



**Jahangirnagar University**  
**Department of Computer Science and Engineering**

4<sup>th</sup> 1<sup>st</sup> Semester B.Sc. (Hons.) Final Examination -2023

Course Title: **Theory of Computation and Compiler Design**  
Time: **3 hours**

Course No: **CSE-401**  
Full Marks: **60**

[Answer each of the following questions. Each question carries equal marks. Figures in the right margin indicate marks.]

✓

**Question No. 1 is based on CO1.**  
Answer *All of questions.*

- a) Define deterministic PDA. 2
- b) Define Universal Turing Machine 2
- c) What do you mean by a language is a recursively enumerable? 2
- d) What is syntax directed translation (SDD)? 2
- e) Define symbol table and what are the data structures used in symbol table? 2
- f) Define Token, Pattern and Lexeme. 2

2.

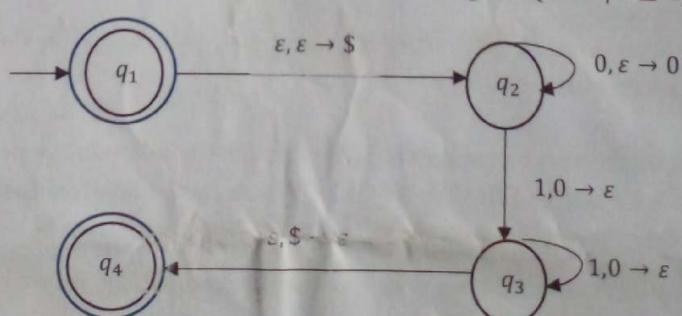
**Question No. 2 is based on CO2.**  
Answer *any Three out of Four* questions.

- a) Explain the statement "every nondeterministic finite automaton has an equivalent deterministic finite automaton". 4
- b) Prove that, if a language is regular then it is described by a regular expression. 4
- c) Let B the language  $\{0^n 1^n | n \geq 0\}$ , by using pumping lemma. Prove that B is not regular. 4
- d) Explain the concept of a parse tree in context-free grammar. 4

✓ 3

**Question No. 3 is based on CO3.**  
Answer *any Three out of Four* questions.

- a) Write the formal description for the following PDA that recognize  $\{0^n 1^n | n \geq 0\}$  4



- b) Prove that every Multi-Tape Turing Machine has an equivalent Single-Tape Turing machine. 4
- c) Define Hilbert's problem. Construct a DFA for a language that accepts any binary string ending in "01". 4
- d) Translate the regular expression  $(a \cup b)^* abac$  into an NFA. 4

**Question No. 4 is based on CO4.**

Answer **any Three** out of **Four** questions.

4. a) Construct a DAG and write the sequence of instructions for the expression  
$$a + a * (b - c) + (b - c) * d.$$

4

- b) What do you mean by code optimization? Explain different types of code optimization. 4  
c) Consider the regular expression:  $de^*|d^*e$   
i) Apply Thompson's Construction algorithm to convert the following RE to NFA.  
ii) Next, apply Subset Construction algorithm to transform the resultant NFA to DFA

4

- d) Consider the following program code: 4

```
prod = 0;  
i = 1;  
do{  
    prod = prod + a[i] * b[i];  
    i = i + 1;  
}while(i<=10);
```

- i) Partition it into blocks.  
ii) Construct the flow graph.

**Question No. 5 is based on CO5.**

Answer **any Two** out of **Three** questions.

5. a) i) What is activation record? Write the various fields of activation record.  
ii) Discuss in detail the storage allocation techniques.

6

- b) Consider the following grammar: 6

1.	$S \rightarrow \underline{\text{if } E \text{ then } S} S'$
2.	$S \rightarrow \underline{\text{otherStmt}}$
3.	$S' \rightarrow \underline{\text{else } S}$
4.	$S' \rightarrow \epsilon$
5.	$E \rightarrow \underline{\text{boolExpr}}$

For reference,

The terminal symbols are *if*, *then*, *otherStmt*, *else*,  $\epsilon$ , *boolExpr*,  $\$$  where  $\$$  is the end of input

The non-terminals are  $S$ ,  $S'$ ,  $E$

Justify whether the above grammar is LL(1) through the following steps:

- i) Construct the FIRST and FOLLOW sets for the non-terminals of the grammar.  
ii) Evaluate the LL(1) parse table for the above grammar.

