Course #1: Operating system and System Programming

1. What are the types of distributed operating systems?
   A. Zone based Operating system
   B. Level based Operating system
   C. Network Operating system
   D. All of the mentioned
2. Which of the following system software resides in main memory?
   A. Text editor
   B. Linker
   C. Loader
   D. Compiler
3. Producer consumer problem can be solved using?
   A. Event counters
   B. Semaphore
   C. Monitors
   D. All of the above
4. What is bootstrapping?
   A. A language interpret other language pr
   B. A language compiling other langu
   C. A language compile itself
   D. All of the above
5. Which one of the following program is not belong to utility program
   A. Spooler
   B. Editor
   C. Debugger
   D. All of the above
6. Which command is used to bring the background process to foreground?
   A. bg
   B. fg
   C. background
   D. foreground
7. Which file system can be used to change certain kernel parameters at runtime using sysctl command?
   A. Ext3
   B. Sysfs
   C. Ext4
   D. Procfs
8. The permission -rwxr–r– represented in octal expression will be:
   A. 777
   B. 666
   C. 744
   D. 711
9. Process Id(PId) of init process is:
   A. 0
   B. 1
   C. 3232
   D. None of the above
10. Which one of the following system call is used to return parent process ID with in child process function?
    A. waitpid
    B. getpid()
    C. getppid()
    D. parenteid()

Course #2: Mobile Application Development

1. Under which of the following Android is licensed?
   A. OSS
   B. Sourceforge
   C. Apache/MIT
   D. None of the above

2. Which of the following converts Java byte code into Dalvik byte code?
   A. Dalvik converter
   B. Dex compiler
   C. Mobile interpretive compiler (MIC)
   D. None of the above
3. How can we stop the services in android?
   A. By using the stopSelf() and stopService() method
   B. By using the finish() method
   C. By using system.exit() method
   D. None of the above
4. How can we kill an activity in android?
   A. Using finish() method
   B. Using finishActivity(int requestCode)
   C. Both (a) and (b)
   D. Neither (a) nor (b)
5. ADB stands for -
   A. Android debug bridge
   B. Android delete bridge
   C. Android destroy bridge
   D. None of the above
6. Which of the following is not an activity lifecycle callback method?
   A. onClick() method
   B. onCreate() method
   C. onStart() method
   D. onBackPressed() method
7. Which of the following is contained in the src folder?
   A. XML
   B. Java source code
   C. Manifest
   D. None of the above
8. Which of the following is the parent class of Activity?
   A. context
   B. object
   C. contextThemeWrapper
   D. None of the above
9. Which of the following is the parent class of service?
   A. context
   B. object
   C. contextThemeWrapper
   D. contextWrapper
10. In which of the following tabs an error is shown?
   A. CPU
   B. Memory
   C. ADB Logs
   D. Logcat

Course #3: Software project Management

1. Risk Exposure (RE) =_____
   A. Probability of Risk * size of risk
   B. Probability of Loss * size of loss
   C. Probability of Risk / size of risk
   D. Probability of Loss / size of loss
2. _____is a process to handle continuous changes of baseline product in a systematic and controlled manner.
   A. Risk Management
   B. Software Quality Management
   C. Software Configuration Management

D. Software Process Management

3. A _____ is a matrix that maps the work of the project, as described in the WBS, to the people responsible for performing the work, as described in the OBS.
   A. Responsibility assessment matrix
   B. Responsibility Index matrix
   C. Responsibility assignment matrix
   D. Responsibility addition matrix
4. What kind of estimation approach is Parkinson's Law _____
   A. Expert Judgment
   B. Estimation by Analogy
   C. Adhoc Approach
   D. Empirical Model
5. Payback Period = _____
   A. Annual Net Cash Flow /Initial I- ment
   B. Initial Investment / Annua' low
   C. Annual Investment /Initial N. low
   D. Initial Net Cash Flow / Annual Inv ment
6. Delphi approach is also called _____ group consensus technique.
   A. Consultative
   B. Non-Consultative
   C. Fully Consultative
   D. Partially Consultative
7. Expand SMART _____
   A. Specific, Measurable, Activity, Realistic, Time-framed
   B. Specific, Measurable, Activity, Resource, Time-framed
   C. Specific, Measurable, Assignable, Resource, Time-framed
   D. Specific, Measurable, Assignable, Realistic, Time-framed
8. _____ is a hierarchical and incremental decomposition of the project into phases, Deliverables and work packages
   A. Task Integration Structure
   B. Bottom-up Integration Structure
   C. Work Integration Structure
   D. Work Breakdown Structure
9. Expand DSDM _____
   A. Development Systems Dynamic Method
   B. Database Systems Development Method
   C. Dynamic Systems Development Method
   D. Development Systems Database Method
10. _____involves organizing and managing projects and programs as a portfolio of investments that contributes to the entire enterprise's success.
    A. Program portfolio
    B. Program Management
    C. Project Management
    D. Project portfolio

