

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Chaitra

Exam.	Regular		
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 All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. What is software crisis? What are typical software characteristics? [4+3]
2. Explain the Prototyping model of software development. What are its advantages and disadvantages? [5+2]
3. Study the narration for a ride sharing system and prepare analysis and design models as specified below:

Real-time ridesharing is a service that arranges one-time shared rides on very short notice. Vehicle owners register to the system as Service Provider and customers register as Service Seeker. The vehicle registration can be done for motorbike and car only. This type of service makes use following technological advances:

 - GPS navigation devices to determine a driver's route and arrange the shared ride
 - Smartphones for a traveler to request a ride from wherever they happen to be

These elements are coordinated through a mobile application, which can instantaneously handle the driver payments and match using an optimization algorithm. When a seeker needs ride, he/she opens the mobile app which automatically tracks his/her location and marks as pick-up point. Seeker sets the drop-off point using map. Seeker can also search the location and set his/her drop-off point. The system calculates the estimated fare and seeker needs to confirm the ride. System searches the near by service providers and displays the information about the provider including the vehicle number and mobile number. Once the service provider picks the seeker, system tracks the route followed and calculates the fare once they reach to the drop-off point. Seeker may pay in cash or other electronic platform like e-sewa. Seeker can provide the feedback about his/her ride and can also view the ride history.

 - a) List functional and non-functional requirements for the system. [5]
 - b) Draw Level 0 DFD. [3]
 - c) Draw Level 1 DFD. [5]
4. Describe software architecture. Explain Client-Server architecture and its importance. [3+4]
5. What is the role of data acquisition system? Explain the difference between hard and soft real time system. [2+3]
6. What are the main problems with software reuse? List key factors that should be considered for reusing software components. [3+3]
7. Differentiate between verification and validation. What are the types of the faults that can be uncovered by software inspection? Differentiate between black-box testing and white-box testing. [3+2+5]
8. What is component composition? Briefly explain the use of COCOMO model. [2+3]
9. Explain different levels of CMMI. [5]
10. What is FTR? How is Formal Technical Review (FTR) performed? [2+5]
11. Write short notes on: [4×2]
 - a) Modular decomposition styles
 - b) Need of software configuration management

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1. a) Define software crisis. How can you say that there was software crisis in late 60s? [5]
 b) Explain incremental model. Writes its advantages and disadvantages. [4+3]
 2. DFD level-0 and DFD level-1 for the case study given below. [3+5]
 A travel agency wants an Airline Ticketing System to be developed for the office so that user can easily book flight tickets from anywhere. First of all, the customer enters the destination and data for the flight. After that, the system displays the available airlines for the same along with route or available time which is provided by the airlines company. Now the customer selects the airline which he/she finds appropriate where he/she can either book the ticket or confirm the ticket. The customer pays the ticket charge either via e-sewa or transferring the amount to the agency's bank account directly. The customer has to provide the valid email address to get the notification of booking or ticket confirmation.
 3. a) What is software design architecture and what is its significance in software engineering? [2+3]
 b) What are the common modular decomposition styles used in architectural design? Explain. [5]
 4. How is a real-time software different from other software? What is a data acquisition system? [2+3]
 5. Briefly describe advantages and disadvantages of software reuse. What is COTS reuse? [4+2]
 6. What are the different factors to be considered before reusing software components. Explain. [5]
 7. What is verification and validation? Explain their difference. Why is verification and validation planning necessary in software engineering? [3+2]
 8. Write about stub. and driver testing. Differentiate between white box and black box testing. [3+3]
 9. Describe Cyclomatic Complexity as a software testing metrics. Use the concept of Halstead's metrics to compute the program length, program vocabulary, program volume, potential volume, program level, programming effort and time for the following code. [2+4]

```

Int x, y, z;
z = 0;
while ( x > 0 )
{
    z = z + y;
    x = x - 1;
}
printf("%d",z);

```
 10. a) What do you mean by Formal Technical Review (FTR)? How is a formal technical review conducted? [2+4]
 b) Describe software reliability an SQA. [3+3]
 11. Describe configuration management planning. [5]

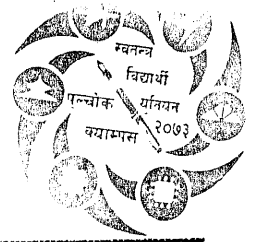
TRIBHUVAN UNIVERSITY
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1. What do you mean by requirement elicitation and analysis? List the characteristics, advantages and disadvantages of Incremental Development Model. [4+6]
2. In a particular college, a sports week needs to be organized you have been assigned a role of business analyst to design a DFD diagram for the whole system. Assuming the activities such as online registration, student council, form fill up, sport event venue and time, score card, rules and regulations, card system and prize distribution. [3+5+2]
 - a) Prepare the list of process and agents.
 - b) Draw the DFD up to level 1.
 - c) Distinguish between functional and non-functional requirements.
3. Why is architectural design really important? What are the different types of control styles used by software engineers in designing the architectures? Explain in detail. [2+6]
4. Differentiate between hard real time system and soft real time system. Outline real time system design process. [2+3]
5. Justify the statement "Advantages of reuse are lower costs, faster software development and lower risks." What is a design pattern? [3+2]
6. What is a component? Explain the component based software engineering (CBSE) process in brief. [2+4]
7. Differentiate verification and validation. Write different types of fault that can be determined from inspection. [5]
8. Explain the V-model for software development process. Distinguish between alpha and beta testing. [5+2]
9. Explain the cocomo model for software cost estimation. [5]
10. a) Define SQA. What are the main objectives of Formal Technical Reviews? [2+3]
 - b) Define term software reliability. Explain how CMM encourages continuous improvement of software process. [2+4]
11. Write short notes on: [4×2]
 - a) SEI Capability Maturity Model
 - b) Software version, variant and release