- c) Write the properties of LR parser with its structure; compile the following program: 6

$$E \rightarrow E + T | T$$

$$T \rightarrow TF | F$$

$$F \rightarrow F * | a | b$$

Construct the SLR parsing table and also parse the input " $a * b + a$ ".

**Jahangirnagar University**  
**Department of Computer Science and Engineering**  
4th Year 1st Semester B.Sc. (Hons.) Final Examination - 2023

**Course Title:** Software Engineering & ISD

**Time:** 3 Hours

**Course No:** CSE-403

**Full Marks:** 60

[Answer each of the following questions. Each question carries equal marks. Figures in the right margin indicate marks.]

1.

**Answer Any six questions**

- a) What is usability? Why usability is important? 2
- b) Define *control flow graph (CFG)* in white box testing. 2
- c) What do you mean by *cohesion* and *coupling* in high level design pattern? 2
- d) When should we **recommend CQRS** (Command and Query Responsibility Segregation) design pattern? 2
- e) What do you mean by *wireframing*? 2
- f) State the **DRY** (Don't Repeat Yourself) principle of software engineering. 2
- g) Why *README* files are necessary? 2

2.

**Answer Any four questions out of Five**

- a) Briefly mention any three Neilsen's Heuristics. 3
- b) What are the differences between *Waterfall* development model and *Prototype* development software process model? When should we use incremental model? 3
- c) Describe **SOLID** design principle in brief. 3
- d) Explain *basic path testing*. Describe how the cyclometric complexity can be computed from the flow graph drawn from the pseudocode of an algorithm using an example. 3
- e) Is GitHub-Wiki a *version control* system? Explain your justification. 3

3.

**Answer Any three questions out of Four**

- a) Explain the phases of incremental development model. Consider the development of a word processing software. Prepare a list of output of each increment after applying this model to the system to be developed. 4

- b) In the following example, the project manager knows the succession of the project activities and the expected time (in weeks) for the following activities. **Apply Critical Path Method (CPM)** to find the critical path of the project. 4

Activity	Predecessor	Expected Time
T1	--	12
T2	T1	9
T3	--	7
T4	T2	18
T5	T3	15
T6	T4	8
T7	T <del>4</del> 5	7
T8	T5, T6	14
T9	T7, TM T <del>8</del> 9	9

- c) Determine the *equivalence partition* for phone numbers having the following format: 4

Area Code (XXXX) Prefix (XXX) - Suffix (XX)

**Area code:** 4 digits number not beginning with first two digits of your exam Roll and except 379, 245

**Prefix:** 3 digits number except last three digits (Omit all leading zeros (0)) of your exam Roll and 205 – 212

**Suffix:** 2 digits number except all the prime numbers which are in the range from 1 to last two digits of your Class Roll.

**N.B.:** Make sure you write down your exam roll at first.

- d) You want to set up a small LAN game center. By considering roles and responsibilities, list the different types of users that need to be considered. Also mention the roles and responsibilities briefly that you considered. 4

4.

Answer *Any three questions out of Four*

- a) Apply the Black Box Equivalence Partitioning test selection technique for the following problem: 4

*"Write a small fragment of code that will find the second largest number in an array of integers".*

You will need to supply as many tests as there are equivalence partitions.

- b) Write a code segment in any programming language for the problem in 4 (a) and then find the cyclomatic complexity based on the code fragment you wrote for the above problem. 4

- c) Explain *Interface Segregation Principle* of **SOLID** design with example including proper **UML diagram**. 4

- d) Classify different fact analysis tools. 4

Organize a Data Flow Diagram (DFD) for level 0 and level 1 to show the data flow and transformation of a course registration system.

- i) Illustrate the importance of user interface design in software development.  
ii) Differentiate between structured and object-oriented analysis.

*Answer Any two questions out of Three*

a) Consider the following scenario:

Margaret is a student at State University. She is currently enrolled in an Arts course. She has a very busy life with a number of different activities. She finds it hard to work with a printed timetable for her subjects. Today she is late for class again. Firstly, she cannot find her timetable slip from existing class routine system so she cannot confirm whether the class starts at 9:00 am or 10:00 am. She guesses it is 10:00 am. Secondly, she is distracted by a fun game on her new mobile phone. The lecturer Dr. Kool notices her come in more than 30 minutes late for the 9:30 am lecture. Dr Kool also notices that she is playing with her mobile phone in the class.