Course #4: Software and Information Security

1. The IT department is reporting that a company web server is receiving an abnormally high number of web page requests from different locations simultaneously
   A. Nonrepudiation
   B. Confidentiality
   C. Availability
   D. Integrity

2. In 2018, scammers send emails and took personal information of ticket-hungry fans saying that the email is from FIFA and fans have won lottery for world cup in Russia. What type of threat/attack is this?
   A. Eavesdropping
   B. DOS
   C. Masquerading
   D. Repudiation
   E. None
3. Liya is applying access controls to ensure that employees in her company are not able to read files that are not directly related to their job functions. What goal of information security is Liya enforcing?
   A. Nonrepudiation
   B. Confidentiality
   D. Integrity
   C. Availability
4. A type of virus that can take different fo ncrypting itself and using a different key for each copy of the virus is kno
   A. Public key virus
   B. Polymorphic virus
   C. Metamorphic virus
   D. Macro virus
5. The property that certain records or transactions not to be attributable to any individual
   A. Anonymity
   B. Authenticity
   C. Assurance
   D. Cryptography
   E. None
6. The term "backdoor" is used to represent an entry point into a program that provides illegal access
   A. True
   B. False
7. A firewall passes or blocks traffic based upon
   A. IP address
   B. Port number
   C. All of the above
   D. None of the above
8. Which security measure allows to verify whether you have a permission to access the specific resources?
   A. Authentication
   B. Authorization
   C. Nonrepudiation
   D. Accountability
9. A process or a device that is designed to detect, prevent, or recover from a security attack.
   A. Security Attack
   B. Security Mechanisms
   C. Security Service
   D. Threat

6. _____ is a technology that creates and handles dynamic contents
   A. GIS
   B. CGI
   C. GCI
   D. GIC
7. What is one benefit that OAuth provides over an API key approach?
   A. A token is encrypted
   B. A token is encoded
   C. A token is scoped to the use case
   D. A token can be shared between systems
8. What component hides the distinction or boundaries between various microservices from out-
   client application?
   A. API logging
   B. API gateway
   C. A layered system
   D. API proxy
9. Which response header tells the client and intermediaries that the response is not to be cached
   anywhere?
   A. Cache-Control: none
   B. Expires: -1
   C. Cache-Control: no-cache
   D. Cache-Control: no-store
10. Which REST constraint specifies that there should be no shared context?
   A. Stateless
   B. Client-Server
   C. Uniform Interface
   D. Cacheable

PART V: Object Oriented Programming

1. Which one of the following is it NOT possible to do in Java?
   A. implement more than one interface;
   B. execute more than one thread at a time;
   C. create arrays with more than two dimensions;
   D. create and manipulate pointers;
   E. none of the above.

2. Consider the following Java program and then choose the correct statement from the list that follows:

```
public  class Hello
{
 public Static void main(String[] args)
 {
   System.out.print("Hello ");
   System.out.print("world")
   EasyIn.pause();
 }
}
```

   A. this program contains more than one syntax error;
   B. this program contains one and only one syntax error;
   C. this program compiles successfully and produces the following output:
      Hello world
   D. this program compiles successfully and produces the following output:
      Hello
      world
   E. none of the above.

