Question 1

1.   Top Speed Garage

Top Speed Garage carries out the repair and servicing of motor cars. An information system is required to hold details of cars, their owners, and of the repair and servicing jobs that the garage undertakes. A car has one owner, although some owners have more than one car. A record of the names of mechanics working for the garage together with their unique employee number will also need to be kept.

When a client contacts the garage, the clerk taking the call first checks whether it is an existing client. If it is not an existing client, the details of the new client are added to the system. The car is then booked in for service or repair; the registration number, make, model, year and approximate mileage of the car are taken and a note is made of whether the client needs a repair or a service. The clerk also makes a note of any faults described by the client. After checking the records of cars that have already been booked in, a day and time for the repair or service (called a 'job' by the garage, and given a unique job number) is agreed.

The garage manager is responsible for allocating mechanics to carry out each job. Sometimes a team of mechanics is required; in this case, one of them is designated the 'chief mechanic'. For more straightforward jobs, a single 'chief mechanic' is allocated. Each job might require the use of one or more standard parts (although some jobs do not require any parts). A standard part has a part number, description and a unit price.

The chief mechanic is responsible for recording the parts used for a particular job, the quantity of each part used and the time taken to fit them (for example there might be complications in removing the old part from the car). The chief mechanic is also responsible for recording the time spent by each mechanic on each job. When the job is complete the clerk prepares a bill for the client. On payment of the bill, the clerk updates the job record to show that it has been paid for.

a)   Draw a Top Level Current Logical Data Flow Diagram for the above scenario.   (15 marks)

b)   Produce an Entity Relationship Diagram (Logical Data Structure) and a set of normalised tables for the above
         scenario. You DO NOT need to show evidence of the normalisation process.

(20 marks)

c)   i) Define what is meant by the concept of an 'Actor' on a Use Case Diagram.   (3 marks)
      ii) Identify the Use Cases carried out by the CLERK at Top Speed Garage. Draw a Use Case Diagram showing these
          Use Cases only. You should have at least one example each of the <<include>> and <<extend>> stereotypes.
(12 marks)

Answer Pointers

Solution to Question 1

See sample diagrams on following pages.
Plausible alternatives will be accepted.