6

Your task is to analyse the current situation in the problem domain.

- (i) Perform an actor analysis and isolate all of the actors in this system. You will need to look at the entire system, not just Margaret.
- (ii) What are the key pain points that Margaret has?
- (iii) What are the goals of Margaret that can be extracted?
- (iv) What are the domain vocabularies?

The University has been decided to implement a mobile application to help students like Margaret. It is assumed the application will have access to the user's timetable at the University.

- (v) What are the assumptions that you have made?
- (vi) What are the constraints that you have to work with?
- (vii) What are the gaps of knowledge in this project?
- (viii) Write a Vision Statement for the new system (Follow the template given in the Lecture).

b)

**Scenario-1:** Imagine that you're creating a logistics management application. The first version of your app can only handle transportation by trucks, so the bulk of your code lives inside the `Truck` class. After a while, your app becomes pretty popular. Each day you receive dozens of requests from sea transportation companies to incorporate sea logistics into the app.

3+3

Great news, right? But how about the code? At present, most of your code is coupled to the `Truck` class. Adding `Ships` into the app would require making changes to the entire codebase. Moreover, if later you decide to add another type of transportation to the app, you will probably need to make all of these changes again.

As a result, you will end up with pretty nasty code, riddled with conditionals that switch the app's behavior depending on the class of transportation objects.

**Scenario-2:** In Bangladesh Premier League (BPL) player selection system, each team owner possesses a numbered paddle that is used to indicate a base price for a player. The BPL managing committee then starts the proceeding by mentioning the base price, and checks when a paddle is raised to accept that price to buy that player. As a result, the acceptance of the player's base price changes which is broadcast to all the team owners in the form of a new bid.

**Which design patterns are applicable in above scenarios? Justify your answers with two points in each case.**

c) Justify the use of delegation in design patterns for the following scenario:

6

Consider an example of a software development company employing a programmer who obtains the position of senior programmer with a 20% increase in salary after a few years, and systems analyst get 5% increase in salary when they are more experienced.

Recommend the use of i) specialization, ii) delegation, and iii) specialization and interface design pattern in designing the above system with appropriate class combination employing inheritance and implementation with code template.



**Jahangirnagar University**  
**Department of Computer Science and Engineering**

4<sup>th</sup> Year 1<sup>st</sup> Semester B.Sc. (Hons.) Final Examination -2023

Course Title: **Digital Image Processing**

Course No: **CSE-405**

Time: **3.00 hours**

Full Marks: **60**

[Answer each of the following questions. Each question carries equal marks. Figures in the right margin indicate marks.]

1.

Answer *All of them*

- a) Define brightness and contrast of an image. 2
- b) Define image restoration and noise (in image). 2
- c) State some of the applications of digital image processing in different fields. 2
- d) Mention the general application areas of CMY, YIQ and HSI color models. 2
- e) List approaches for dealing with the problem of applying a filter at the border of an image. 2
- f) Define (*any two*): 2
  - i. Lookup Table (LUT)
  - ii. FFT
  - iii. 2-D Moment (of an image)

2

Answer *Any Three out of Four.*

- a) Compare *unsharp masking* and *high boost filtering*. 4
- b) What are the sources of noise in digital images? Also discuss a noise model accommodating different types of noises. 4
- c) Point out the basic principle of histogram equalization, histogram modeling and histogram specification for image enhancement. 4
- d) Explain the relation between RGB, HSI and CMYK. 4

3.

Answer *Any Three out of Four.*

- a) Describe the Otsu method of adaptive thresholding. 4
- b) i. Explain the Laplacian filtering technique. 4  
ii. Define Derivative filter. 4
- c) Illustrate the homomorphic transformation for image enhancement. 4
- d) Write a short note on image segmentation techniques. 4

4

Answer *Any Three out of Four.*

- a) Classify image compression methods and explain *run length encoding (RLE)* with an example. 4
- b) Prove that first order moment invariants,  $\mu_{10} = \mu_{01} = 0$ . Why we do not use higher and lower-order moments in image processing? 4
- c) Write the thinning algorithm. 4
- d) Write the spatial mask for the following 4
  - i. Prewitt Mask
  - ii. Laplacian Mask

5.

