Nirma University

Institute of Technology

Semester End Examination (IR/RPR), May - 2018

B.Tech in Computer Engineering / Information Technology, Semester – VI

IT601 – Software Engineering

Roll / Exam No. _____ Supervisor's initials With date _____

Time: 3 Hours Max. Marks: 100

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Assume suitable assumptions and specify them.
5. Attempt all sub-questions of a question together.

Q.1 Do as directed: **[16]**

A Answer the following with justification: **8**

i) Suggest a process model for developing a new library automation software that would link various libraries in the city.

ii) Suggest a process model for a system to control anti-lock braking in a car.

iii) In the software engineering process, what can be the myths from developer's point of view?

iv) Selection of a process model for any software project to be developed depends upon a number of factors. Which are those factors that are taken into consideration?

B Justify the statement – Software doesn't wear out, but it gradually deteriorates. **4**

C What do you mean by Umbrella Activities? Describe any three umbrella activities that are involved in a Software Engineering Process. **4**

Q.2 Do as directed: **[16]**

A What do you understand by traceability in the context of software requirements specification? How is traceability achieved? **4**

B Consider a payroll system to be developed in SDLC methodology. The system is to be defined for monthly salaried personnel with standard process of salary computations i.e. earnings, deductions and additions and the salary payable is transferred to the employee's bank account. **6**

1. Define the scope of the system.
2. Identify functional and non-functional requirements.
3. Identify stakeholders of the system and their corresponding viewpoints.

C Design a class diagram for the following: A Movie Store System is used for selling and buying DVDs and videos of movies. It has three types of users. **6**

First, the regular customers, they can access the database of DVDs and videos with different types of search. Second, there is a group of users that can post DVDs or/and videos to be sold. These users have access to add movies to the database, so that regular customers can search for these movies. When the customer has finished searching for a DVD and/or a video he/she can communicate a message to the seller in order to buy the product from him. The third class of user is the administrator; this user will be in charge of administrating the database and users. The administrator will be in charge of giving and revoking selling privileges to regular customers so that they are able to add videos and DVDs in the database.

OR

C Design a use case diagram for a ticket distributor for a train system. The system includes two actors: a traveler who purchases different types of tickets and a central computer system that maintains a reference database for the tariff. Use cases should include buy one way ticket, buy weekly card, buy monthly card, and update tariff. Also, include the following optional cases: timeout, transaction aborted, distributor out of change and distributor out of paper. **6**

Q.3 Do as directed: **[18]**

A Answer the following with justification: **4**

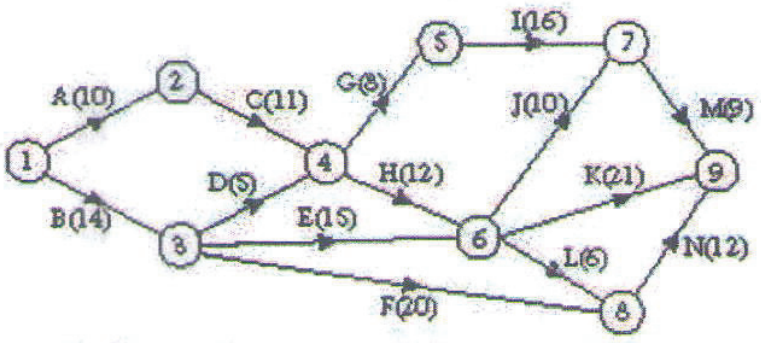
i) Suggest an appropriate control model for a batch processing system that takes information about hours worked and pay rates and prints salary slips and bank credit transfer information

ii) Suggest an appropriate structural model for a robot floor-cleaner that is intended to clean relatively clear spaces such as corridors. The cleaner must be able to sense walls and other obstructions.

B Elaborate about the conversion of object oriented analysis model to object oriented design model using a diagram. **4**

C What do you mean by the term Monolithic Software? Is designing a Monolithic software suggestable? Recommend the alternative to it with a proper justification. **4**

D **6**



An engineering project is modelled by the activity network shown above. The activities are represented by the arcs. The number in brackets on each arc gives the time in days to complete the activity. Each activity requires

one worker. The project is to be completed in the shortest time. Perform the following:

i) Calculate the earliest start time and latest completion time of each activity.
ii) Find the float time for each activities.
iii) Identify the critical path and total number of days required for project completion.