Marking Scheme

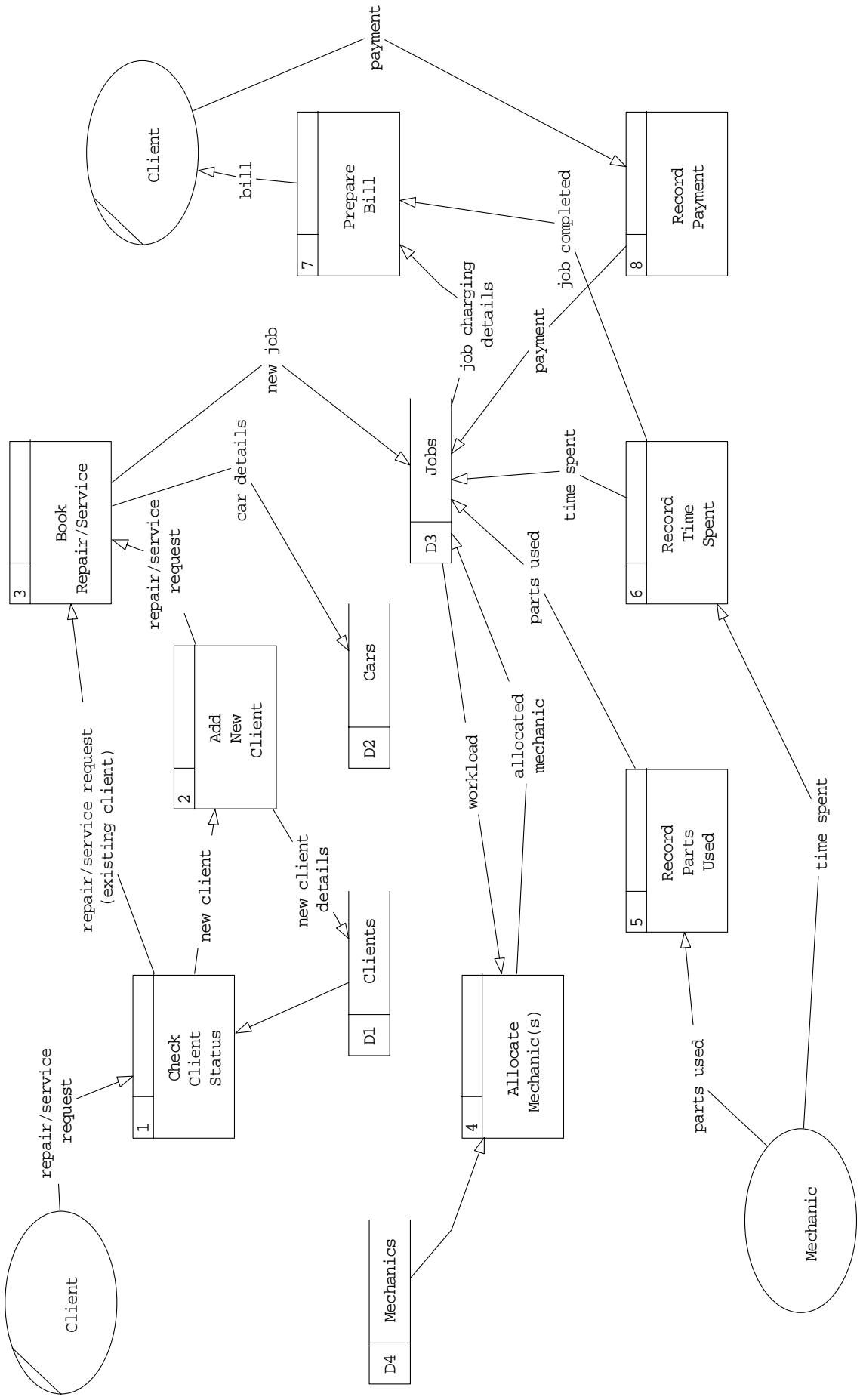a) Processes   up to 6

External Entities   up to 2
Data Stores   up to 4
Flows   up to 3

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Total     15 marks
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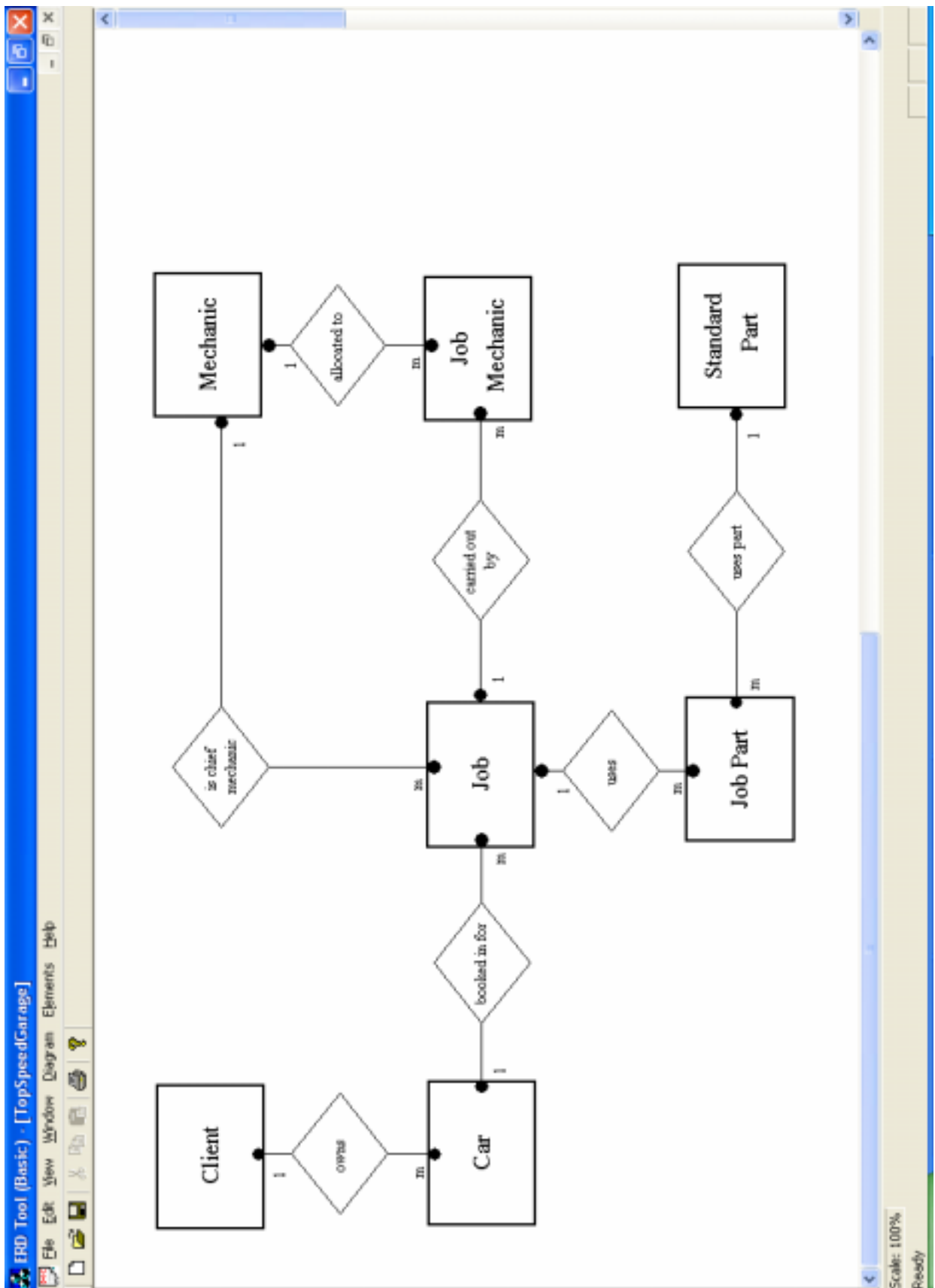
b) Entities   0.5 each up to 3
    Relationships, including appropriate degree & membership class   1 each up to 7