3. Assume that the user of a program is asked to enter a day number (1-7) into an integer variable called day. Which one of the following while loops can then be used to validate the day entered:

A.
```
while (day >= 1 || day <= 7)
{
  System.out.print("ERROR 1 - 7 only, enter again: ");
  day = EasyIn.getInt();
}
```

B.
```
while (day >= 1 && day <= 7)
{
  System.out.print("ERROR 1 - 7 only, enter again: ");
  day = EasyIn.getInt();
}
```

C.
```
while (day <= 1 || day >= 7)
{
  System.out.print("ERROR 1 - 7 only, enter again: ");
  day = EasyIn.getInt();
}
```

D.
```
while (day > 1 && day < 7)
{
  System.out.print("ERROR 1 - 7 only, enter again: ");
  day = EasyIn.getInt();
}
```

E.
```
while (day < 1 || day > 7)
{
  System.out.print("ERROR 1 - 7 only, enter again: ");
  day = EasyIn.getInt();
```

4. You are told that a class called Gas has a public static method, setPressure, which requires a parameter of type int. A variable temp, of type int, has been declared and initialized. Which of the following statements, in a program that uses the Gas class, would result in a compiler error?
   A. Gas.setPressure(10.58);
   B. Gas.setPressure(temp + 10);
   C. Gas.setPressure(temp);
   D. Gas.setPressure(-1);
   E. Gas.setPressure(0);

5. Consider the following explicit creation of an array and then choose the correct statement from the list that follows

```
int[] someArray = { 2, 13, 9, 11, 10 };
```

   A. the value of someArray.length is 6;
   B. the value of someArray[2] is 13;
   C. an array cannot be created this way in Java;
   D. the value of someArray[11] is 4;
   E. none of the above.

6. Consider a class, RecordAlbum, which has three attributes: the artist name (stored as a String), the record title (stored as a String) and the price (stored as a double). The constructor for this class takes values for the artist name, title and price respectively. Now consider the following array declaration

RecordAlbum[] store = new RecordAlbum[100];

Which one of the following instructions would add the album "I love Java", by the artists "Charatan & Kans" at a price of £12.99 into the 10th position in the array?

A. store[10] = new RecordAlbum("Charatan & Kans", "I love Java", 12.99);
B. RecordAlbum[10] = new store("Charatan & Kans", "I love Java", 12.99);
C. store [9] = new RecordAlbum("Charatan & Kans", "I love Java", 12.99);
D. store[11] = new RecordAlbum("Charatan & Kans", "I love Java", 12.99);
E. store [9] = ("Charatan & Kans", "I love Java", 12.99).

7. Declaring a class as abstract means that:

A. the class consists entirely of abstract methods;
B. the class cannot be subclasssed;
C. it is not possible to declare objects of that class;
D. the class has no attributes of its own;
E. none of the above.

8. Declaring a class as final means that:
A. the class consists entirely of abstract methods;
B. the class cannot be subclasssed;
C. it is not possible to declare objects of that class;
D. the class has no attributes of its own;
E.. none of the above.

9. Assume that a two dimensional array is required to hold sales figures for 5 days of the week and for 52 weeks in the year. Which of the following is a correct way of creating such an array if the array is to be called sales:

A. double sales = new double [5][52];
B. double [5][52] = new sales;
C. double [][] = new sales [5][52];
D. double [][] sales = new double [4][51];

10. Which of the following statements is NOT true in respect of the technique known as object serialization?

A. any class in Java is automatically serializable;
B. serialization is the process of converting an object into a stream of data suitable for storage on a disk;
C. the method writeObject of the ObjectOutputStream class enables us to write whole objects to a file;
D. if a program uses the ObjectInputStream and ObjectOutputStream classes, then the files m be accessed only within a Java program;
E. none of the above

PART VI: Big data modeling

1. What is MapReduce? It is a

   A. programming model used for processing and analyzing large amounts of data

   B. database management system used for storing and managing big data

   C. cloud-based platform used for data storage and management

   D. machine learning algorithm used for predictive analytics

2. What is the most commonly used evaluation metric for linear regression models?
   A. Mean squared error C. Root mean squared error

   B. Mean absolute error D. Coefficient of determination

3. What are some practical problems with the sigmoidal activation function in neural nets?
   A. It is convex, and convex functions cannot solve nonconvex problems
   B. It does not work well with the entropy loss function
   C. It can have negative values
   D. Gradients are small for values away from 0, leading to the "Vanishing Gradient" a problem for large or recurrent neural nets

4. What is recall in classification evaluation techniques?
   A. The percentage of true positive predictions out of all positive predictions
   B. The percentage of true positive predictions out of all actual positive cases
   C. The overall accuracy of a classification model
   D. The ability of a classification model to avoid false negatives

5. What is the ROC curve used for in classification evaluation?
   A. To evaluate the accuracy of a classification model
   B. To compare the performance of different classification models
   C. To determine the most important features for a classification model
   D. To visualize the trade-off between the false positive rate and true positive rate