Answer *Any Two* out of *Three*.

- a) i. Consider a 5-bit grayscale image of resolution  $6 \times 7$  is shown below in Fig.1. Draw its histogram and CDF. Comment on the quality of this image if it is represented using 8-bit (on the basis of a linear scale) then express your opinion regarding the image. 6

0	5	4	10	10	0	0
6	5	5	4	4	4	0
0	20	2	2	2	4	4
30	0	2	2	2	4	4
0	0	2	2	2	4	4
0	10	3	3	20	31	0

Fig.1

- ii. Convert the image shown in Fig.1 into its binary equivalent using a threshold value of 15. 6
- b) Summarize the steps to evaluate principal component analysis (PCA) of a given dataset. 6
- c) Perform erosion operation for the image shown in the following Fig.2. Use a  $3 \times 3$  cross-size structuring element. 6

0	0	0	1	1
0	1	1	0	1
0	1	0	0	1
1	1	1	1	1
1	1	0	1	1

Fig.2



**Jahangirnagar University**  
**Department of Computer Science and Engineering**  
4<sup>th</sup> Year 1<sup>st</sup> Semester B.Sc. (Hons.) Final Examination 2023

Course Title: **Wireless Networks**

Time: **3 hours**

Course No: **CSE 407**

Full Marks: **60**

[Answer each of the following questions. Each question carries equal marks. Figures in the right margin indicate marks.]

1. Question No. 1 will be based on **CO1**. Answer **All of them**.

- a) Write the reason of using Collision Avoidance in wireless network instead of Collision Detection. 2
- b) Write the protocol stack of IEEE 802.11 and compare it with OSI. 2
- c) Give the design steps of WAN. 2
- d) Write the concept of Multi-hop routing algorithm. 2
- e) Define False alarm and Misdetection in CRN. 2
- f) Write the reason of using millimeter wave in 5G network. Also mention its main drawbacks. 2

2. Question No. 2 will be based on **CO2**.

Answer **Any Three out of Four**.

- a) Draw the architecture of LTE and mention the combined function of S-GW and MME. 4
- b) (i) Compare CSMA/CD and CSMA/CA? Why wireless network uses CA? 2  
(ii) Give the steps Binary Exponential Backoff Algorithm with timing diagram. 2
- c) i. Explain the reason of using Hexagonal cell in WAN and why sectored antennas is preferable for the network of congested area? 3  
ii. Draw 7/21 cell patterns. 1
- d) i. Compare between MANET and conventional network. 2  
ii. Compare between Adjacent channel interference and Co-channel interference. 2

3. Question No. 3 will be based on **CO3**.

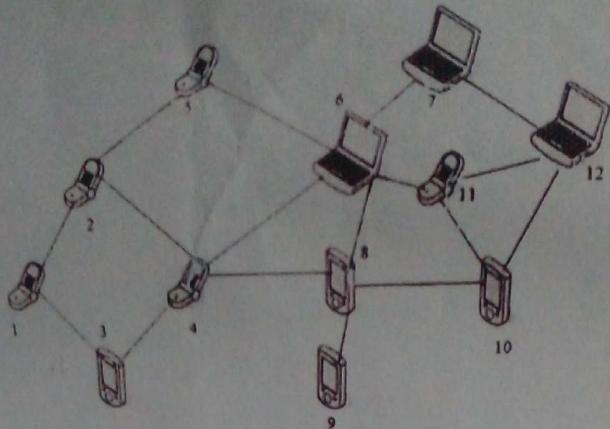
Answer **Any Three out of Four**.

- a) Explain the reason of using Cooperative Spectrum Sensing in CRN. Show the arrangement of spread spectrum technique with pulse diagram. 4
- b) Sketch the architecture of the 5G network. Mention the function of AMF and SMF. 4
- c) Why DEEP clustering algorithm is preferable compared to LEACH algorithm? Show the geometry of DEEP algorithm with all the parameters then give the steps of the algorithm. 4
- d) Demonstrate how a node's routing table is updated under the DSDV protocol. Give three example of routing table update. 4

4. Question No. 4 will be based on **CO4**.

Answer **Any Three out of Four**.

