

University of Mumbai
Examination 2021 under cluster __ (Lead College: _____)

Examinations Commencing from 1st June 2021 to 14th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester VI

Course Code: **CSC601** and Course Name: **Software Engineering**

Time: 2 hours

Max. Marks: 80

| | |
|------------|---|
| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
| 1. | COCOMO-II model is an example of : |
| Option A: | Risk Management |
| Option B: | Estimation Models |
| Option C: | Requirement Analysis |
| Option D: | software testing |
| 2. | Empirical Estimations model are constructed on: |
| Option A: | Expert judgment based on past projects |
| Option B: | Regression models derived from historical project data |
| Option C: | Expected value estimation |
| Option D: | Trial and error parameter values |
| 3. | Which of the following does not fall under project scheduling? |
| Option A: | Effort validation |
| Option B: | Market assessment |
| Option C: | Compartmentalization |
| Option D: | Time allocation |
| 4. | Which of the following software process models couples the iterative nature of prototyping with the controlled and systematic factors of the linear sequential model? |
| Option A: | The Spiral Model. |
| Option B: | The Waterfall Model. |
| Option C: | The Incremental Model. |
| Option D: | The Revolutionary Model |
| 5. | A Person is anyone within the company that has business interest in the product to be built and might be rewarded for the outcome or criticized if the attempt fails. |
| Option A: | Developer |
| Option B: | Stakeholder |
| Option C: | Coder |

| | |
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| Option D: | Proprietor |
| 6. | A technique for handling the introduction of products with an emphasis on chronic transparency and not overburdening the development team is ----- |
| Option A: | Kanban |
| Option B: | Scrum |
| Option C: | Agile |
| Option D: | Development |
| 7. | Which of the following is a useful measure for measuring the quality of a system? |
| Option A: | integrity, sales, usability, maintainability |
| Option B: | Stakeholders ,integrity, usability, sales |
| Option C: | correctness, usability, maintainability, integrity |
| Option D: | Correctness ,size ,usability ,maintainability |
| 8. | The 3 P's in Project management are: |
| Option A: | Process, Performance and Product |
| Option B: | Process, Product and People |
| Option C: | Product, Performance and People |
| Option D: | People, Process and Performance |
| 9. | In LOC Estimation techniques Problem decompositions are based on: |
| Option A: | project schedule |
| Option B: | process activities |
| Option C: | product specification |
| Option D: | software function |
| 10. | SRS is said to be consistent if and only if |
| Option A: | its structure and style are such that any changes to the requirements can be made easily while retaining the style and structure |
| Option B: | every requirement stated therein is verifiable |
| Option C: | every requirement stated therein is one that the software shall meet |
| Option D: | no subset of individual requirements described in it conflict with each other |
| 11. | What questions do black-box tests answer? |
| Option A: | Are all independent paths within a module exercised? |
| Option B: | Is the system particularly sensitive to certain input values? |
| Option C: | Does the internal structure to ensure their validity are exercised? |
| Option D: | Do all loops at their boundaries and within their operational bounds are exercised? |
| 12. | In the Change control process, the change report is evaluated finally by whom? |
| Option A: | Software Developer |
| Option B: | Project Manager |
| Option C: | Software Configuration Manager |

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| Option D: | Change Control authority |
| 13. | Which design concept defines a direct outgrowth of modularity and the concepts of abstraction and information hiding? |
| Option A: | Refinement |
| Option B: | Architectural Patterns |
| Option C: | Functional Independence |
| Option D: | Refactoring |
| 14. | The reverse engineering is concerned with |
| Option A: | Any adaptation of the system |
| Option B: | Any reconstruction of the system |
| Option C: | Any maintenance of the system |
| Option D: | Documentation change of the software |
| 15. | Estimate the risk exposure, if the risk probability is given as 70%, 15 components need to be developed from scratch and the average component is 100 LOC with software engineering cost for each LOC is Rs.12. |
| Option A: | Rs.10,500 |
| Option B: | Rs.18,000 |
| Option C: | Rs.8,400 |
| Option D: | Rs.12, 600 |
| 16. | Which one among the following provides the upper bound on the number of test cases that will be required to guarantee that every statement in the program has been executed at least once |
| Option A: | Cyclomatic Complexity |
| Option B: | Flowchart and flow graph |
| Option C: | Boundary value analysis |
| Option D: | Independent Program Paths |
| 17. | Which of the following errors should not be tested when error handling is evaluated? |
| Option A: | Error description is impossible to understand |
| Option B: | Error noted does not correspond to error encountered |
| Option C: | Error condition causes system intervention |
| Option D: | Error description provide enough information to assist in the location of the cause of the error |
| 18. | Which of the following is not a SQA plan for a project? |
| Option A: | evaluations to be performed |
| Option B: | duration of technical work |
| Option C: | audits and reviews to be performed |
| Option D: | procedures for error reporting and tracking |