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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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1. What factors have contributed to the making of the present software crisis? Suggest the possible solutions to the present software crisis? [3+3]
2. Why it is so difficult to gain a clear understanding of what the customer wants? Describe the guidelines for the requirement elicitation process with suitable examples. [3+4]
3. Suppose a travel and tour agency needs a software for automating its book keeping activities. The set of activities to be automated are rather simple and are at present being carried out manually. The travel agency had indicated that it is unsure about the type of user interface which would be suitable for its employees and its customers. Would it be proper for a development team to use the spiral model for developing this software? Justify. [6]
4. A company needs to develop a time Management system (TMS) for its executives. The software should let the executives register their daily appointment schedules. The information to be stored includes person (s) with whom meeting is arranged, venue, the time and duration of the meeting, and the purpose. When a meeting involving many executives needs to be organised, the system should automatically find a common slot in the diaries of the concerned executives, and arrange a meeting at that time. It should also inform the concerned executives about the scheduled meeting through e-mail. If no common slot is available, TMS should help the secretary to rearrange the appointments of the executives in consultation with the concerned executives for making room for a common slot. To help the executives check their schedules for a particular day the system should have a very easy-to-use graphical interface. Since the executives and the secretaries have their own desktop computers, the time management software should be able to serve several remote requests simultaneously. Many of the executives are relative novices in computer usage. Everyday morning the time management software should e-mail every executive his appointments for the day. Besides registering their appointments and meetings, the executives might mark periods for which they plan to be on leave. Also, executives might plan out the important jobs they need to do on any day at different hours and post it in their daily list of engagements. Other features to be supported by the TMS are the following—TMS should be able to provide several types of statistics such as which executive spent how much time on meetings. For which project how many meetings were organised for what duration and how many man-hours were devoted to it. Also, it should be able to display for any given period of time the fraction of time that on the average each executive spent on meetings.
 - a) List out all functional and non-functional requirements of the Time Management System. [6]
 - b) Draw a labelled DFD for the following Time Management Software (TMS). Clearly show the context diagram and its hierarchical decompositions up to level 2. [6]

5. Why is it necessary to design the system architecture before specifications are written? Explain the different methods of modular decompositions with suitable examples. [3+4]
6. What are the major technical and non-technical factors that hinder software reuse? Do you suggest to reuse much software and, if not, why not? [4+3]
7. Develop a complete test strategy for the Time Management System (Q.N.4). Document it in a Test Specification. [4+4]
8. What are the importance of quality management in Software Development? Explain about staged CMMI Model. [3+4]
9. What is COCOMO? Calculate COCOMO effort, development time in calendar month, average staffing and productivity for the software construction process of Q.N.4. State your assumptions if necessary. [2+6]
10. Write short notes on: [4×3]
 - a) Real Time Operating System Vs. Non-real Time Operating System
 - b) Verification Vs. Validation
 - c) CBSE Process
 - d) Formal Technical Review

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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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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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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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2073 Shrawan

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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]
 - 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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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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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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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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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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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 identify 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 plan
 - c) Release Management

Exam.	Result		
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 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 obscure 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

Exam.	Regular		
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 All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

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): [2.5×4]
 - a) Change Management
 - b) Version and Release Management
 - c) COCOMO
 - d) Component based Software Engineering
 - e) Feasibility Study

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

Subject: - Software Engineering

- ✓ 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 are the advantages and limitations of water fall process model? List out various models of software development. Explain the limitations of water fall model in detail. [10]
2. Explain software requirement specification (SRS). What are the characteristics of a good software requirement specification document? [10]
3. What is Software Quality Assurance (SQA)? What steps are required to perform Statistical SQA? [10]
4. What problems may be encountered when top down integration is chosen? What is regression testing? [10]
5. What are the main objectives of Formal Technical Reviews (FTR)? What is clean room software engineering? [10]
6. What are the types of software maintenance? Give some design principles for maintainability. [10]
7. Write notes on: [5×4]
 - a) Software Safety
 - b) Cohesion and Coupling
 - c) Capability Maturity Module
 - d) Software Reengineering