- 4. a) Illustrate the Physical Resource Blocks (PRB) under both Normal CP and Extended CP of LTE-A. If the separation is 15 KHz then Calculate the length of the slot of PRB for both the cases. 4
- b) What is aggregate and edge data rate of 5G network? How local cloud is formed in 5G? Give three real-life applications of M2M in 5G? 4
- c) Draw the routing table of 6 and 11 of the following ad-hoc network. What is the main drawback of DSDV? Mention its remedial measure. 4



- d) i. Draw the complete diagram of a wireless sensor node and point out the function of sensing unit, processing and memory unit. 2
- ii. How energy consumption model in WSN is modified with inclusion of data rate and number of hops. 2

Question No. 5 will be based on **COS**.

Answer **Any Two** out of **Three**.

5. a) A city has a population of  $4 \times 10^6$ . A mobile cellular service provider has 1200 cells with 12 channels each to serve the people. On an average each user generates 1 call/hour with duration of 2 minutes. Determine market penetration of the service provider. Given the GoS (grade of service) of the network is 2%. 6
- i. Determine the market penetration of the service provider.
- ii. Determine % of improvement of market penetration rate if the GoS is changed to 5%.
- iii. How much improvement of penetration rate is possible with increment of 2 channels per cell.

Erlang B Traffic Table

N/B	Maximum Offered Load Versus B and N B is in %							
	0.01	0.05	0.1	0.5	1.0	2	5	10
1	.0001	.0005	.0010	.0050	.0101	.0204	.0526	.1111
2	.0142	.0321	.0458	.1054	.1526	.2235	.3813	.5954
3	.0868	.1517	.1938	.3490	.4555	.6022	.8994	.1271
4	.2347	.3624	.4393	.7012	.8694	1.092	1.525	2.045
5	.4520	.6486	.7621	1.132	1.361	1.657	2.219	2.881
6	7.282	.9957	1.146	1.622	1.909	2.276	2.960	3.758
7	1.054	1.392	1.579	2.158	2.501	2.935	3.738	4.666
8	1.422	1.830	2.051	2.730	3.128	3.627	4.543	5.597
9	1.826	2.302	2.558	3.333	3.783	4.345	5.370	6.546
10	2.260	2.803	3.092	3.961	4.461	5.084	6.216	7.511
11	2.722	3.329	3.651	4.610	5.160	5.842	7.076	8.487
12	3.207	3.878	4.231	5.279	5.876	6.615	7.950	9.474
13	3.713	4.447	4.831	5.964	6.607	7.402	8.835	10.47
14	4.239	5.032	5.446	6.663	7.352	8.200	9.730	11.47
15	4.781	5.634	6.077	7.376	8.108	9.010	10.63	12.48

- b) A mobile cellular network provides dual band service. The bandwidth of each call of narrowband service is 12kbps and that of wideband is 20kbps. The offered traffic of  $A_1$  of narrowband service is 1 Erlangs and that of  $A_2$  wideband is 2 Erlangs. If total Bandwidth supported by the network is 40kbps, then probability state will be with the condition:  $0 \leq BW_1x_1 + BW_2x_2 \leq 40$ . Determine QoS of each traffic. 6
- c) Compare centralized and decentralized clustering techniques of WSN. If the number of nodes  $N = 120$  and the number of CH is 8 then find, 6

$$T(n) = \begin{cases} \frac{p}{1-p(r \bmod (1/p))} & \text{for } n \in G \\ 0 & \text{otherwise} \end{cases} \quad \text{for } r = 0 \text{ (1}^{\text{st}} \text{ round) and 1 (2}^{\text{nd}} \text{ round) for LEACH}$$

Clustering Protocol. If the local random number generated by  $i^{\text{th}}$  node on round-1 is 0.0621 and that of on round-2 is 0.0112 then find its status (member or CH).

Consider the following case study:

The restaurant manager is responsible for managing the menu by creating new item in the menu, update information about existing items, and deleting menu items. When creating a new item, he needs to enter the item name, description, and price. He can also print the sales report. The system allows him to select the date range for generating the sales report. The customer can make orders. He can select items from the menu and enter the quantity he desires. He can request a new account by providing his name, address, and his mobile number. The sales executive can view the orders made online by the customers. He can process the order by selecting an order and assigning it to a cook and a delivery person. He can also cancel the order if it cannot be served. The system admin can create accounts for the restaurant manager and the sales executive. He can also approve the account creation request for the customer. The system shall be user friendly. Any operation should not take more than five clicks. The system shall be highly usable. The system shall be able to support 100,000 user accounts and should be able to handle 100 simultaneous users at any given time. The system shall be efficient.