6. Among the components of Big Data technologies, _____ is mainly concerned with representing data in a way that is easy for humans to understand.
   A. Data capturing C. Data storing
   B. Data processing D. Data visualization

7. Identify the correct item about Apache Hadoop and Apache Spark Big Data Technologies.
   A. Hadoop is meant for batch processing and streaming
   B. Spark is designed for in-memory processing
   C. Spark has a higher latency compared to Hadoop
   D. Hadoop has high-throughput with low-latency

8. From previously existing stock market data, predicting next week's stock price is an example of _____ problem.
   A. Classification C. Clustering
   B. Regression D. None of the above

9. Data generated for one uses case may not be applicable to another use case. This describ which characteristic of Big Data?
   A. Velocity
   B. Veracity
   C. Validity
   D. Value
10. All of the following accurately describe Hadoop, except _____.
   A. Open source
   B. Real-time
   C. Java-based
   D. Distributed computing approach

PART: VI: Software Testing, Verification and Quality Assurance

1. Consider the following code snippet

```
for(int i = 0; i< 10; i++) {

    System.out.println("The value of i is: "+i);

}
```

Which of the following best describes the type of testing that would be performed on this code?

   A. Boundary Value Analysis
   B. Decision Coverage
   C. Loop Testing
   D. Static Analysis

2. An application accepts the user's age as input, which must be between 18 and 65. The application has been tested using various test cases, but it is still failing in some cases. Which of the following test cases should be considered to validate the Boundary Value Analysis?

   A. Age = 18, Age = 17, Age = 16, Age = 66, Age = 67
   B. Age = 18, Age = 19, Age = 20, Age = 64, Age = 65
   C. Age = 16, Age = 17, Age = 18, Age = 65, Age = 66
   D. Age = 16, Age = 66, Age = 67, Age = 68, Age = 69

3. A software development team is working on a new web application. The application is complex, and the requirements are not fully defined. The team has decided to use exploratory testing as part of their test strategy. Which of the following statements best describes exploratory testing?
   A. It is a scripted testing approach that follows a predefined test plan.
   B. It is an ad-hoc testing approach that relies on the tester's knowledge and experience.
   C. It is a testing approach that only tests a specific set of pre-defined scenarios.
   D. It is a testing approach that is only suitable for testing small and simple applications

2. What is the minimum number of test cases required to achieve 100% decision coverage for the below code snippet?

```
if(x > 0 && y < 10) {
    z = 1;
} else if(x <= 0 && y >=10) {
    z = -1;
} else {
    z = 0;
}
```

A. 1
B. 2
C. 3
D. 4

3. Which of the following testing techniques is most likely to identify syntax errors and programming mistakes in the code?
A. Decision coverage
B. Branch coverage
C. Statement coverage
D. Path coverage

4. Which activity in the fundamental test process involves defining the objectives, scope, and approach to testing?
A. Test Planning and Control
B. Test Analysis and Design
C. Test Implementation and Execution
D. Test Closure

5. Which testing principle states that defects are not evenly distributed throughout the software, and that a small number of modules or areas are likely to have a large number of defects?
A. Testing shows the presence of defects
B. Exhaustive testing is not possible
C. Early testing saves time and money
D. Defect clustering occurs

6. Which of the following is a typical characteristic of integration testing?
A. It is typically done using white-box testing techniques
B. It focuses on testing individual units in isolation
C. It requires a significant amount of test data to be generated
D. It does not involve collaboration between developers and testers

7. What is the main difference between software verification and validation?
A. Verification focuses on ensuring that the software meets the user's needs, while validation focuses on ensuring that the software is built correctly.
B. Verification focuses on ensuring that the right software is being built, while validation focuses on ensuring that the software meets the specified requirements.
C. Verification focuses on ensuring that the software is being built correctly, while validation focuses on ensuring that the software meets the user's needs.
D. Verification and validation are the same process

8. Which test level is the lowest level of testing in the V-Model?
A. Integration Testing
B. System Testing
C. Acceptance Testing
D. Unit Testing

9. What is a failure in software testing?
   A. An expected outcome of a test
   B. A deviation from the expected behavior of the software
   C. A minor issue that does not impact the software or its users
   D. A critical issue that can cause significant problems
10. A software testing professional has been asked to test a new feature for a client. However, the tester realizes that the feature is not working properly and may cause harm to the end-users. The client insists that the feature is released as scheduled, even though the tester has recommended further testing. What ethical principle from the ISTQB Code of Ethics should the tester follow in this situation?
    A. Honesty
    B. Respect
    C. Fairness
    D. Responsibility

