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1. Suppose you are an analyst working for a big company to develop an executive system. The system is not big, while it needs an innovative display to summarize and drill down key facts in a quick way. It is highly required for its reliability and a short time schedule with schedule visibility. The critical concern is the requirements are not so clear. What type of methodology would you use to design? 5%

2. Suppose you are an analyst developing a new information system to automate the sales transactions and manage inventory for each retail store in a large chain. The system would be installed at each store and exchange data with a mainframe computer at the company's head office. What type of methodology would you use to design? 5%

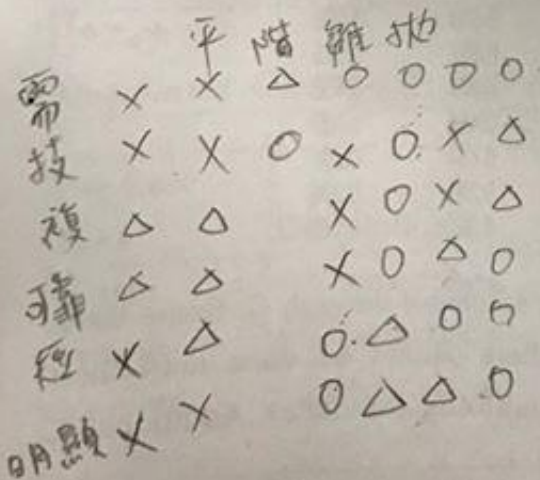
3. Use the following example to describe Encapulation. 5%

```
public class Employee {
    private BigDecimal salary = new BigDecimal(50000.00);

    public BigDecimal getSalary() {
        return salary;
    }

    public static void main() {
        Employee e = new Employee();
        BigDecimal sal = e.getSalary();
    }
}
```

4. Use the following example to describe Inheritance 2% and Polymorphism 5%.



```
abstract class Animal {
    abstract String talk();
}

class Cat extends Animal {
    String talk() {
        return "Meow!";
    }
}

class Dog extends Animal {
    String talk() {
        return "Woof!";
    }
}

void letsHear(Animal a) {
    println(a.talk());
}

void main() {
    letsHear(new Cat());
    letsHear(new Dog());
}
```

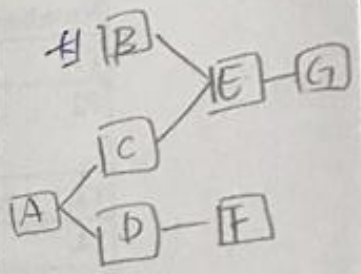
5. Assume the following facts: A project will cost $45,000 to develop. When the system becomes operational, after a one-year development period, operational costs will be $9,000 during each year of the system's five-year life. The system will produce benefits of $30,000 in the first year of operation, and this figure will increase by a compound 10% each year. What is the payback period (break even point) for this project? What is the ROI for this project? Using an eight percent factor, what is the NPV for this project? Should this project be accepted by the approval committee? **10%**

PERIODS	6%	8%	10%	12%	14%
1	0.943	0.926	0.909	0.893	0.877
2	0.890	0.857	0.826	0.797	0.769
3	0.840	0.794	0.751	0.712	0.675
4	0.792	0.735	0.683	0.636	0.592
5	0.747	0.681	0.621	0.567	0.519
6	0.705	0.630	0.564	0.507	0.456
7	0.665	0.583	0.513	0.452	0.400
8	0.627	0.540	0.467	0.404	0.351
9	0.592	0.500	0.424	0.361	0.308
10	0.558	0.463	0.386	0.322	0.270

6. In the following example there are seven tasks, labeled *A* through *G*. Some tasks can be done concurrently (*A* and *B*) while others cannot be done until their predecessor task is complete (*C* cannot begin until *A* is complete). Additionally,

each task has three time estimates: the optimistic time estimate (O), the most likely or normal time estimate (M), and the pessimistic time estimate (P). The expected time (T_E) is computed using the probability distribution for the time estimates. Please use the formula introduced in our textbook and fill in the blanks in the figure below. Once this step is complete, please draw a Gantt chart and identify the critical path by using PERT. Since Saturday and Sunday are not work days and are thus excluded from the schedule. 15%

Activity	Predecessor	Time estimates			Expected time
		Opt. (O)	Normal (M)	Pess. (P)	
A	—	2	4	6	
B	—	3	5	9	
C	A	4	5	7	
D	A	4	6	10	
E	B, C	4	5	7	
F	D	3	4	8	
G	E	3	5	8	



7. We are now going to estimate project effort. Please complete the use-case point estimation worksheet as below.

Use Case Point Estimation Worksheet

Actor Type	Description	Weighting Factor	Number	Result
Simple	External system with well-defined API	1	1	1
Average	External system using a protocol-based interface, e.g., HTTP, TCT/IP, or a database	2	2	4
Complex	Human	3	4	12
Unadjusted Actor Weight Total (UAW) = 17 3%				

Use Case Type	Description	Weighting Factor	Number	Result
Simple	1-3 transactions	5	3	15
Average	4-7 transactions	10	3	30
Complex	> 7 transactions	15	5	75

Unadjusted Use Case Weight Total (UUCW) = 120

Unadjusted Use Case Points (UUCP) = 137 3%

Technical Complexity Factors

Factor Number	Description	Weight	Assigned Value (0-5)	Weighted Value
T1	Distributed system	2.0	4	8
T2	Response time or throughput performance objectives	1.0	5	5
T3	End-user online efficiency	1.0	3	3
T4	Complex internal processing	1.0	1	1
T5	Reusability of code	1.0	1	1
T6	Easy to install	0.5	5	2.5
T7	Ease of use	0.5	4	2
T8	Portability	2.0	4	8
T9	Ease of change	1.0	2	2
T10	Concurrency	1.0	5	5
T11	Special security objectives included	1.0	2	2
T12	Direct access for third parties	1.0	2	2
T13	Special user training required	1.0	3	3

Technical Factor Value (TFactor) = 44.5

*Technical Complexity Factor (TCF) = 0.6 + (0.01 * TFactor)=* 1.045 3%

Environmental Factors

Factor Number	Description	Weight	Assigned Value (0-5)	Weighted Value
E1	Familiarity with system development process being used	1.5	5	7.5
E2	Application experience	0.5	5	2.5
E3	Object-oriented experience	1.0	5	5
E4	Lead analyst capability	0.5	5	2.5
E5	Motivation	1.0	5	5
E6	Requirements stability	2.0	5	10