1. List down the functional and non-functional requirements which are clearly stated in the text above. 5
2. Come up with 2 additional non-functional product requirements that seem important for the restaurant food ordering system (not listed in the above text description). 2
3. Is/Are there any non-functional requirement(s) which are stated in the text above seem(s) wrong? If so, how can you do to improve them? 3

65

Class Roll: 351

CSE 403

Quiz-3

Time: 25 minutes

Question 1

[4 points]

1) Debuging is _____ a) creating program code b) finding and correcting errors in the program code c) identifying the task to be computerized d) none of the option	2) A test case consists of _____ a) set of testing outputs b) execution conditions c) expected output d) All the above options
3) Which is/are not developer testing? a) unit testing b) system testing c) module testing d) acceptance testing	4) Testing will end when a) Customer is confident that the system meets stated requirements b) Testing budget is not exhausted c) System exhibits an acceptable level of quality d) All the mentioned options

Question 2 Define Regression testing.

[1 points]

when any test is needed repeation after  
unit testing, integration testing, then that  
is called regression testing,

65

Question 3 Find cyclomatic complexity of the following source code:

[10 points]

public static void computeStats (int [ ] numbers)

{

    int length = numbers.length, i;

    double med, var, sd, mean, sum, varsum;

    sum = 0; i = 0; 1

    while (i < length) 2

    {

        if (i != 15 || (i % 2 == 0)) 3

            sum += numbers [ i ]; 4

            i++; 5

    }

    med = numbers [ length / 2 ];

    mean = sum / (double) length; 6

    varsum = 0;

    for (int i = 0; i < length; i++) 7

    {

        varsum = varsum + ((numbers [ i ] - mean) \* (numbers [ i ] - mean)); 8

        if (i != 15) 9

            System.out.println ("mean: " + mean); 10

    }

    var = varsum / (length - 1.0);

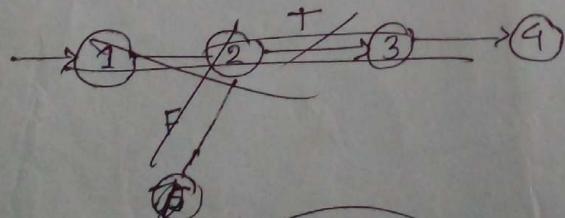
    sd = Math.sqrt ( var );

    System.out.println ("median: " + med);

    System.out.println ("variance: " + var);

    System.out.println ("standard deviation: " + sd);

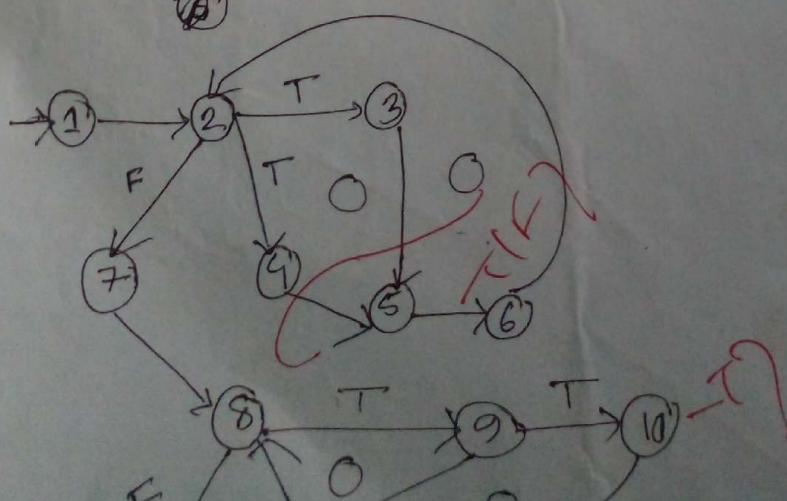
}



Here,  
2, 8, 9

so, cyclomatic  
complexity

$$= 3 + 1 = 4$$



On, Region = 4  
C.C = 4

Question 1 (Just write "T" for True and "F" for false) [4 points]

	Statement	T / F
1.	Software engineering doesn't assume that the persons designing a software system are the same people who will implement the system.	F ✓ T
2.	Software evolution can be avoided if we satisfy all of stakeholders' requirements.	F ✓
3.	The waterfall model is flexible and is friendly to accepting changes in requirements.	F ✓
4.	Agile scrum methodology is a style of project management that emphasizes incremental progress.	T ✓

Question 2 [2 points]

Mention the difference between MVC and ECB architectural pattern model.