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| 19. | Which of the following is not the golden rule for user interface design? |
| Option A: | Place the user in control |
| Option B: | Reduce the user's memory load |
| Option C: | Make the interface consistent |
| Option D: | Risk identification |
| | |
| 20. | Independence of a module is measured using the following 2 qualitative criteria : |
| Option A: | Module and modularity |
| Option B: | Cyclomatic complexity and modularity |
| Option C: | Cohesion and coupling |
| Option D: | Abstraction and function point |

| Q2. | Solve any Two Questions out of Three | 10 marks each |
|------------|---|----------------------|
| A | Differentiate between Spiral and Agile process models. Explain which process model is appropriate for developing any Mobile application. | |
| B | Explain the SCM Process. Differentiate between Quality Assurance and Quality control | |
| C | Describe the various testing strategies for a conventional system. Also discuss the different testing methods applicable for Web application. | |

| Q3. | Solve any Two Questions out of Three | 10 marks each |
|------------|--|----------------------|
| A | Is Risk can be quantified? Justify your answer. How to practice risk management? Explain in detail. | |
| B | Explain COCOMO II Model with a suitable example. A project size of 200 KLOC is to be developed. Software development team has average experience on similar types of projects. The project schedule is not very tight. Calculate the Effort, development time, average staff size, and productivity for the project. | |
| C | Describe verification and validation with example. What comes first? Justify | |

University of Mumbai
Examination June 2021

Examinations Commencing from 1st June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester VI

Course Code: CSC602 and Course Name: System Programming & Compiler Construction

Time: 2 hour

Max. Marks: 80

| | |
|------------|---|
| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
| 1. | Which language processor bridges an execution gap but not translator? |
| Option A: | Pre-processor |
| Option B: | Assembler |
| Option C: | Compiler |
| Option D: | Loader |
| 2. | What are the fields present in MOT used in two pass assembler design? 1. Mnemonic opcode 2. Binary opcode 3. Instruction length 4. Instruction format |
| Option A: | 1 & 2 only |
| Option B: | 2 & 3 only |
| Option C: | 1,2,3 & 4 |
| Option D: | 3 & 4 only |
| 3. | Which of the following types of statements are present in assembly program? |
| Option A: | Imperative statements and assembler directives |
| Option B: | imperative and declarative statement |
| Option C: | imperative and declarative statement as well as assembler directive |
| Option D: | declarative statements and assembler directive |
| 4. | In a two-pass assembler, which of the following process is/are done under first pass? 1. Adding literals to literal table 2. Address resolution of local symbol |
| Option A: | 1 only |
| Option B: | 2 only |
| Option C: | 1 & 2 both |
| Option D: | Neither 1 nor 2 |
| 5. | Consider following code. What will be the entry come under MNT ? The current values for MDTC and MNTC are MDTC=1 and MNTC=1 MACRO INCR4 &AR1, &AR2, &AR3 A 1, &AR1 |

| | |
|-----------|--|
| | A 2, &AR2 A 3, &AR3 MEND |
| Option A: | Index-4, Macro name- INCR4, MDT index- 1 |
| Option B: | Index-1, Macro name- MACRO, MDT index- 1 |
| Option C: | Index-1, Macro name- INCR4, MDT index- 1 |
| Option D: | Index-4, Macro name- MACRO, MDT index- 4 |
| | |
| 6. | What is the process of replacing macro name by the statements and instructions included in macro definition is called? |
| Option A: | Expanding Macro |
| Option B: | Inserting a Macro |
| Option C: | Initializing a Macro |
| Option D: | Installing a Macro |
| | |
| 7. | Which of the following is not a data structure used during Macro Processor design? |
| Option A: | Symbol table |
| Option B: | MNT |
| Option C: | MDT |
| Option D: | ALA |
| | |
| 8. | In case of Direct Linking Loader, which are the fields are present in Relocation and Linkage Directory (RLD) card? |
| Option A: | source card reference number, ESD ID, Length, Flag, Relative Address |
| Option B: | source card reference number, ESD ID, Flag |
| Option C: | source card reference number, ESD ID, Relative Address |
| Option D: | source card reference number, Relative Address, Length |
| | |
| 9. | In case of absolute loading scheme, which function is performed by loader? |
| Option A: | Loading and Allocation |
| Option B: | Loading |
| Option C: | Relocation |
| Option D: | Allocation |
| | |
| 10. | In which of the following scheme the loading and linking of external references is done at execution time? |
| Option A: | Absolute Loading |
| Option B: | Dynamic Linking |
| Option C: | General Loading |
| Option D: | Compile and go loading |
| | |
| 11. | Consider following Expression. $-(p * q) + (r + s) - (p + q + r + s)$ How many numbers of temporary variables are required to construct 3 address code? |
| Option A: | 8 |
| Option B: | 7 |
| Option C: | 9 |
| Option D: | 6 |

