notes on: [3×3]
    a) Software Requirement Specifications (SRS)
    b) Generator based reuse
    c) Change management

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42 TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

Examination Control Division

2070 Ashad

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
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1. What makes the software development process a complex? The simple man-month measurement and additional workers assignment for delayed project does not work in software project, why? Explain in detail. [7]
2. What are the different techniques used for requirements gathering and analysis? Explain any three methods in detail. [7]
3. If the principle jobs of Software Engineering are to write codes and programs then why do such engineering need CASE tools? What are the benefits of using CASE tools? [7]
4. In order to schedule the classes, a famous engineering school, Mero College of Engineering (MCE) in Dauramandu, needs to know about courses that can be offered, instructors and their availability, audio/visual equipment requirements for particular courses, and class rooms. From the list of courses, the courses that can be scheduled are selected in the scheduling process. For each of these courses, one or more classes are scheduled, which are called sections of the same class. The problem of schedulers is to assign classes to instructors, rooms and time slots. The schedulers are constrained by the reality that (a) some courses cannot conflict because many students take them during the same semester, (b) instructors cannot be in two places at the same time, (c) rooms cannot be double-booked. Construct a system level data model following the above details of class scheduling process with clear statement reasonable assumptions that you have made. [7]
5. The Capability Maturity Model (CMM) rates software companies according to how well they identity and manage their software processes. Present the list of five different levels of the model and explain any two in detail. What advantages are there for a company to move up to the top level? [7]
6. Why software verification is essential before launching any system? Write a brief note on verification. Differentiate between verification and validation. [5]
7. What is Equivalence partitioning? Explain with an example of checking for a campus student roll number entry like 674211, where 67 is year 2067, 4 is for Electronics engineering (there are 1-to-7 different engineering programs) and next 2 is the section id, which can range from 1-to-9 and last two digits are roll call that may range from 1-to-48. [5]
8. Why unit test is not enough in the system verification process for a complex system, which consists of multiple and interacting units. Write in brief, what other types of tests are required? [8]
9. Explain the various control style used in architectural design. [6]
10. Provided a brief comparison of the following: [3×4]
    a) Multiprocessor architecture versus Client-Server architecture
    b) Reuse Framework versus pattern Generator
    c) DBMS versus data acquisition system
11. Write short notes on: [3×3]
    a) Component Based Design
    b) Software Quality Assurance

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2070 Chaitra

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Subject: - Software Engineering *(CT601)*

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1. What are the different processes for requirements gathering? Explain at least three different methods and also prepare a comparative chart of with their pros and cons of each. [3+4.5+2.5]
2. What are the major components of any feasibility study report? Explain with examples. The candidate matrix with recommendation in a feasibility report is considered as a standard, justify with reason. [7+3]
3. Explain in detail on CMMI levels. [10]
4. Explain why software reliability is important. Give two examples of worst case disaster due to software failure. [10]
5. Discuss the difference between verification and validation. What is the difference between alphas of beta testing? [10]
6. Write short notes on: (any four) [5×4]
   a) Clean room engineering
   b) Risk Analysis
   c) Black box testing
   d) Object oriented analysis
   e) Software quality assurance
7. Describe different types of software maintenance. [10]

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INSTITUTE OF ENGINEERING
Examination Control Division
2069 Ashad

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT 601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt <u>All</u> questions.*
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- ✓ *Assume suitable data if necessary.*

1. What is a software process model? Describe the main activities in the software design process and the output of these activities. [3+5]
2. What do you mean by requirement elicitation and analysis in software engineering? Explain functional and non-functional requirements with examples. [6+6]
3. Explain object aggregation model with suitable example. [5]
4. What do you mean by software architecture? What are the advantages of having explicit architecture for software? [5]
5. Explain different control styles in context of software architecture with relevant example. [5]
6. Explain real-time software design process with example. [5]
7. "Software Engineering has been more focused on original development but it is now recognized that to achieve better software, more quickly and at lower cost, we need to adopt a design process that is based on systematic software reuse", Do you agree with the given statement? Explain why? [5]
8. Compare validation and verification? What are the goals of validation and verification process? [5]
9. Explain software inspection. What do you mean by formal methods of verification? [5]
10. Software Quality, Reliability and Safety seem to be similar concepts but are fundamentally different. Discuss. [5]
11. Explain capability maturity model and compare it with ISO standards. [5]
12. What is a component composition? How the configuration management planning is done? [3+4]
13. What are the different types of system testing? Explain merits for object-oriented testing. [4+4]