MVC  
Full form: Model-View-ControllerAdvantages: Flexible, not complex  
Disadvantages: for short project and easy to implement.ECB  
Full form: Entity control-Base

costly, complex and not nich.

Question 3: [6 points]

Choose the most appropriate answer(s):

1) Which of these software engineering activities is not a part of software processes?	2) The process of checking that the system conforms to its specification and it meets the real needs of the users of the system is known as:
a) Software development b) Software dependence c) Software validation d) Software specification	a) Requirements engineering b) Design and implementation c) Software validation d) Software evolution
3) Updates or bug fixes of software occur at:	4) If requirements are easily understandable and defined then which model is best suited?
a) Planning      b) Pre-development c) Testing      d) None of the option	a) Spiral model      b) Waterfall model c) Prototyping model      d) None of the above
5) The process in which the structure is translated into an executable system is known as:	6) Software should be written in such a way so that it can evolve to meet the changing needs of customers:
a) Testing      b) Validation c) Implementation      d) Specification	a) Usability      b) Reusability c) Efficiency      d) Maintainability

Question 4:

[8 points]

Consider the following scenario:

Mr. John wants a software for his firm. He is not able to fully determine all the requirements at the beginning. He thinks that it is not possible to figure out all of the requirements without getting actual feel of the system. So, he wants a version of the system that will perform some of the functions and interacting with that version of the system can enable him to better usage of the desired system.

(i) Which Software Process Models discussed in lectures would be the best one to develop the software for the proposed system in the Case Study? Give two (2) reasons for your choice.

(ii) Can we apply Waterfall model to develop the software for the proposed system in the Case Study? Justify your answer with two (2) reasons.

i) Agile software process models discussed in lectures would be best one to develop the software for the proposed system in the case study.

# **Tutorial 1**

**Course Name:** Wireless Network

**Course Code:** CSE 407      **Time:** 45 Minutes    **Marks:** 20

- 1) What do you mean by False alarm and misdetection in CRN? 2
- 2) Why hexagonal cell is used in WAN? Why sectored antenna is preferable for the network of congested area? 4
- 3) Write the reason for handover failure in GSM. 3
- 4) Write the major problem of Wireless network. Explain Hidden terminal problem. 3
- 5) Draw the layered architecture of Wi-Fi protocol and compare it with OSI model. 4
- 6) Draw the frame format of IEEE 802.11. Mention the function of type, subtype and more fragment field. 4

## Tutorial D2

Course Name: Wireless Network

Course Code: CSE 407      Time: 35 Minutes      Marks: 15

1. A city has a population of  $2 \times 10^5$ . A mobile cellular service provider has 400 cells with 10 channels each to serve the people. On an average each user generates 1 call/hour with duration of 1.5 minutes. Determine market penetration of the service provider. Given the GoS (grade of service) of the network is 2%.      3
2. Write Basic concepts of CDMA Spread spectrum with diagram and write the reason of using CDMA in wireless network.      5
3. Write the concepts of adaptive modulation and coding.      3
4. Describe in short about the working principle of MAC common part sublayer.      2
5. Draw the 802.16 protocol stack.      2

## Tutorial 3

**Course Name:** Wireless Network **Course Code:** CSE 407

**Marks:** 15

**Time:** 40 minutes

4+4+4+3

1. Draw the Physical Resource Blocks (PRB) under both Normal CP and Extended CP of LTE-A. If the separation is 15 KHz then determine the length of the slot of PRB for both the cases.
2. Give the basic concept of CP. Why it is used in OFDMA.
3. Draw the architecture of LTE and mention the combined function of S-GW and MME.
4. Write in short about the working principle of P-GW, ePDG and PCRF.