OR

D From the table given below which sets out a number of activities, duration and dependencies for garage construction, draw an activity network which shows the project schedule. Show the duration of all the paths created and so, identify the critical path for the same specifying the duration taken. **6**

Activity ID	Activity Description	Duration (days)	Dependencies / Predecessor
A	Prepare foundations	7	-
B	Make and position door frame	2	-
C	Lay drains, floor base and screed	15	-
D	Install services and fittings	8	E
E	Erect walls	10	A, B
F	Plaster ceiling	2	D, G
G	Erect roof	5	E
H	Install door and windows	8	G
I	Fit gutters and pipers	2	C, F
J	Paint outside	3	I

Q.4 Do as directed: **[16]**

A Analyze the advantages and disadvantages of using LOC based estimation over FP based estimation in software engineering. **4**

B Distinguish between software verification and software validation. When during the software life cycle are verification and validation performed? Can one be replaced by another? **4**

C Make a classification tree for different types of modelling in software engineering and corresponding UML diagrams used to depict each. **4**

D Design black box test suits for a function that checks whether a character string (of up to 25 characters length) is a palindrome using equivalence partitioning and boundary value analysis. Consider all possibilities for the functionality given. **4**

Q.5 Do as directed: **[16]**

A Explain the process of version control and change control in software configuration management. **6**

OR

A Differentiate between static and dynamic metrics in quality management. **6**

Describe object oriented metrics in software quality management in detail.

B Differentiate between reverse engineering and forward engineering. Also, describe the process of reverse engineering. **4**

C Discuss about risk assessment in the field of security engineering. **6**

OR

C What do you mean by aspect oriented software engineering? Justify the significance of cross cutting concerns in the same. Differentiate between joinpoint and pointcut. **6**

Q.6 Do as directed: **[18]**

A Consider the following algorithm: **6**

```
begin
    low := 1;
    high := n;
    found := false;
    while (low <= high) and (not found) do begin
            mid := (low + high) / 2;
            if E < A[mid] then high := mid – 1;
                    else if E > A[mid] then low := mid + 1;
                    else found := true;
            end if;
    end while;
    bin_search := found;
end;
```

Do the following:

a) Derive the control flow graph for the given pseudo code.
b) Apply basis path testing to develop test cases that will guarantee that all statements in the program have been tested. Find the cyclomatic complexity and find out the independent paths.

B Consider the following system: **6**

Company XYZ plants to enhance its Accounts Payable (AP) application. This is a menu driven system. To enter the application, the user must take selections from a main menu. The menu has following options:

- Invoices
  - Add an invoice
  - Display an invoice (by firing a query)
  - Update an invoice
  - Delete an invoice
- Payments
  - Retrieve payments due (by firing a query)
  - Payment records to be outputted to user.

Invoices and payments are maintained in the Invoice logical file in AP. This will allow users to maintain Vendor information in the AP application. The following is being added to the AP menu:

- Vendor

- Add a vendor
- Display vendor information (by firing a query)
- Update vendor information

The vendor information will be maintained in a new Vendor logical file in the AP application.
This AP application needs a file from another application called Customer Relations Management (CRM) application that gives information about all the customers present.
Also, a report is generated at the end from AP application that stores information about invoice, payment and vendors.

All of these data are of average complexity and assume sum of value adjustment factors is 50. Given the historical data that the organizational average productivity for systems of this type is 9.5 FP/pm. Also, labor rate is of Rs 32,000 per month. Based on the data provided, compute the following:

a) Compute FP for the system.
b) Total estimated project cost of the system.

Weighting factors required are provided as follows:

Simple	Average	Complex
3	4	6
4	5	7
3	4	6
7	10	15
5	7	10

C Consider a database system needed for an office automation project. The requirements document shows 4 modules needed. **6**
Sizes for each of the module are estimated as follows:

- Data entry = 6000 LOC
- Data update = 6000 LOC
- Query = 8000 LOC
- Report generation = 10000 LOC

Assuming that the project is an organic project and average salary of a software engineer be Rs. 30,000 per month. Determine the effort required to develop the software product, nominal development time and total cost to develop the product. The values required for the calculation for the same are:

Type of Software project	a_b	b_b	c_b	d_d
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32