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**Punjab Engineering College (Deemed to be University)**  
**End-Term Examination-December 2021**

Programme: BE (CSE)  
Course Name: Software Engineering  
Maximum Marks: 70

Year/Semester: 5<sup>th</sup> Semester  
Course Code: CSN 302  
Time Allowed: 2 Hours

**Notes:**

- All questions are compulsory
- The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right course code.

- 1.a) Discuss Synchronize and Stabilize model for software development. How is it different from Waterfall model? (5+3)
- b) What are various phases in Win-Win Spiral model? Discuss with the help of block diagram. How is it different from Agile Development? (06)
- c) Discover ambiguities and omissions in the following statement of the requirements for part of a drone system intended for search and recovery: (06)  
The drone system will be very useful in search and recovery operations, especially in remote or in extreme weather conditions. It will click high-resolution images. It will fly according to a path preset by a ground operator, but will be able to avoid obstacles on its own, returning to its original path whenever possible. The drone will also be able to identify various objects and match them to the target it is looking for.
- 2.a) Write a set of non-functional requirements for the above drone system (Q1c), setting out its expected safety and response time. (04)
- b) The author uses interactive sessions when he teaches a course that includes distance learning students. The author divides the students into teams and posts a problem on the Web page. The teams work on the problem using chat rooms, ask questions of the instructor using a message board, and submit the solution via email. The instructor then grades the solutions using a grading sheet. Draw UML use case model for this description of interactive sessions. (08)
- c) Draw UML class model for the above description of interactive sessions. (08)
- 3.a) Using the following software project job log, calculate all of the basic measures and the progress indicators. What is the status of the project on 1<sup>st</sup> May 2021? (08)

Task	Estimated Effort (pd)	Actual Effort (pd)	Due Date of Completion	Actual Date Completed
1	50	70	15 <sup>th</sup> Jan	1 <sup>st</sup> Feb
2	35	20	15 <sup>th</sup> Feb	15 <sup>th</sup> Feb
3	20	40	25 <sup>th</sup> Feb	1 <sup>st</sup> March
4	40	40	15 <sup>th</sup> April	1 <sup>st</sup> April
5	60	10	1 <sup>st</sup> June	
6	80	20	1 <sup>st</sup> July	

- b) Explain how the SEI-Capability Maturity Model (CMM) encourages continuous improvement of software process. (06)



- 4.a) Consider a program for classification of a triangle. Its input is a triple of positive integers (say a, b, c) and the input parameters are greater than zero and less than or equal to 100. (05)

The triangle is classified according to the following rules:

Right angled triangle:  $c^2 = a^2 + b^2$  or  $a^2 = b^2 + c^2$  or  $b^2 = c^2 + a^2$

Obtuse angled triangle:  $c^2 > a^2 + b^2$  or  $a^2 > b^2 + c^2$  or  $b^2 > c^2 + a^2$

Acute angled triangle:  $c^2 < a^2 + b^2$  and  $a^2 < b^2 + c^2$  and  $b^2 < c^2 + a^2$ .

The program output may have one of the following:

Acute angled triangle, Obtuse angled triangle, Right angled triangle, Invalid triangle.  
Design the **boundary value test cases** for this program.

- b) Consider the following program for above (Q4a) triangle classification problem; Draw the control flow graph for the given code, find cyclomatic complexity and independent paths. (5,6)

```
void main()// Main begins
{ double a, b, c, a1,a2,a3;
  int valid=0;
  clrscr();
  printf("Enter first side of the triangle:"); //Enter the sides of Triangle/
  scanf("%lf",&a);
  printf("Enter second side of the triangle:");
  scanf("%lf",&b);
  printf("Enter third side of the triangle:");
  scanf("%lf",&c);
  //Checks whether a triangle is valid or not/
  if(a>0&&a<=100&&b>0&&b<=100&&c>0&&c<=100){
    if((a+b)>c&&(b+c)>a&&(c+a)>b) {
      valid=1;
    }
    else {
      valid=-1;
    }
  }
  if(valid==1) {
    a1=(a*a+b*b)/(c*c); a2=(b*b+c*c)/(a*a);
    a3=(c*c+a*a)/(b*b);
    if(a1<1||a2<1||a3<1) {
      printf("Obtuse angled triangle");
    }
    else if(a1==1||a2==1||a3==1) { printf("Right angled triangle");
    }
    else {
      printf("Acute angled triangle");
    }
  }
  else if(valid==-1) {
    printf("Invalid Triangle");
  }
  else {
    printf("Input Values are Out of Range");
  }
  Getch();
} //Main ends
```

$$21-17+2 \\ 4+2=6$$