Question 1 (Just write "T" for True and "F" for false) [6 points]

	Statement	True/False
1.	Git is same as GitHub.	False
2.	A user story is a special kind of story used to describe system behavior in detail.	True
3.	Git automatically adds new files to the repository and starts tracking them.	False
4.	SRS serves as a contract between customer and developer.	True
5.	Non-functional requirements capture the intended behavior of the system.	True
6.	A DFD provides no information about the timing or ordering of processes, or about whether processes will operate in sequence or in parallel.	True

Question 2: (Short answer) [4 points]

1. What is the command to add all files and changes of the current folder to the staging environment of the Git repository?

git add filename

2. What is the command to get the current status of the Git repository?

git status

3. What is the command to commit the staged changes for the Git repository?

git commit -u origin branchname

4. What is the command to move to the branch named "new-email"?

git checkout new-email

Question 3:

[14 points]

Choose the most appropriate answer(s):

1) Which of the following is/are not functional requirement(s)? a) The system must run on MS Windows b) Mean time between failures must be at least 30 days c) An "Undo" feature must be provided d) The system must be available 24/7	2) What does the .git directory store? a) Configuration files b) source code c) Project documentation d) repository metadata and version history
3) UML diagrams are not type of documentation. a) written b) source code c) community d) machine code	4) Which command creates a new branch in Git? a) git new branch b) git branch c) git branch-new d) git create-branch
5) Git commit history is automatically deleted: a) every year b) every 2 weeks c) never automatically deleted d) every month	6) Which of the following is not included in SRS? a) Performance b) Functionality c) Design solutions d) None of the options
7) What are the 3 parts to a user story? a) Who, When, Why b) Who, Where, Why c) Who, What, Why d) Who, What, Where	8) What does the HEAD in Git represent? a) The base of the current branch b) The currently checked-out commit c) The latest commit in the remote repository d) The first commit in the repository

9) Generally each user story is \_\_\_\_\_

- a) short / concise
- b) not Goal oriented
- c) describe how to implement specific functionality
- d) describe a feature

11) What's wrong with this user story: *As a developer, I want to build a storage database for security questions*

- a) Nothing is wrong, it looks good to me!
- b) The developer is not an end user or customer, so that user story isn't written well
- c) Why a storage database, maybe it could be something else?

13) In DFD, A ... is represented graphically by an arrow into or out of a process:

- a) Process
- b) Entity
- c) Flow
- d) Level

10) The "Who" part of the user story represents what?:

- a) The Developer or Software Engineer
- b) Anyone on the team
- c) The end user or customer
- d) All of the options

12) What's wrong with this user story: *As a login system the invite to change password must expire in 30 minutes*

- a) Nothing is wrong, it looks good to me!
- b) It doesn't give enough detail on the invite and what it looks like
- c) The user is a system, and that is not a good practice!

14) In DFD, Initially a context diagram is drawn, which is a simple representation of the entire system under investigation. This is followed by

- a) level 0 diagram
- b) level 1 diagram
- c) level A diagram
- d) both a and b

#### Question 4:

[6 points]

What is *merge conflict* in Git? Explain with one example.

Merge conflict is when two branches of a repository try to ~~commit~~ <sup>merge</sup> their changes on the master branch on the same line ~~on position of~~ <sup>of file</sup> the main branch. Git tries to add both the changes without knowing which one's priority comes first as a result, garbage value is created and merging isn't done perfectly.

Example:

git init my\_fol

git add .  
git commit -m "Initial commit"  
git clone https://github.com/username/repo\_name

git checkout -b feature-branch  
git add .  
git commit -m "Initial commit in feature branch"

**Question 5:****[10 points]**

A class named Math has the following functions. Please write the **template code** (no need to write the body of the function) using *Pascal* casing for class and method name and *Camel* casing for function parameter names. Also write documentation in XML format.

Function	Purpose	Parameters	Return type
constructor	Initialize object	1 String	-
perform subtraction	subtraction of two numbers	2 floating values	floating value
check even number	check whether a number is even	1 integer	boolean

```

public class Math {
    <-- initialize object -->
    math (String x) {
        <-- subtraction of two numbers -->
        performSubtraction (float x, float y)
        {
            float z;
            :
            return z;
        }
        <-- checks whether the number is even or not
        <-- by dividing it by 2 -->
        checkEven (int x)
        {
            bool y
            :
            return y;
        }
    }
}

```