ANSWER SHEET

NAME: _____

IDNO _____ ***SEC*** _____

PART I	PART II	PART III	PART IV	PART V	PART VI	PART VII
1.	1.	1.	1.	1.	1.	1.
2.	2.	2.	2.	2.	2.	2.
3.	3.	3.	3.	3.	3.	3.
4.	4.	4.	4.	4.	4.	4.
5.	5.	5.	5.	5.	5.	5.
6.	6.	6.	6.	6.	6.	6.
7.	7.	7.	7.	7.	7.	7.
8.	8.	8.	8.	8.	8.	8.
9.	9.	9.	9.	9.	9.	9.

PART III: Fundamental of software engineering

1. From large to small scale software industries there are a series of activities [illegible] followed to deliver the final software product. This sequence of activities that [illegible] production of a software product is generally referred as
   A. Software model
   B. requirement engineering
   C. Software process
   D. Design process
2. There are general issues that affect many different types of software systems. Among which [illegible] that software systems are required to operate as distributed systems across networks that include different types of computer and mobile devices. Which of the following best describes this behavior
   A. Heterogeneity
   B. Business and social change
   C. Security and trust
   D. System evolution
3. _____ is a property of the software system that reflects its trustworthiness or the degree of confidence a user has that the system will operate as they expect, and that the system will not 'fail' in normal use.
   A. Reliability
   B. Dependability
   C. Availability
   D. Scalability
4. Assume you are working on word-processing software. You are planning to deliver basic file management, editing, and document production functions in the first phase; more sophisticated editing and document production capabilities in the second phase; spelling and grammar checking in the third phase. Which of the following software process model you have to follow for this type of scenario?
   A. Spiral model
   B. Rapid Application Development
   C. Incremental model
   D. Linear sequential model
5. Which of the following is less likely associated with AGILE method of development
   A. Planning phase
   B. Sprint Cycle
   C. Sprint retrospective
   D. Preparing extensive documentation
6. Which of the following is considered as scenario based modeling during requirement engineering
   A. Use cases and user scenarios
   B. Class diagram and collaboration diagram
   C. State diagram and sequence diagram
   D. DFDs and Data models
7. Which of the following activities is not related with the requirement change management process
   A. analyzing the costs and benefits of proposed changes
   B. validating and approving those changes
   C. tracking which components in the system have been changed
   D. Prototyping the change request
8. "While eliciting requirements, you begin by elaborating objectives such as performance and functionality. Next Alternative ways of achieving these objectives, and dealing with the constraints on each of them, are then enumerated. Then each alternative is assessed against each objective and sources of project risk are identified". Which software process model best fits this.
   A. Waterfall
   B. Incremental development model
   C. Staged delivery model
   D. Spiral model

9. Models are used at different stage of the software development process to capture different perspectives of the system and its interactions. Which of the following is wrongly matched model and its purposes?
   A. external perspective→ model the context or environment of the system
   B. interaction perspective→ model the interactions between a system and its environment or between the components of a system
   C. behavioral perspective→ model the dynamic behavior of the system
   D. structural perspective-→ models object states at different stages
10. Which of the following nonfunctional requirement and their respective metrics are wrongly matched?(Note: Items on the left of the arrow are nonfunctional requirements and items on the right of the arrow are the respective metrics used to measure them)
   A. Ease of use-→training time
   B. Reliability→Rate of failure occurrence
   C. Robustness→ Probability of unavailability
   D. Portability→ Number of target systems

PART IV: Web Design and Programming

1. When the switch statement matches the expression with the given labels, how is the comparison done?
   A. Both the datatype and the result of the expression are compared
   B. Only the datatype is compared without considering the result
   C. Only the value of the expression is compared
   D. None of the above
2. What will be the output of the following code snippet?
   console.log(parseInt("543Javascript"));
   console.log(parseInt("Javascript123"));
   A. 543
      NaN
   B. 543
      123
   C. NaN
      NaN
   D. NaN
      123
3. What will be the output of the following CSS code snippet?
   h1 {color: red text-decoration: underline; font-style: italic;}
   A. color: red, text-decoration: underline works
   B. only font-style: italic works
   C. color: red, text-decoration: underline and font-style: italic all works
   D. text-decoration: underline and font-style: italic works
4. Which option allows a sandboxed iframe to run script from the same domain?
   A. allow-forms
   B. allow-scripts
   C. allow-same-origin
   D. none of the above
5. What will be the width of the div element given below?

```
div {
 width: 310px;
 padding: 20px;
 border: 5px solid blue;
 margin: 0;
}
```