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TRIBHUVAN UNIVERSITY
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Examination Control Division
2069 Chaitra

Exam.		Regular	
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Software Engineering *(CT601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1. What is the purpose of going through feasibility study? List out the various types of feasibility to be studied and explain any two types in detail. [7]
2. Why the Software Requirement Specification (SRS) document is required during the system development phases? How could you justify the extra efforts and resources being used in this specification detailing at the early stage, which outweigh the resource and efforts required to meet the obscures specification later? [7]
3. Differentiate function and nonfunctional requirement used during requirement engineering process. [7]
4. Bhrantipur Book Store is popular among engineering students within the city of Bandhapur, as they have good reputation of making available of the reference books very efficiently through their books inventory system. Their reputation is mainly because of their close coordination with engineering schools. The various departments submit initial data about courses, instructors, textbooks and projected enrollments to the book store on a reference-book master list. The book store then generates a purchase order, which is sent to publishing companies that supplies the books. Book orders arrive at the bookstore accompanied by a packing slip, which is checked and verified by the receiving departments of engineering schools. When they pay for the books, the students are given a sales receipt.
   Following the details of the book order, inventory and sales processes prepare a system level process (behavior) model diagram for above scenario with clear statement of any assumptions that you have made. [7]
5. What are the different characteristics of the systems at the different levels of Capability Maturity Model Integration (CMMI)? Explain the two top levels of integration models and relate how well these models are effective in managing their software processes. [7]
6. What is the fundamental difference between a black-box test and white-box test? Explain with appropriate examples of software test. [5]
7. What is Equivalence Partitioning? Explain with an example of checking for a telephone number (of a Country called *Pumpkin Republic*, which has 85 districts altogether) entry like 4422561263, where first two digits signify the number of district, third digit for either PSTN (1) or Cellular (2) and remaining digits are just numbers. [5]
8. What is the fundamental difference between an alpha versus beta test? Explain about their importance in software development process. [8]
9. What is the role of reference architectures in the process of system design? Justify with example. [6]
10. Provide a brief comparison of the followings: [3×4]
    a) Distributed Object versus Multiprocessor architecture
    b) Application Framework versus Component Reuse
    c) General OS versus Real-time OS
11. Write short notes on: [3×3]
    a) Software Quality Assurance
    b) Version control
    c) Version and Release management

41 TRIBHUVAN UNIVERSITY
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2068 Chaitra

Exam.	Regular		
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Subject: - Software Engineering *(CT 601)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
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1. What is software crisis? Explain with the help of an example. [5]
2. Describe Spiral model for software development. What are its advantages and disadvantages? [5]
3. A restaurant uses an information system that takes customer orders, sends the order to the kitchen, monitors the goods sold and inventory and generates reports for management. List functional and non-functional requirements for this Restaurant Information System. [5]
4. Explain requirement management process with necessary illustration. [5]
5. Why system modeling is important? Mention the weakness of structured analysis method? [2+3]
6. What is an architectural design? Why it is important in software engineering? Explain multiprocessor architecture with example. [2+3+5]
7. Define a real-time system. Explain the real-time operating system and its components? [1+4]
8. What are the benefits and problems of software reuse? What factors need to be taken care of for software reuse planning? [5]
9. Explain why program inspection are an effective technique for discovering errors in a program? What types of error are unlikely to be discovered through inspections? [5+5]
10. Consider a program for the determination of the nature of roots of a quadratic equation. Its input is a triple of positive integers (say a, b, c) and values may be from interval [0, 100]. The program output may have one of the following words. [Not a quadratic equation; Real roots, Imaginary roots, Equal roots]. Design test cases to test this program. [5]
11. How do you conduct formal technical review? Explain Garvin's quality dimensions. [6+4]
12. Write short notes on: (any four): [2.5x4]
    a) Change Management
    b) Version and Release Management
    c) COCOMO
    d) Component based Software Engineering
    e) Feasibility Study

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