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| 12. | In which Code Optimization technique, variables are replaced with constants that have been assigned to them? |
| Option A: | loop optimization |
| Option B: | constant folding |
| Option C: | local optimization |
| Option D: | Constant propagation |
| | |
| 13. | Which technique is applicable to optimize the given code? <pre>a=10; for (j=0 ; j< a*2; j++) { x=j+2; }</pre> |
| Option A: | Code Motion |
| Option B: | Copy Propagation |
| Option C: | Induction Variable Reduction |
| Option D: | Common Sub-expression Elimination |
| | |
| 14. | Which of the following cannot be used as intermediate code form? |
| Option A: | Post fix notation |
| Option B: | Three address code |
| Option C: | Abstract Syntax tree |
| Option D: | Token |
| | |
| 15. | What of the following graph represents flow of control among the set of basic blocks? |
| Option A: | Hamiltonian graph |
| Option B: | Control graph |
| Option C: | Flow graph |
| Option D: | DAG |
| | |
| 16. | What will be the FOLLOW(A) for following grammar? $S \rightarrow AaAb$ $S \rightarrow BaBb$ $A \rightarrow \epsilon$ $B \rightarrow \epsilon$ |
| Option A: | Only a |
| Option B: | a, b |
| Option C: | Only b |
| Option D: | Only ϵ |
| | |
| 17. | Which of the following grammar is appropriate for operator precedence grammar? |
| Option A: | $S \rightarrow EF$ |
| Option B: | $S \rightarrow E * F \mid \epsilon$ |
| Option C: | $S \rightarrow E + F$ |
| Option D: | $S \rightarrow +EF$ |
| | |
| 18. | Which of the following statement are correct for Syntax Directed Definition? i. The terminals do not have inherited attributes. ii. The non-terminal can have both inherited and synthesized attributes. |

| | |
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| | iii. Each grammar symbol is associated with a set of attributes. |
| Option A: | i only |
| Option B: | i, ii and iii |
| Option C: | ii and iii |
| Option D: | iii only |
| | |
| 19. | Which of the following approach is used to evaluate the attributes in L-attributed SDTs? |
| Option A: | DFS with left-to-right Parsing |
| Option B: | BFS with left-to-right Parsing |
| Option C: | DFS with right-to-left Parsing |
| Option D: | BFS with right-to-left Parsing |
| | |
| 20. | Which sentence/s is correct with respect to lexical analyzer? 1. Recognizing the tokens 2. To organize the variables in a lexical order 3. Building a literal and identifier table |
| Option A: | 1 only |
| Option B: | 2 & 3 only |
| Option C: | 1, 2 & 3 |
| Option D: | 1 & 3 only |
| | |

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| Q2. | Solve any Two 10 marks each |
| A | Generate SLR parsing table for the following grammar. $S \rightarrow DD$ $D \rightarrow dD \mid e$ |
| B | Explain databases used in Single pass assembler design with suitable example. |
| C | What is Macro call, Macro expansion, Macro definition? How is macro different from subroutine? |
| Q3. | |
| A | Solve any Two 5 marks each |
| i. | Explain the process of elimination of left recursion with example. |
| ii. | Compare application software and system software. |
| iii. | Generate Three address code. For(i=0;i<10;i++) { If (i<5) a=b+c*3; else x=y+z; } |
| B | Solve any One 10 marks each |
| i. | What is fundamental process of a loader? Explain dynamic loading in detail. |
| ii. | Explain loop optimization techniques with example. |

University of Mumbai
Examination June 2021

Examinations Commencing from 1st June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester VI

Course Code: CSC603 and Course Name: Data Warehousing and Mining

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|--|
| 1. | The purpose of the operational system is used to _____ |
| Option A: | Run the business in real time and is based on historical data |
| Option B: | Takes strategic decisions for business |
| Option C: | Support decision making and is based on historical data |
| Option D: | Run the business in real time and is based on current data |
| 2. | Which of following describes a data warehouse well? |
| Option A: | Can be updated by end users. |
| Option B: | Contains numerous naming conventions and formats. |
| Option C: | Organized around important subject areas. |
| Option D: | Contains only current data |
| 3. | Expected amount of information (in bits) needed to assign a class to a randomly drawn object is _____ |
| Option A: | Gain ratio |
| Option B: | Gini Index |
| Option C: | Entropy |
| Option D: | Information Gain |
| 4. | Which of the following achieves data reduction by detecting redundant attributes |
| Option A: | Data cube aggregation |
| Option B: | Dimension reduction |
| Option C: | Data compression |
| Option D: | Numerosity reduction |
| 5. | The fraudulent usage of credit card-scan be detected using data mining task should be used |
| Option A: | Prediction |
| Option B: | Outlier analysis |
| Option C: | Association analysis |
| Option D: | Correlation |
| 6. | Given the record of users and movies viewed. Using Jaccard similarity measures, find similarity between {A-B,A-C,B-C } |