   A. 310px
   B. 320px
   C. 360px
   D. 350px

10. Write an SQL statement to give every employee a 10% raise.
    A. ALTER Emp SET salary=salary * 1.1
    B. MODIFY Emp SET salary=salary * 1.1
    C. CHANGE Emp SET salary=salary * 1.1
    D. UPDATE Emp SET salary=salary * 1.1

PART II: Fundamentals of Networking

1. When a client perceives a group of different computers as a single, cohesive system, this is referred to as _____.
    A. Mail system
    B. networking system
    C. distributed system
    D. computer network
2. When compared to the TCP/IP model, which layer does the OSI model add?
    A. Application layer
    B. Session and Presentation layer
    C. Presentation layer
    D. Session layer
3. The transport layer is used in _____.
    A. NIC
    B. MAC
    C. End system
    D. Packet
4. The synchronization and delimiting of data exchange is done by _____.
    A. Data link layer
    B. Session layer
    C. Presentation layer
    D. Application layer
5. Your IP address is 10.16.13.5, and your subnet mask is 255.255.255.128. What are your broadcast, subnet, and class of addresses?
    A. Class A, Subnet 10.16.13.0, Broadcast address 10.16.13.127
    B. Class B, Subnet 10.16.13.0, Broadcast address 10.16.13.255
    C. Class B, Subnet 10.16.0.0, Broadcast address 10.16.255.255
    D. Class B, Subnet 10.16.13.0, Broadcast address 10.16.13.127
6. How many hosts and subnets are available at the 172.16.0.0/19 network address?
    A. 9 subnets, 30 hosts each
    B. 7 subnets, 2,046 hosts each
    C. 9 subnets, 2,046 hosts each
    D. 8 subnets, 8,190 hosts each
    E. 1001001
7. Frames arrive at a rate of 5000 frames per second, with a length of 10,000 bits, and a channel capacity of 100Mbps. Determine the average time delay.
    A. 200 µsec
    B. 300 µsec
    C. 40 msec
    D. 3000 µsec
8. The appropriate order (ascending) based on the network's size is
    A. LAN, PAN, MAN, WAN
    B. PAN, MAN, LAN, WAN
    C. LAN, MAN, WAN, PAN
    D. PAN, LAN, MAN, WAN
9. The following binary notation to be converted to hexadecimal notation: 10000000 00001011 00000011 00011111
    A. 0x 80 0B 03 1F
    B. 0x 82 0B 03 1E
    C. 0x 81 0B 04 1E
    D. 0x 82 0C 04 1F
10. 213.125.67.82/27 is a given host classless address. Locate the first address.
    A. 213.125.67.78
    B. 213.125.67.32
    C. 213.125.67.82
    D. 213.125.67.64

Consider the Supplier-Parts-Catalog schema from the previous question. State what the following queries compute:

7. $\pi_{sname}(\pi_{sid}(\sigma_{color='red'} Parts) ./ (\sigma_{cost<100} Catalog) ./ Suppliers)$
   A. Find the Supplier names of the suppliers who supply a red part that costs less than 100 dollars and a green part that costs less than 100 dollars
   B. Find the Supplier names of the suppliers who supply a red part that costs less than 100 dollars
   C. Find the Supplier names of the suppliers who supply a red part that costs less than 100 dollars and a green part that costs less than 100 dollars.
   D. All the above
8. $\pi_{sname}((\pi_{sid,sname}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost<100} Catalog) \bowtie Suppliers)) \cap (\pi_{sid,sname}((\sigma_{color='green'} Parts) \bowtie (\sigma_{cost<100} Catalog) \bowtie Suppliers)))$
   A. Find the Supplier names of the suppliers who supply a red part that costs less than 100 dollars and a green part that costs less than 100 dollars.
   B. Find the Supplier names of the suppliers who supply a green part that costs less than 100 dollars.
   C. Find the Supplier names of the suppliers who supply a green part that costs less than 100 dollars and a red part that costs less than 100 dollars.
   D. None of the above