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

Subject: - Software Engineering

- ✓ 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. Compare between waterfall model and spiral model of software development process. What is the role of user participation in selection of life cycle model? [11]
2. Explain the importance of requirement engineering. List out requirement elicitation techniques. What are the problems in formation of requirements? [12]
3. What are the characteristics of Object Oriented Programming? What are the main advantage of OOP? [10]
4. Explain how CMM encourages continuous improvement of software process. Describe various key process areas of CMM at various maturity levels. [12]
5. Explain Computer Aided Software Engineering (CASE), CASE environment and CASE tools? [11]
6. Why does software project fail after it has passed through acceptance testing? Explain integration testing. [8]
7. Define the following in the context of software engineering. [4×4]
 - a) Symbolic execution
 - b) Software errors and their import on cost
 - c) Software reliability models
 - d) Regression testing

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

Subject: - Software Engineering

- ✓ 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. For the case study mentioned below produce: [15]

- a) Context diagram and DFD level 1
- b) DFD up to level 2 for one of the key processes
- c) Expand the system to take care of other important issues including online system

Customer sends inquiry to commercial department and receives quotation from sales department and places an order. Based on the customer order, the work order is sent to the planning department for planning, scheduling and control; in turn the planning department raises job order on the shop floor. On completion, delivery note and invoices are made out. Costing department also prepares an order wise comparative statement of estimated and actual costs.

2. What is CASE tool? Explain its importance with modern software development process. Support your answer with example. [10]

3. Explain characteristics of OOP. Define aggregation and composition with diagram. What are the main advantages of OOP? [10]

4. What are the types of Software Maintenance? List the activities done in maintenance phase. [10]

5. What are the basic principles of software testing? List the characteristics of testability of software. List out possible errors of black box testing? [10]

6. Distinguish between verification and validation. [5]

7. Define Coupling and Cohesion and their uses in determining software design strength. [10]

8. What is Clean Room Engineering? Explain how CMM encourages continuous improvement of software process. [10]

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

Subject: - Software Engineering

- ✓ 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. Define the following in the context of Software Engineering: [15]
 - Software errors and their impact on cost
 - Software reliability models
 - Symbolic execution
2. Testing is one of the very important core part of software development and implementation. Comment on this statement and explain various testing techniques. [13]
3. What are different types of software maintenance activities? Describe the factors which affect the cost of maintenance. [12]
4. What is software quality? Explain how CMM encourages continuous improvement of software process. Discuss key process areas of CMM at various maturity levels. [10]
5. What is moving in both technology and methodology in new trends in software development? [10]
6. For the case study mentioned below: [20]
 - Context diagram and DFD level 1
 - Expand the system to take care of other important issues
 - DFD up to level 2 for one of the key processes

An operator selects a particular operational mode from a menu as entrance to a particular system function. In order to enter the function certain system components must be active, certain external conditions must prevail, and certain software products must be resident in memory. These features would be listed as conditions for entrance into this operational mode. The system responds by activating certain system components and displaying another function level menu. If the system does not respond as expected, a failure mode is entered. This failure mode is treated separately and requires another unique timeline.

If the menu appears as expected, the operator selects one of the menu entries and enters a code(s) or command(s) at the on-screen prompt that appears. The prompt is one of the system responses to the menu item selection. Other hardware and software responses are identified. Each keystroke, command, or data item entered should be carefully described in a data dictionary format. Many of these data items will be documented in the data dictionary, and the detail descriptions will be useful in software design. There are standards associated with how the human-to-computer interface should be effected. These standards are imposed on the display descriptions.

Execution of the selected curve-fitting process may require intervention by the operator. Each intervention will require displays to the operator, attendant operator action, and system action.

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

Subject: - Software Engineering

- ✓ 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. For the case study mentioned below produce: [15]

- a) Context diagram and DFD level 1
- b) DFD up to level 2 for one of the key processes
- c) Expand the system to take care of other important issues

The fruit shop keeps track of all available fruits in Nepal. When a customer approaches for a particular fruit, the stock is checked to verify the availability of that product and if it is available, then it is supplied to the customer who is billed. Apart from computerizing all the manual tasks that are performed in the shop, it can also keep track of inventories and when the stocks of particular reaches below a predefined level, it can alert person or even automatically order it in a requisite quantity.

2. What do you understand by Computer Aided Software engineering? What are the benefits of CASE tools in software design process? Explain with examples. [10]

3. Define the following in the context of software engineering. [8]

- a) Software Errors and their impact on cost
- b) Software Reliability Models

4. What are some objects within your current environments? What classes can be formed from those objects? Draw a class diagram to depict relationships between the objects you identified. Be sure to specify the multiplicity. [10]

5. Define the following in the context of software engineering. [8]

- a) Symbolic execution
- b) Clean room process

6. What is software quality? Explain how CMM encourages continuous improvement of the software process. Discuss various key process areas of CMM at various maturity levels. [12]

7. What do you mean by data modelling? Explain the use of ER diagram in the software engineering with suitable example. [6]

8. What is the basic concept of modular programming? Explain with suitable example. [5]

9. Why maintenance is required in the software development process? Explain the process. [6]