    Tables, consistent with ERD & with suitable PK   0.5 each up to 3
    FKs   0.5 each up to 3
    Other attributes   4

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    Total 20 marks
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Data Flow Diagram

External Entities:
- Client
- Mechanic

Processes:
- 1 Check Client Status
- 2 Add New Client
- 3 Book Repair/Service
- 4 Allocate Mechanic(s)
- 5 Record Parts Used
- 6 Record Time Spent
- 7 Prepare Bill
- 8 Record Payment

Data Stores:
- D1 Clients
- D2 Cars
- D3 Jobs
- D4 Mechanics

Data Flows:
- Client → repair/service request
- repair/service request (existing client) → Book Repair/Service
- new client → Add New Client
- new client details → Clients (D1)
- Clients (D1) → Check Client Status
- car details → Cars (D2)
- repair/service request → Book Repair/Service
- new job → Jobs (D3)
- workload → Allocate Mechanic(s)
- allocated mechanic → Jobs (D3)
- Mechanics (D4) → Allocate Mechanic(s)
- parts used → Record Parts Used
- parts used → Jobs (D3)
- time spent → Record Time Spent
- time spent → Jobs (D3)
- Mechanic → parts used
- Mechanic → time spent
- job charging details → Prepare Bill
- job completed → Record Payment
- payment → Jobs (D3)
- payment → Record Payment
- bill → Client
- Client → payment

File Edit View Window Diagram Elements Help

Question 2

2. a) Explain the purpose of a Feasibility Study and identify the areas of feasibility that are normally considered in such a study? (10 marks)

   b) Describe and justify the contents of a Feasibility Study Report. (15 marks)

2a Answer Pointers

- A FS is a study to assess the feasibility of a proposed project/development.
- A FS looks at the present system, its problems and ways of solving these problems.
- It is undertaken to assess if the project is worth developing further following a preliminary study
- A FS proposes several solutions and makes a firm proposal of which one should be implemented.
- It provides an outline functional specification for the proposed solution.
- Specific areas that a FS should consider include, legal, organisational/social, technical and economic.

2a Marking Pointers

Definition of a FS clearly showing the purpose of deciding to proceed or not   5 marks
1 Mark for each area of feasibility identified   to a maximum of 5 marks

Q2a = 10marks

2b Answer Pointers

Contents	Purpose	
Introduction	To set the boundary and purpose	
Background	Contextualise the study and to provide background to the emerging need for a solution	
Current processes	A review of current processes is needed to provide assurance that the study has a full and detailed understanding of the current business processes.	
Current problems	This section can and should highlight the problems with the current system that gave rise to the belief that a new systems may be needed.	
New/revised systems requirements	A list of requirements should be presented and agreed to form the foundation upon which candidate solutions can be identified and judged.	
Proposed solutions	Normally management will require a set of alternative solutions to be presented and their relative pro's and con's to be reviewed.	
Evaluation of alternatives: 1. Legal aspects 2. Organisational or social impact 3. Technical feasibility 4. Economic feasibility		This is the core of the FS. Each proposed solution is evaluated against these aspects of feasibility to assess their relative costs, technical challenges, and the impact each solution would have on the wider organisational context. Once this evaluation is complete a recommended solution can emerge and be justified.
Recommendation	The outcome of a FS is whether to proceed or not and if the development is to go ahead then the FS must propose an outline functional specification for the recommended solution. This is a fundamental responsibility of the FS team. The purpose of the FS report is to recommend and justify a proposed solution. Management want to know that the major risks and opportunities have been identified and that the best solution has been identified and proposed.	
Appendices:		The FS will contain a

1. Copy of the TOR/PID given to guide the FS 2. Outline functional specification for proposed solution 3. Systems models 4. List of Functional and non-functional requirements 5. Etc.	range of appendices that relate to and further inform the content of the main body of the FS report.

2b Marking Pointers

1 Mark for each area (ie. content) of a feasibility report listed to a max' of 5 marks

2 marks for a discussion of the purpose of the sections listed to a max of 2*5   10 marks

Q2b = 15marks

Total for Q2 = 25 marks

Question 3

3. a) What does 'Quality' mean in information systems development?   (5 marks)

    b) Propose, explain and justify TWO quality assurance procedures that could be used to support the systems analysis stage of a development project.

