Cloud Computing

Q1. List down the steps to create a Virtual Machine that runs an Ubuntu 20.04 Operating System using Oracle Virtualbox 7. (10 marks)

Q2. Justify Google Colab as a PaaS with reasons. How can you determine the details of the infrastructure underlying the platform of Google Colab? Write the relevant code using Python and/or Linux commands. (10 marks)

Q3. Write the Git commands for the following operations. (10 marks)
   a. Initialize a Git repository on local machine
   b. Make a commit in a Git repository with a message
   c. Get all code from the remote repository
   d. Clone a repository to a local machine
   e. Send local changes from the local repository to the remote repository

Cloud Computing

Q1. List down the steps to create a Virtual Machine that runs an Ubuntu 20.04 Operating System using Oracle Virtualbox 7. (10 marks)

Q2. Justify Google Colab as a PaaS with reasons. How can you determine the details of the infrastructure underlying the platform of Google Colab? Write the relevant code using Python and/or Linux commands. (10 marks)

Q3. Write the Git commands for the following operations. (10 marks)
  a. Initialize a Git repository on local machine
  b. Make a commit in a Git repository with a message
  c. Get all code from the remote repository
  d. Clone a repository to a local machine
  e. Send local changes from the local repository to the remote repository

M.Sc (Informatics)-IIIrd Semester-2022

Subject: Software Engineering (ITCC-301)

TIME: 03 hours

Max Marks: 75

(Write your Roll No. on the top immediately on receipt of this question paper)

Attempt five questions in all.

All questions carry equal marks.

Q.1(a) What do you understand by the term life cycle model of software development? What problems would a software development organization face if it does not have a documented process model, and therefore, follows only an informally described life cycle model? (5)

(b) Draw a schematic diagram to represent the iterative waterfall model of software development. On your diagram, represent the deliverables that need to be produced at the end of each plan. (5)

(c) Instead of having a one time testing of a software product at the end of its development, why are three different levels of testing--- unit testing, integration testing, and system testing— necessary? What is the main purpose of each of these different levels of testing? (5)

Q.2(a) What are the different categories of software development projects according to the COCOMO estimation model? Give examples of software product development projects belonging to each of these categories. (5)

(b) Railroad Crossing Gate Controller: In a town near Delhi, there is a rail road crossing when a road crosses the railroad tracks. There are three separate tracks at the intersection, and each track has sensors to detect when a train approaches the intersection and when it leaves. When no trains are present (or approaching), the crossing gate is up. When the first train approaches, the crossing gate is lowered, and when the last train leaves, the gate is raised. If a second or third train arrives while a train is in the intersection, there is no action on the gate (because it is already down).

Express the Railroad Crossing Gate Controller problem as a finite state machine. (5)

(c) Suppose you are a project manager of a software project requiring the following activities.

Activity No.	Activity Name	Duration (weeks)	Immediate Predecessor
1.	Obtain requirements	4	-
2.	Analyze operations	4	-
3.	Define subsystems	2	1
4.	Develop database	4	1
5.	Make decision analysis	3	2
6.	Identify constraints	2	5

7.	Build module 1	8	3,4,6
8.	Build module 2	12	3,4,6
9.	Build module 3	18	3,4,6
10.	Write report	10	6
11.	Integration and test	8	7,8,9
12.	Implementation	2	10,11

(a) Draw the Activity Network representation of the project.

(b) Draw the Gantt chart representation of the project.   (5)

Q.3 (a) What are the component of use case diagram (UCD) in unified modeling language (UML)? Explain using an example, how an NFR (non- functional requirement) can affect a functional requirement.

(5)

(b) Given the following English description: This system allows authors to submit their research work to a journal or conference for publication. An admin user assigns submitted papers to various reviewers by e-mailing them about the assignment. Reviewers' logon and check the assigned papers, review them, and submit their evaluations. Once all evaluations of a submission are received, the admin makes the decision to accept or reject the paper and informs all reviewers and the authors of that paper. The author should be able to check the status of the submitted work online. Identify the actors and use cases. Produce one or more UCDs. Identify possible security requirements for the system.

(7)

(c) Consider the following C program:

```c
main()
{

        Int a, b , c, avg;


        scanf("%d %d %d", &a,&b,&c);

        avg = (a+b+c)/3;

        printf("avg= %d",avg)

}
```

Based on Halstead's software science, estimate the program length and volume.   (3)

Q.4 (a) What do you understand by the term Function point (FP) metrics? Suppose the software being developed has 1 external input, 3 external outputs, and 1 user inquiry, all of simple complexities. In addition, it has 2 external inputs and 1 user inquiry of average complexity, and 1 external input, 1 external output, 1 internal file, and 3 external files of high complexity. Calculate the total unadjusted function points (UFP) using weight factors for function point metrics as given in Table:1.   (5)

Table:1

	Simple	Average	Complex
External input	3	4	6
External output	4	5	7
User inquiry	3	4	6
External file	7	10	15
Internal file	5	7	10

(b) What are the requirements review techniques? What are the techniques for requirements elicitation?   (3)

(c) What is behavioral modeling? Which techniques can be used in behavior modeling? Following is the description of the partial behavior of the ATM machine. First the user inserts the bank card in the ATM's card reader. Then, the ATM expects the user to enter the PIN within 20 seconds, otherwise the ATM will beep and eject the card. If the PIN is valid, the user is allowed to proceed with a choice of banking transactions. Otherwise, if the PIN is invalid, the user can retry for a maximum of two more trials. After three unsuccessful attempts, the card is confiscated by the ATM and user has to contact the main branch. Construct an EFSM diagram specifying the foregoing description.   (7)

Q.5 An online book ordering system accepts orders from buyers, which could be either human users or software agents. A book order is normally made after the buyer browses a book catalog. The system checks the availability of the ordered items in the store inventory and the status of the buyer in the customer file. If all items are available and the customer has a good record, the buyer is asked to provide credit card payment and shipping information. The payment information is then passed to a payment server to verify their validity. If the payment information is valid, an online bill and payment confirmation is sent to the buyer. Otherwise, the buyer is informed of the rejection of the payment information and consequently, the order. In the meantime, the inventory file, the customer information file, and the orders file are updated. In addition, customer information, including name and shipping address, is used to deliver the ordered items to the buyer.