| | | Users | Movie 1 | Movie 2 | Movie 3 | Movie 4 | movie 5 | |
|-----------|---|-------|------------|------------|------------|------------|------------|--|
| | | A | 1 | 0 | 1 | 0 | 1 | |
| | | B | 0 | 0 | 1 | 0 | 1 | |
| | | C | 0 | 1 | 0 | 0 | 1 | |
| Option A: | {0.67,0.25,0.33} | | | | | | | |
| Option B: | {0.67,0.33,0.25} | | | | | | | |
| Option C: | {0.5,0.33,0.67} | | | | | | | |
| Option D: | {0.5,0.25,0.67} | | | | | | | |
| 7. | Five-number summary of a distribution (Minimum, Q1, Median, Q3, Maximum) is displayed by----- | | | | | | | |
| Option A: | Histogram | | | | | | | |
| Option B: | quantile plot | | | | | | | |
| Option C: | Scatterplot | | | | | | | |
| Option D: | Box plot | | | | | | | |
| 8. | If a set is a frequent set and no superset of this set is a frequent set, then it is called _____. | | | | | | | |
| Option A: | maximal frequent set | | | | | | | |
| Option B: | border set | | | | | | | |
| Option C: | lattice | | | | | | | |
| Option D: | infrequent sets | | | | | | | |
| 9. | _____ is a mining task that examines the web and hyperlinks structure that connect web pages. | | | | | | | |
| Option A: | Web content mining | | | | | | | |
| Option B: | Web structure mining | | | | | | | |
| Option C: | Web usage mining | | | | | | | |
| Option D: | Web link mining | | | | | | | |
| 10. | What does Web content mining involve? | | | | | | | |
| Option A: | analyzing the universal resource locator in Web pages | | | | | | | |
| Option B: | analyzing the unstructured content of Web pages | | | | | | | |
| Option C: | analyzing the pattern of visits to a Web site | | | | | | | |
| Option D: | analyzing the PageRank and other metadata of a Web page | | | | | | | |
| 11. | A sub-database which consists of set of prefix paths in the FP-tree co-occurring with the suffix pattern is called as | | | | | | | |
| Option A: | Suffix path | | | | | | | |
| Option B: | FP-tree | | | | | | | |
| Option C: | Prefix path | | | | | | | |
| Option D: | Condition pattern base | | | | | | | |
| 12. | In star schema, there is one fact table as F1 is connected with four-dimension | | | | | | | |

| | |
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| | tables D1, D2, D3, D4 then fact table will have how many foreign keys? |
| Option A: | 2 |
| Option B: | 4 |
| Option C: | 3 |
| Option D: | 5 |
| | |
| 13. | If Mean salary is 54,000 Rs. and standard deviation is 16,000 Rs. then find z score value of 73,600 Rs. salary |
| Option A: | 1.225 |
| Option B: | 0.351 |
| Option C: | 1.671 |
| Option D: | 1.862 |
| | |
| 14. | The generalization of cross-tab which is represented visually is _____ which is also called as data cube. |
| Option A: | Two-dimensional cube |
| Option B: | Multidimensional cube |
| Option C: | N-dimensional cube |
| Option D: | Cuboid |
| | |
| 15. | In KDD and Data mining, noise is referred to as |
| Option A: | Complex data |
| Option B: | Meta data |
| Option C: | Error |
| Option D: | Repeated data |
| | |
| 16. | Find the IQR of the data set {3, 7, 8, 5, 12, 14, 21, 13, 18}. |
| Option A: | 6 |
| Option B: | 12 |
| Option C: | 16 |
| Option D: | 10 |
| | |
| 17. | Which of the following is not a method to estimate a classifier's accuracy |
| Option A: | Holdout method |
| Option B: | Random Sampling |
| Option C: | Information Gain |
| Option D: | Bootstrap |
| | |
| 18. | For questions given below consider the data Transactions : T1 {F, A, D, B} T2 {D, A, C, E, B} T3 {C, A, B, E} T4 {B, A, D} With minimum support is 60% and the minimum confidence is 80%. Which of the following is not valid association rule? |
| Option A: | A -> B |
| Option B: | B -> A |
| Option C: | D -> A |
| Option D: | A -> D |
| | |

