# SOFTWARE ENGINEERING
## (CSBS 3201)

**Time Allotted : 3 hrs**          **Full Marks : 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and*
*<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

## Group – A
### (Multiple Choice Type Questions)

1.  Choose the correct alternative for the following:      **10 × 1 = 10**

    (i)    If branch coverage has been achieved on a unit under test, which of the following coverage is implicitly implied?
    (a) Path coverage          (b) Multiple condition coverage
    (c) Statement coverage          (d) Data flow coverage.

    (ii)    The purpose of error seeding is which one of the followings?
    (a) Determine the origin of the bugs
    (b) Plant Trojans
    (c) Determine the number of latent bugs
    (d) Plant insidious bugs before delivery to the customer.

    (iii)    When is code review performed during software life cycle?
    (a) After unit testing          (b) After coding and compiling
    (c) During integration testing          (d) During system testing.

    (iv)    _____ Specification is also known as SRS document.
    (a) Black Box          (b) Grey Box
    (c) White Box          (d) Red Box

    (v)    In function point analysis number of complexity adjustment factors are
    (a) 12          (b) 13
    (c) 15          (d) 14.

    (vi)    A DFD does not contain
    (a) External Entity          (b) Process
    (c) Data Store          (d) Predicate.

    (vii)    Coupling is
    (a) an intra-module activity          (b) an inter- module activity
    (c) a design-oriented activity          (d) a measurement-oriented activity.

(viii) Which of the following is not activity in software process?
    (a) Feasibility analysis             (b) Software marketing
    (c) Installation of software      (d) Software debugging.

(ix) Critical Path method is a part of
    (a) SDLC                      (b) Project Scheduling
    (c) SRS                       (d) Risk Management.

(x) Which of the following describes "Is-a-Relationship"?
    (a) Aggregation                (b) Inheritance
    (c) Dependency               (d) None of the above.

## Group- B

2. (a) What are the features of a good SRS?       *[(CO1)(Remember/LOCQ)]*
   (b) Draw an ERD for Hospital Management System showing cardinalities, strong and weak entities, derived attributes, primary key etc. Your diagram should have at least five entities.      *[(CO3)(Create/HOCQ)]*
                                           **3 + 9 = 12**

3. (a) Write the demerits of waterfall model. In what circumstances would prototyping be the best approach in system development?    *[(CO1)(Remember/LOCQ)]*
   (b) What do you mean by aggregation and generalization? Explain with a proper example.      *[(CO3)(Understand/LOCQ)]*
   (c) Why Spiral Model is called Meta Model?      *[(CO1)(Analyse/IOCQ)]*
                                           **6 + 3 + 3 = 12**

## Group - C

4. (a) Draw an Class diagram for online job portal in which job seeker log in the system, then they can view the current job (by location, by job nature, by qualification). After that they can apply for a suitable job. System must send an acknowledgement after being successfully applied. Different employer also can log in the system and then they can request to admin to post different new jobs. Admin has the right to add/delete job, change job details etc. You should include different class (with attribute and functionality), relationship between classes, multiplicity, generalization etc.    *[(CO3)(Create/HOCQ)]*
   (b) "Loosely coupled and strongly cohesive system is our target"-explain.
                                      *[(CO2)(Analyze/IOCQ)]*
   (c) What do you mean by temporal cohesion? Give example.  *[(CO2)(Remember/LOCQ)]*
                                           **6 + 4 + 2 = 12**

5. (a) Write the difference between include and extend relationship used in UML diagram (with example). How do we represent private and public data member in class diagram?    *[(CO3)(Understand/LOCQ)]*
   (b) Draw an activity diagram for Electricity Bill payment system in which user /customer log in the system and then they can view the current bill, previous bill

and late fine if any. By using the consumer id user can make payment for current/previous bill. Admin can make changes in the bill, Add / Delete connection. Also user can apply for a new connection in the system, by viewing that request Admin has to take necessity step on the basis of reconnection as a defaulter. You must include the concept of Special states, Normal States, Swimlanes, Fork and Join.           *[(CO3)(Create/HOCQ)]*
                                                                       **(4 + 2) + 6 = 12**

## Group - D

6.  (a)  Write short notes on performance testing.           *[(CO4)(Understand/LOCQ)]*
    (b)  What do you understand by positive and negative test cases?
                                                             *[(CO4)(Understand/LOCQ)]*
    (c)  Draw a control flow graph for a C function that finds GCD between two integer numbers. Hence find the cyclomatic complexity.           *[(CO4) (Create/HOCQ)]*
                                                                       **4 + 2 + (3 + 3) = 12**

7.  (a)  Explain 'equivalence class partitioning' with an example. Discuss the different metric used for software reliability.           *[(CO4)(Understand /LOCQ)]*
    (b)  Write down four important coding standards and coding guidelines that you would  recommend for any Software organization.           *[(CO4)(Understand/LOCQ)]*
    (c)  What is the McCabe's Cyclomatic complexity for the following code segment? Derive all the test cases based on the cyclomatic complexity.           *[(CO4)(Apply/IOCQ)]*

```
intfunc(int x,int y){
while (x != y){
if (x>y) then
     x=x-y;
else y=y-x;
 }
return x;
}.
```
                                                                       **(3 + 3) + 2 + (1 + 3) = 12**

## Group – E

8.  (a)  Assume that the size of an semidetached type software product has been estimated to be 100000 lines of source code. Assume that the average salary of software engineers is Rs. 50000/- per month. Determine the effort required to develop the software product and nominal development time.
                                                             *[(CO5)(Analyse/IOCQ )]*
    (b)  What do you mean by Slack time?           *[(CO6)(Understand/LOCQ)]*
    (c)  Differentiate between Gantt chart and PERT chart.           *[(CO6)(Analyse/IOCQ)]*
                                                                       **5 + 3 + 4 = 12**

9.  (a)  Draw the PERT diagram for the given set of tasks and dependencies. Also draw the Gantt Chart for the given task with showing critical path. Assume start time =0.

| Subtask | Time to complete | Dependencies |
|---------|------------------|--------------|
| 1 | 8 | ----- |
| 2 | 10 | ----- |
| 3 | 8 | 1,2 |
| 4 | 9 | 1 |
| 5 | 5 | 2 |
| 6 | 3 | 3,4 |
| 7 | 2 | 4,5 |
| 8 | 4 | 6,7 |
| 9 | 3 | 5,6 |

*[(CO6)(Create/HOCQ)]*

(b)　　Explain the different types of Metrics used in software project management.

*[(CO5)(Understand/IOCQ)]*

**(4 + 3 + 2) + 3 = 12**

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| Cognition Level | LOCQ | IOCQ | HOCQ |
|-----------------|------|------|------|
| *Percentage distribution* | *38.54* | *23.96* | *37.5* |

**Course Outcome (CO):**

After the completion of the course students will be able to
1.　　Understand the basic concept of SDLC stages and different SDLC models.
2.　　Model function-oriented software design.
3.　　Develop object-oriented software design.
4.　　Analyze different approaches of testing methodology in a software system.
5.　　Estimate size, effort, cost and time related to a software project.
6.　　Prepare software project schedule and staffing plan.

*\*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*