

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B. Tech
BRANCH: CSE

SEMESTER : V
SESSION : MO/2025

SUBJECT: IT337 SOFTWARE ENGINEERING

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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|--------|--|----|----|
| Q.1(a) | What is a software life cycle model? Which life cycle phase consumes maximum effort? Draw the neat diagram of an Iterative Waterfall Model | 1 | 2 |
| Q.1(b) | Give the best reason (only one) for the following statements: 1. Test first development gives the programmer a better understanding of the system requirements 2. The productivity rate in Pair programming is more than half of two programmers working individually. 3. Change is inevitable in software engineering. | 1 | 2 |
| Q.2(a) | Identify and briefly describe four types of requirements that may be defined for a computer-based system. | 2 | 2 |
| Q.2(b) | For the given Scenario: Draw a UML case diagram for the university car park system. A university wishes to increase security in its car park. It has been decided to issue an identity card to all employees. The cards record the employee's name, department and identity number. A barrier, a card reader and a sensor are placed at the entrance of the car park. The driver inserts the numbered card into the card reader. The card reader checks the card number. If the number is valid, the reader sends a signal to raise the barrier and the vehicle can enter the car park. The sensor sends a signal to the barrier to lower when the vehicle has entered. There is a system at the exit with a barrier which is raised when a car wishes to leave the car park. When there are no spaces in the car park a sign at the entrance displays "Full" and is only switched off when a vehicle leaves. Special visitors' cards, which record a number and the current date, also permit access to the car park. Visitors' cards may be sent out in advance or collected from reception. All visitors' cards must be returned to the reception when the visitor leaves the site so that they can be deleted from the list of valid cards. | 2 | 3 |
| Q.3(a) | Develop a sequence diagram showing the interactions involved when a student registers for a course in a university. Courses may have limited enrollment, so the registration process must include checks that places are available. Assume that the student accesses an electronic course catalog to find out about available courses. | 3 | 3 |
| Q.3(b) | When should a modular design be implemented as monolithic software? Discuss the relationship between the concept of information hiding as an attribute of effective modularity and the concept of module independence. | 3 | 2 |

- Q.4(a) Explain why it is not necessary for a program to be completely free of defects [2+1.5*2] 4 4
before it is delivered to its customers.
Consider the following program segment :
- ```
main(){
int number,index;
printf("Enter a number");
scanf(%d, &number);
while(index !=number-1){
 if (number %index==0){
 printf("not a prime number");
 break;}
 index++;}
if(index==number)
printf("prime number");}
```
- (i) Draw a CFG for the above program segment.  
(ii) Calculate McCabe's Complexity metric using all the methods.
- Q.4(b) Enumerate the methods of performing static Testing. [2+3] 4 2,3  
For a program that takes an input as a string (5 to 20 characters), and a single character separately. It checks whether the single character is present in the string or not. How many test cases will be required for Boundary value analysis, robust testing, worst case testing and equivalence partitioning. Justify your answers.
- Q.5(a) Consider a software project with following important functional units: No of user [5] 5 2,3  
inputs=30, No of user outputs=40, No of user Inquiries=45, No of internal logical files=08, No of external interface files=05. Assuming all complexity adjustment factors are complex and the weighting factors are average. Compute the FP.
- Q.5(b) Describe the models of COCOMO-II. Use the Basic COCOMO model to estimate [5] 5 2,3  
efforts and duration of an embedded software development project with size of 60 KLOC. How many workers should be hired for this project? For Embedded: a=3.6 b=1.2, c= 2.5, d = .32.