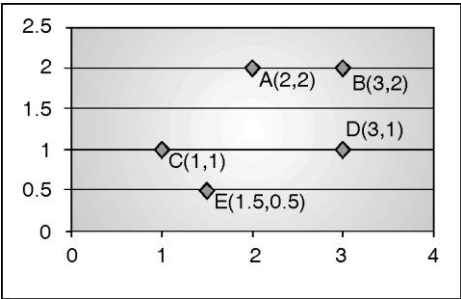
| | |
|-----------|---|
| 19. | To calculate distance between two isotheticrectangles, _____ is efficient approach and produces cluster of high quality |
| Option A: | CLARA |
| Option B: | PAM |
| Option C: | Spatial mining |
| Option D: | IR Approximation |
| 20. | Geographers typically model the world with objects located at different places on surface of the earth. Through _____ model, the real word entities are represented by lines, points and polygons |
| Option A: | Vector data model |
| Option B: | Raster data model |
| Option C: | Network data model |
| Option D: | Topology data model |

| Q2 | Solve any Four out of Six5 marks each | | | | | | | | | | | | | | | | | | | | |
|-----------|--|-----|------------------|------|------------|------|--------|------|--------|------|------------|------|--------|------|--------|------|--------|------|----------------|------|------------|
| A | <i>Consider Metadata as an equivalent of Amazon book store, where each data element is book. What this meta data will contain. Explain.</i> | | | | | | | | | | | | | | | | | | | | |
| B | <i>Suppose a group of sales price records has been sorted as follows: 6, 9, 12, 13, 15, 25, 50, 70, 72, 92, 204, 232. Partition them into three bins by equal-frequency (Equi-depth) partitioning method. Perform data smoothing by bin mean.</i> | | | | | | | | | | | | | | | | | | | | |
| C | <i>Suppose that the data for analysis includes the attribute age. The age values for the data tuples are (in increasing order): 13, 15, 16, 16, 19, 20, 23, 29, 35, 41, 44, 53, 62, 69, 72 Use min-max normalization to transform the value 45 for age onto the range [0:0, 1:0].</i> | | | | | | | | | | | | | | | | | | | | |
| D | <i>Use K-means algorithm to create 3 - clusters for given set of values: {2, 3, 6, 8, 9, 12, 15, 18, 22}</i> | | | | | | | | | | | | | | | | | | | | |
| E | <i>Transaction database is given Below. Min Support = 2. Draw FP-Tree.</i> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>TID</th> <th>List of item_Ids</th> </tr> </thead> <tbody> <tr> <td>T100</td> <td>I1, I2, I5</td> </tr> <tr> <td>T200</td> <td>I2, I4</td> </tr> <tr> <td>T300</td> <td>I2, I3</td> </tr> <tr> <td>T400</td> <td>I1, I2, I4</td> </tr> <tr> <td>T500</td> <td>I1, I3</td> </tr> <tr> <td>T600</td> <td>I2, I3</td> </tr> <tr> <td>T700</td> <td>I1, I3</td> </tr> <tr> <td>T800</td> <td>I1, I2, I3, I5</td> </tr> <tr> <td>T900</td> <td>I1, I2, I3</td> </tr> </tbody> </table> | TID | List of item_Ids | T100 | I1, I2, I5 | T200 | I2, I4 | T300 | I2, I3 | T400 | I1, I2, I4 | T500 | I1, I3 | T600 | I2, I3 | T700 | I1, I3 | T800 | I1, I2, I3, I5 | T900 | I1, I2, I3 |
| TID | List of item_Ids | | | | | | | | | | | | | | | | | | | | |
| T100 | I1, I2, I5 | | | | | | | | | | | | | | | | | | | | |
| T200 | I2, I4 | | | | | | | | | | | | | | | | | | | | |
| T300 | I2, I3 | | | | | | | | | | | | | | | | | | | | |
| T400 | I1, I2, I4 | | | | | | | | | | | | | | | | | | | | |
| T500 | I1, I3 | | | | | | | | | | | | | | | | | | | | |
| T600 | I2, I3 | | | | | | | | | | | | | | | | | | | | |
| T700 | I1, I3 | | | | | | | | | | | | | | | | | | | | |
| T800 | I1, I2, I3, I5 | | | | | | | | | | | | | | | | | | | | |
| T900 | I1, I2, I3 | | | | | | | | | | | | | | | | | | | | |
| F | <i>Write short note on Spatial Clustering Techniques : CLARANS .</i> | | | | | | | | | | | | | | | | | | | | |
| Q3 | Solve any Two Questions out of Three 10 marks each | | | | | | | | | | | | | | | | | | | | |
| A | <i>For a Supermarket Chain consider the following dimensions, namely Product, store, time , promotion. The schema contains a central fact tables sales facts with three measures unit_sales, dollars_sales and dollar_cost.</i> | | | | | | | | | | | | | | | | | | | | |

Design star schema and calculate the maximum number of base fact table records for the values given below :
 Time period : 5 years
 Store : 300 stores reporting daily sales
 Product : 40,000 products in each store (about 4000 sell in each store daily)
 Promotion : a sold item may be in only one promotion in a store on a given day

B

Use the data given below. Create adjacency matrix. Use complete link algorithm to cluster given data set. Draw dendrogram.



