Time – 2 Hours   Full Marks – 60

Note: Answer all questions. All parts of a question must be answered at one place.

1.

(a) Explain Agile in 2-3 sentences? Explain Scrum framework? What is a Product Backlog? How do you create it? What is a *Burndown* chart and how it is different from *Burnup* chart?   [**2+8+2+2+2=16**]

(b) Explain the similarities in the objectives and practices of the Rapid Application Development (RAD) and Agile models of software development? Also explain the dissimilarities between these two models?   [**2+2 = 4**]

2.

(a) Consider the following requirements for software that to be developed for controlling a chemical plant. The chemical plant has a number of emergency conditions. When any of the emergency conditions occurs, some prescribed action should be taken. The different emergency conditions and corresponding actions that need to be taken are as follows.

   i.   If the temperature of the chemical plant exceeds T_1°C, then the water shower should be turned ON and the heater should be turned OFF.

   ii.   If the temperature of the chemical tank falls below T_2°C, then the heater should be turned ON and the water shower should be turned OFF.

   iii. If the pressure of the chemical plant is above P_1, then the valve V_1 should be OPENED.

   iv.   If the pressure rises above P_1 and the temperature rises above T_1°C, then the water shower should be turned ON, valve V_1 is OPENED and the alarm bells sounded.

Write the requirements of this chemical plant software in the form of a *Decision Table*. Also draw a *Decision Tree* to represent the processing logic of the chemical plant controller.   [**4+4=8**]

(b) Consider the following requirements for a communication protocol that to be developed for computer networks. The Sender sends a frame and stops waiting for an acknowledgement from the receiver (ACK). Once the receiver correctly receives the expected packet, it sends an acknowledgement to let the Sender sends the next frame. Specify the above the communication protocol using *Petri Net*.   [**6**]

(c) Explain the important properties of formal specification?   [**6**]

3. Consider the following requirements for Video-Rental Software to be used for renting videos. A Video-Rental Company is a small video rental store. The video rental store lends videos to customers for a fee, and purchases its videos from a local supplier. A customer wishing to borrow a video provides the empty box of the video they desire, their membership card, and payment – payment is always with the credit card used to open the customer account. The customer then returns the video to the store after watching it. If a loaned video is overdue by a day the customer's credit card is charged, and a reminder letter is sent to them. Each day after that a further card is made, and each week a reminder letter is sent. This continues until either the customer returns the video, or the charges are equal to the cost of replacing the video. New customers fill out a form with their personal details and credit card details, and the counter staff gives the new customer a membership card. Each new customer's form is added to the customer file. The local video supplier sends a list of available titles to Video-Rental Company, who decide whether to send them an order and payment. If an order is sent, then the supplier sends the requested videos to the store. For each new video a new stock form is completed and placed in the stock file.

Do the following for the above software:
(a) Prepare the Software Requirement Specification (SRS) document?   **[10]**
(b) Draw the Context and Level1 Data Flow Diagrams?   **[2+4=6]**
(c) Draw the structure chart?   **[4]**

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