Answer each of the following questions briefly. The questions are based on the following relational schema:

Emp(eid: integer, ename: string, age: integer, salary: real)
Works(eid: integer, did: integer, pcttime: integer)
Dept(did: integer, dname: string, budget: real, managerid: integer)

9. Write the SQL statements required to create the *Works* relations, including appropriate versions of all primary and foreign key integrity constraints.
   A. CREATE TABLE Works (eid INTEGER, did INTEGER, pcttime INTEGER, PRIMARY KEY(eid,did), FOREIGN KEY (eid) REFERENCES Emp, FOREIGN KEY(did) REFERENCES Dept, ON DELETE SET NULL)
   B. CREATE TABLE Works (eid INTEGER, did INTEGER, pcttime INTEGER, PRIMARY KEY(eid,did), FOREIGN KEY (eid) REFERENCES Emp, FOREIGN KEY(did) REFERENCES Dept, ON DELETE CASCADE)
   C. CREATE TABLE Works (eid INTEGER Not Null, did INTEGER Not Null, pcttime INTEGER, PRIMARY KEY(eid,did), FOREIGN KEY (eid) REFERENCES Emp, FOREIGN KEY(did) REFERENCES Dept)
   D. All of the above

I. Choose the best answer and put the answer of your choice on the answer sheet

PART I: Fundamental of Database

1. The purpose of foreign key is to identify a particular row of _____
   A. Parent table and Child table
   B. Referenced table
   C. Child table
   D. All of the above
2. Which of the following is the property of transaction that protects data from system failure?
   A. Atomicity
   B. Isolation
   C. Durability
   D. Consistency
3. Which normalization form is based on the transitive dependency?
   A. 1NF
   B. 2NF
   C. 3NF
   D. BCNF

Consider the following schema:

Suppliers(*sid*: integer, *sname*: string, *address*: string)
Parts(*pid*: integer, *pname*: string, *color*: string)
Catalog(*sid*: integer, *pid*: integer, *cost*: real)
Write the following queries in relational algebra

4. Find the *names* of suppliers who supply some red part.
   A. π sid (π pid (σ color=' red ' ∨color= ' green ' Parts) ./ catalog)
   B. ρ(R1, π sid ((π pid σ color= ' red ' Parts) ./ Catalog))
      ρ (R2, π sid σ address=' 221PackerStreet ' Suppliers)
      R1 ∪ R2
   C. π sname (π sid ((π pid σ color= ' red ' Parts) ./ Catalog) ./ Suppliers)
   D. (π sid,pid Catalog)/(π pid σ color= ' red ' Parts)

5. Find the *pids* of parts that are supplied by at least two different suppliers.
   A. ρ(R1, Catalog)
      ρ (R2, Catalog)
      π R1.sid,R2.sid (σ R1.pid=R2.pid∧R1.sid=R2.sid∧R1>R2.color(R1 × R2))
   B. ρ(R1, Catalog)
      ρ (R2, Catalog)
      π R1.pid σ R1.pid=R2.pid ∧ R1.sid=R2.sid (R1 × R2)
   C. ρ(R1, Catalog)
      ρ (R2, Catalog)
      π R1.pid σ R1.pid=R2.pid U R1.sid=R2.sid (R1 × R2)
   D. None

6. Find the *sids* of suppliers who supply some red part or are at *Amist Kilo*.
   A. SELECT S.sid FROM Suppliers S WHERE S.address = 'Amist Kilo'
      OR S.sid IN (SELECT C.sid FROM Parts P, Catalog C WHERE P.color='red')
   B. SELECT C.sid FROM Suppliers S, Catalog C WHERE S.color = 'red' AND S.pid = C.pid
      AND EXISTS (SELECT P2.pid FROM Parts P2, Catalog C2 WHERE P2.color = 'red'
      AND C2.sid = C.sid AND P2.pid = C2.pid AND S. address='Amist Kilo')
   C. SELECT S.sid FROM Suppliers S, Parts P, Catalog C WHERE P.color='red' AND
      C.pid=P.pid AND C.sid=S.sid AND S.address='Amist Kilo'
   D. SELECT S.sid FROM Suppliers S WHERE S.address = 'Amist Kilo'
      OR S.sid IN (SELECT C.sid FROM Parts P, Catalog C WHERE P.color='red' AND P.pid =
      C.pid)