C

Using the following training data set. Create classification model using decision-tree and draw final Tree.

| Tid | Income | Age | Own House |
|-----|-----------|--------|-----------|
| 1. | Very High | Young | Yes |
| 2. | High | Medium | Yes |
| 3. | Low | Young | Rented |
| 4. | High | Medium | Yes |
| 5. | Very high | Medium | Yes |
| 6. | Medium | Young | Yes |
| 7. | High | Old | Yes |
| 8. | Medium | Medium | Rented |
| 9. | Low | Medium | Rented |
| 10. | Low | Old | Rented |
| 11. | High | Young | Yes |
| 12. | medium | Old | Rented |

University of Mumbai
Examination June 2021

Examinations Commencing from 1st June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: TE Semester VI

Course Code: **CSC604** and Course Name: **Cryptography and System Security**

Time: 2 hour

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|-----------|--|
| 1. | _____ defines a security service as a service that is provided by a protocol layer of communicating open systems and that ensures adequate security of the systems or of data transfers. |
| Option A: | X.800 |
| Option B: | X.809 |
| Option C: | X.832 |
| Option D: | X.802 |
| 2. | _____ are fundamental to a number of public-key algorithms, including and the digital signature algorithm (DSA). |
| Option A: | Discrete logarithms |
| Option B: | Chinese remainder theorem |
| Option C: | Fermat's theorem |
| Option D: | Miller and Rabin algorithm |
| 3. | Plain text message is: "meet me after the toga party" with a rail fence of depth 2. Compute cipher text. |
| Option A: | MEMATRHTGPRYETEFETEOAAT |
| Option B: | MEMATRHTGPRYETEFETFOAAT |
| Option C: | MEMATRHTHPRYETEFETEOAAT |
| Option D: | MEMATRHTGPRYETEFFTEOAOT |
| 4. | In _____ mode, the same plaintext value will always result in the same cipher text value. |
| Option A: | Cipher Block Chaining |
| Option B: | Cipher Feedback |
| Option C: | Electronic code book |
| Option D: | Output Feedback |
| 5. | DES encrypting the plaintext as block of _____ bits. |
| Option A: | 64 |
| Option B: | 56 |
| Option C: | 128 |
| Option D: | 32 |
| 6. | _____ is a symmetric block cipher that is intended to replace DES as the approved standard for a wide range of applications. |
| Option A: | AES |

| | |
|-----------|---|
| Option B: | RSA |
| Option C: | MD5 |
| Option D: | RC5 |
| | |
| 7. | The number of rounds in RC5 can range from 0 to _____ |
| Option A: | 127 |
| Option B: | 63 |
| Option C: | 31 |
| Option D: | 255 |
| | |
| 8. | How many rounds does the AES-192 perform? |
| Option A: | 10 |
| Option B: | 14 |
| Option C: | 16 |
| Option D: | 12 |
| | |
| 9. | For the Knapsack: {1 6 8 15 24}, Find the cipher text value for the plain text 10011. |
| Option A: | 40 |
| Option B: | 15 |
| Option C: | 14 |
| Option D: | 39 |
| | |
| 10. | Which of the following is not possible through hash value? |
| Option A: | Password check |
| Option B: | Data integrity check |
| Option C: | Data retrieval |
| Option D: | Digital signature |
| | |
| 11. | Which of the following is not an element/field of the X.509 certificates? |
| Option A: | Issuer Name |
| Option B: | Serial Modifier |
| Option C: | Issue unique identifier |
| Option D: | Signature |
| | |
| 12. | _____ is responsible for distributing keys to pairs of users (hosts, processes, applications) as needed |
| Option A: | Key distribution center |
| Option B: | Key analysis center |
| Option C: | UKey storing center |
| Option D: | HKey storing center |
| | |
| 13. | A digital certificate system is _____. |
| Option A: | uses third-party CAs to validate a user's identity |
| Option B: | uses digital signatures to validate a user's identity |
| Option C: | uses tokens to validate a user's identity |
| Option D: | are used primarily by individuals for personal correspondence |
| | |
| 14. | Hashed message is signed by a sender using |
| Option A: | His public key |
| Option B: | His private key |