    (20 marks)

3a Answer Pointers

Quality means 'zero defects', fit for purpose, meets requirements, on time, on budget, economic, usable, supportive, flexible, etc.

3a Marking Pointers

    1 marks for each quality indicator identified to a max' of 1*5 =   5 marks

or

    2 marks for more detailed discussion of fewer indicators to max' of 5 marks

Q3a total marks = 5 marks

3b Answer Pointers

Likely responses to this question include:
    Structured walkthroughs
    Quality circles
    Peer review

3b Marking Pointers

    2 marks for each procedure identified to a max' of 2*2 =   4 marks

    4 marks for each procedure explained to max' of 2*4 =   8 marks

    4 marks for each procedure justified to max' of 2*4 =   8 marks

Q3b total marks = 20 marks

Total marks = 25 marks

Question 4

4. a) List FIVE criticisms of the Systems Development Life Cycle approach that you feel the management of Top Speed Garage should be aware of before their system is developed using this approach.   (5 marks)

    b) Identify the stages of the Systems Development Life Cycle that may be used in developing the Top Speed Garage system and describe the activities that would take place in each stage.   (20 marks)

4a Answer Pointers

- Inflexible
- Emphasis on Hard systems concepts
- Requirements drift/scope creep
- Historically, little user or user management involvement
- Fail to meet budget, time and or user requirements
- Model of processes unstable in modern business world
- Large amounts of documentation of questionable use and worth
- Contributed to the applications backlog

4a Marking Guidelines

1 mark for each valid criticism listed to a max of 5 marks
Total marks for Q4a = 5 marks

4b Answer Pointers

Stage	Activity
Identification of the problem	Liaise with senior managers to determine nature of problems to be investigated. Identify and agree the boundary of the system investigation. Create and sign-off a Terms of Reference (TOR) or project initiation document (PID in SSADM). Appoint a FS team and Steering Committee.
Feasibility study	Further review of problems and issues. Can investigate legal, operational, technical and or economic feasibility (LOTE). Develop a range of alternative solutions to the problem(s) being investigated. Undertake and present a Risk and CBA. Make recommendations to management. Stage may be omitted if no detailed LOTE issues to address.
Systems investigation	Fact-finding. Examine data and processes required. This stage may merge with Systems Analysis.
Systems analysis	SA is concerned with **what** is required. Undertake detailed analysis of problems and determine systems requirements. Produce a Requirements Specification to feed forward into design.
Systems design	SD is concerned with **how** requirements will be met. Technical definition of how the system will be built. Both automated and manual aspects are designed, as are I/O documents, controls, interface screens, program module, etc..
Systems implementation	Implement the design, ie. actually write the code, produce the screens, test the controls, link it all together, test it refine it, install it in the user location, and undertake systems training and acceptance testing.
Review and maintenance	Review the whole development process and the extent to which the deliverables meet the users requirements defined earlier. Provide ongoing maintenance as required.

4b Marking Guidelines

1 mark for each of the main stages identified to a maximum of	6 marks
2 marks for describing the main activities in each stage to maximum of	14 marks

(Note:
  a. If fewer than 7 stages described, but in greater detail then allocate 3 or 4 marks to stages depending on level of detail provided.
  b. Answer must really describe rather than simply list the activities – 1 mark each for activities listed.)

Total marks for Q4b = 20 marks
Total marks for Q4 = 25 marks

Question 5

5.   Briefly explain, with a UML example of usage, any FIVE of the following terms as used in systems analysis:

  a)   Inheritance
  b)   Aggregation
  c)   Composition
  d)   Activity diagram
  e)   Association class
  f)   Collaboration diagram   (5 marks each – 25 marks)

Answer Pointers

Brief definitions:
a.   Inheritance – A Gen-Spec relationship between classes with sub-classes inheriting all attributes and op's from super-classes.
b.   Aggregation – A whole part association between 2 or more objects.
c.   Composition – A strong form of aggregation with a life time dependency between the whole and its parts.
d.   Activity diagram – Model a task, UC or operation logic. Basically a flow chart with state chart notation. Good for modelling parallelism.
e.   Association class – A class created to store attributes and operations that belong more to the association between classes than to either class involved in the association.
f.   Collaboration diagram – Shows the collaboration between classes in UC realisation.

All answers are expected to include:
a.   A definition and or explanation of the term.
b.   An example of usage to which the item would be put, ie. an explanation of how it would be used or an example of the model.
c.   An illustration of the model, concept or document.

Marking Pointers

For each item attempted:

Definition and explanation	2 marks
An example of usage ie. model and or explanation	3 marks

For each item 5 marks

Q5 total marks 5*5 = 25 marks