(a) Obtain   (10)

    (i) The context level DFD,

    (ii) Level-0 DFD corresponding to the above description.

(b) Produce an OOA model.   (5)

(15)

Q.6 Given the following function for trimming a string:

Function trim(instring: string):string;

1. const blank =' ';

2.

3. var i,j : integer, found: Boolean, result: string;

4. begin

5.   i:= length(instring);

6.   found:= false;

7.   while (not found) and (I >=1) do

8.   begin

9.   if instring[i] < > blank then

10.   found:= true

11.   else

12.   i:= I -1

13.   end

14.   for j:= 1 to i do result[j]:= instring[j]

15.   return result;

16. end

Briefly describe the main purpose pf this function. Produce a black box -based test plan using both boundary value analysis and equivalence class testing given the function interface and its functional description. Produce a control flow graph. Produce a white box=based test plan to catch the maximum number of errors. Produce a path expression from the obtained flow graph. Produce 2 path expression describing the data flow for variables *i* and *found*. Is there any data flow anomaly? Show it?

M.Sc (Informatics)-IIIrd Semester-2022
Subject: Cloud Computing (ITEC-304)

Max Marks: 75

TIME: 03 hours

(Write your Roll No. on the top immediately on receipt of this question paper)

All questions carry equal marks.

1. **A.** Explain the differences between a SaaS provided over the web and a Web Application if any. (5)

   B. What are the pros and cons of using in-house physical infrastructure versus infrastructure as a cloud service for an IT organization that works to develop Full Stack Web Applications? (10)

2. **A.** Explain the concept of Virtualization. How do Hypervisors enable virtualization? (10)

   B. Describe an example scenario in which *Type 2 hypervisor* would be preferred over a *Type 1 hypervisor.* (5)

3. **A.** What are the stack of services that are provided in the following cloud service delivery models? (10)
   a. IaaS
   b. PaaS
   c. SaaS

   B. Mention 3 examples of each of the above service delivery models. (5)

4. Using a diagram, explain the requirement(s) and process of Cloud Bursting. Describe an example scenario which can be dealt with using Cloud Bursting. (15)

5. Write a short note on the platform and data cloud services provided by *Heroku*. Describe the working or usage of each service using a diagram. (15)

[Handwritten notes:]

Pros:
→ Control over all aspects of application
→ More Privacy
→ Can define ids own security protocols
→ Less hassle because No agreements or compliance

Cons
→ Spend money to purchase infrastructure
→ Continuous Maintenance
→ Hard to determine usage requirements
→ Need specialists to maintain infrastructure

M.Sc. (INFORMATICS) /III Semester 2022
PAPER ITCC302: Information System Design

TIME: 03 hours   Max Marks: 75

Write your roll no. top to the Q. paper (Attempt all parts of a question together)

Note: **Attempt any five questions. All questions carry equal marks**

1.
   a. What are the main components of an Information System? How does information system impact society?   10
   b. "Feedback is critical to the successful operation of a system." Justify this statement.   5

2.
   a. What is open-source software? What is the biggest stumbling block with the use of open-source software?   8
   b. Describe the term enterprise resource planning (ERP) system. What functions does such a system perform?   7

3.
   a. What are OLAP and Data Mining? What are the similarities and differences between OLAP and Data Mining?   9
   b. Differentiate between   6
      i. Outsourcing and On-demand Computing
      ii. Grid Computing and Cloud Computing

4.
   a. What is the redundant array of independent/inexpensive disks (RAID)? Do all RAID levels provide redundancy?   10
   b. What is the difference between e-commerce and m-commerce?   5

5.
   a. What are the purposes of the feasibility analysis? How are they used in the project selection process?   8
   b. Describe the major elements and issues with waterfall development.   7

6.
   a. What is the purpose of normalization? Describe the analysis that is applied to a data model in order to place it in second normal form (2NF).   8
   b. Convert the following table into 3NF.   7

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean, Clash of the Titans	Ms.
Robert Phil	3rd Street 34	Forgetting Sarah Marshal, Daddy's Little Girls	Mr.
Robert Phil	5th Avenue	Clash of the Titans	Mr.

M.Sc. (Informatics) – III Semester - 2022
ITCC–303: IT Planning and Management

Note: Attempt any five questions in all. All question carries equal marks

TIME: 03 hours   **Max Marks: 75**

(Write your Roll No. on the top immediately on receipt of this question paper)

1. How are information systems transforming business, and what is their relationship to globalization?   **15**

2. Explain the roles of a manager and team leader in an organization/ project. Also discuss how a good manager can improve the efficiency of the organization.   **15**

3. Discuss about the various factors which helps an organization to take decision about in-house development or outsourcing of the projects.   **15**

4. What is meant by software quality management? List few software quality attributes. Discuss the key activities involved in software quality management.   **15**

5. What are the direct and indirect ways of software measurements? Discuss about the software process and project metrics in detail.   **15**

6. Draw Use Case Diagram and 1-Level Data Flow Diagram for Online Admission System for an Institution which offers Bachelor and Master Level Programmes. The system supports for online registration and fee payment.   **15**

    Also, list the functional and non-functional requirements of the system. Make necessary assumptions required.

    DFD :-