| | |
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| Option C: | Receivers public key |
| Option D: | Receivers private key |
| | |
| 15. | The man-in-the-middle attack can endanger the security of the Diffie-Hellman method if two parties are not |
| Option A: | Authenticated |
| Option B: | Joined |
| Option C: | Submit |
| Option D: | Separate |
| | |
| 16. | Which of the following does authorization aim to accomplish?. |
| Option A: | Restrict what operations/data the user can access |
| Option B: | Determine if the user is an attacker |
| Option C: | Flag the user if he/she misbehaves |
| Option D: | Determine who the user is |
| | |
| 17. | _____ operates in the transport mode or the tunnel mode. |
| Option A: | IPSec |
| Option B: | SSL |
| Option C: | PGP |
| Option D: | BGP |
| | |
| 18. | When a hash function is used to provide message authentication, the hash function value is referred to as |
| Option A: | Message Field |
| Option B: | Message Digest |
| Option C: | Message Score |
| Option D: | Message Leap |
| | |
| 19. | Which of the following tool would NOT be useful in figuring out what spyware or viruses could be installed on a client's computer? |
| Option A: | Wireshark |
| Option B: | Malware Bytes |
| Option C: | HighjackThis |
| Option D: | HitmanPro |
| | |
| 20. | What is honey pot attack? |
| Option A: | dummy device put into the network to attract attackers |
| Option B: | single line threat |
| Option C: | Ip spoofing bypass |
| Option D: | recognition attack |

| | | |
|-----------|--|----------------------|
| Q2 | Solve any Two | 10 marks each |
| A | Explain Security Services and Mechanisms in detail. Explain the relationship between them. | |
| B | What is meant by the Diffie-Hellman key exchange algorithm? Explain with example. | |
| C | Describe HMAC algorithm. Comment on the security of HMAC. | |

| | | |
|-----------|---|----------------------|
| Q3 | Solve any Two | 10 marks each |
| A | Describe signing and verification in Digital Signature Algorithm. | |

| | |
|---|---|
| B | Explain any 2 ways to classify Intrusion Detection Systems. |
| C | Explain Man-in-the-Middle and Flooding attacks concept in detail. |

University of Mumbai
Examination June 2021

Examinations Commencing from 1st June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: TE Semester VI

Course Code: CSDLO6021 and Course Name: Machine Learning

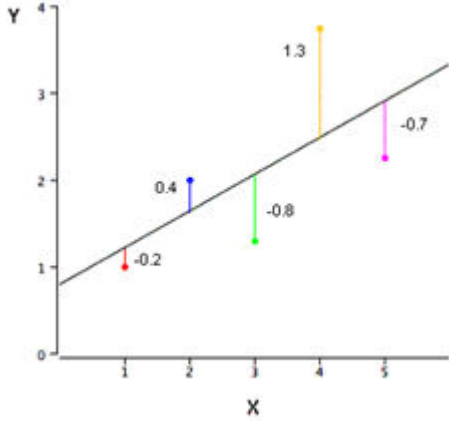
Time: 2 hour

Max. Marks: 80

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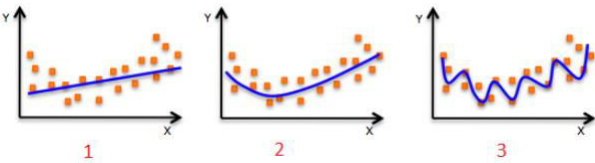
| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
|------------|--|
| 1. | Which of the following are examples of unsupervised learning? i. Modeling a spam filter from a set of labeled emails as spam and not spam ii. Given a set of news articles found on the web, group them into articles under different categories iii. Given a database of customer data, automatically discover market segments and group customers into different market segments iv. Given a database of patients diagnosed as either having diabetes or not, learn to classify new patients as having diabetes or not |
| Option A: | Both i and iv |
| Option B: | Both i and iii |
| Option C: | Both ii and iii |
| Option D: | Both iii and iv |
| 2. | Which of the following options are true about Machine Learning? 1. Machine learning is automatic learning based on experience 2. Machine learning is programmed so that it learns, and past experience is not required. 3. It can learn and improve from the past experience without being explicitly programmed. 4. Machines can learn from past experience, but it must be explicitly programmed. |
| Option A: | 1 and 2 |
| Option B: | 2 and 4 |
| Option C: | 1 and 4 |
| Option D: | 3 and 4 |
| 3. | Which of the following is an example of reinforcement learning? |
| Option A: | Stock price prediction |
| Option B: | Sentiment analysis |
| Option C: | Customer segmentation |

| | |
|-----------|--|
| Option D: | Robot in a maze |
| 4. | In Downhill Simplex method, if $f(x)$ at the reflected point is greater than $f(x)$ at worst point (N) then the new point is obtained by |
| Option A: | Contraction |
| Option B: | Multiple Reflection |
| Option C: | Expansion |
| Option D: | Multiple contraction |
| 5. | In classical Newton's Method, having Hessian Matrix H, Gradient G, X_{K+1} is computed using |
| Option A: | $X_{K+1} = X_K + H_K^{-1} * G_K$ |
| Option B: | $X_{K+1} = X_K - H_K^{-1} * G_K$ |
| Option C: | $X_{K+1} = X_K - H_K * G_K$ |
| Option D: | $X_{K+1} = X_K + H_K * G_K$ |
| 6. | Which of the following is not true about the derivative free techniques? |
| Option A: | They use evolutionary concepts. |
| Option B: | The objective function has to be differentiable |
| Option C: | These methods use an empirical approach for analysis. |
| Option D: | Random search and Downhill Simplex are examples of Derivative free techniques. |
| 7. | Given $X=[1 \ 2 \ 3 \ 4]$ $W=[1 \ 1 \ -1 \ -1]$ compute $f(\text{net})$ given $\lambda = 0.5$ using i. Bipolar continuous ii. Unipolar continuous activation function |
| Option A: | i. 0.7615 ii. 0.880 |
| Option B: | i. 0.880 ii. 0.7615 |
| Option C: | i. -0.7615 ii. 0.1192 |
| Option D: | i. 0.119 ii. -0.7615 |
| 8. | Hebbian learning is an example of _____ and perceptron learning is an example of _____ |
| Option A: | Feedforward supervised learning, supervised binary response |
| Option B: | Feedforward unsupervised learning, supervised binary response |
| Option C: | Feedback supervised learning, unsupervised binary response |
| Option D: | Feedback unsupervised learning, supervised multivariate response |
| 9. | _____ is a type of learning rule which works with a layer of neurons. |
| Option A: | Perceptron |
| Option B: | Hebbian |
| Option C: | Widrow Hoff |
| Option D: | Winner takes all |
| 10. | Which of these statements are false with respect to the metrics in linear regression? a. For a strong linear regression R^2 value should be high b. Multiple R value of 1 represents perfect positive relationship |

| | <p>c. Karl pearson value of -1 indicates total negative linear correlation</p> <p>d. High value of Sum of Squared Errors(SSE) indicates perfect fit</p> | | | | | | | | | |
|-----------------|--|--------------|-------------|--------------|----------------|-----|----|-----------------|----|----|
| Option A: | Both A and B are false | | | | | | | | | |
| Option B: | Both A and C are false | | | | | | | | | |
| Option C: | Both B and C are false | | | | | | | | | |
| Option D: | Only D is false | | | | | | | | | |
| 11. | <p>The graph below represents a regression line predicting Y from X. The values on the graph shows the residuals for each predicted value. Use this information to compute the Sum of squared errors (SSE)</p>  | | | | | | | | | |
| Option A: | 4.02 | | | | | | | | | |
| Option B: | 3.02 | | | | | | | | | |
| Option C: | 1.01 | | | | | | | | | |
| Option D: | 0 | | | | | | | | | |
| 12. | <table border="1" data-bbox="371 1503 1433 1612"> <thead> <tr> <th></th> <th>Actual True</th> <th>Actual False</th> </tr> </thead> <tbody> <tr> <th>Predicted True</th> <td>156</td> <td>20</td> </tr> <tr> <th>Predicted False</th> <td>14</td> <td>50</td> </tr> </tbody> </table> <p>Compute the specificity and the precision?</p> | | Actual True | Actual False | Predicted True | 156 | 20 | Predicted False | 14 | 50 |
| | Actual True | Actual False | | | | | | | | |
| Predicted True | 156 | 20 | | | | | | | | |
| Predicted False | 14 | 50 | | | | | | | | |
| Option A: | Specificity = 88.6% Precision = 71.4% | | | | | | | | | |
| Option B: | Specificity = 71.4 % Precision = 88.6% | | | | | | | | | |
| Option C: | Specificity = 28.5% Precision = 11.36% | | | | | | | | | |
| Option D: | Specificity = 71.4% Precision = 11.36% | | | | | | | | | |
| 13. | Which is not true statement about Kernel Trick | | | | | | | | | |
| Option A: | A Kernel Trick is a method where a Non Linear data is projected onto a higher dimension space so as to make it easier to classify the data where it could be linearly divided by a plane. | | | | | | | | | |

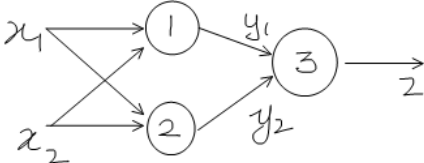
| | |
|-----------|--|
| Option B: | A Kernel Trick is a method of transforming the original (non-linear) input data into a higher dimensional space (as a linear representation of data). |
| Option C: | The Kernel Trick allows us to take linear Support Vector Machines and extend their functionality to classify non-linear data sets. |
| Option D: | A Kernel Trick is a method which can easily separates the data points in a lower dimensionality space |
| 14. | The difference between naïve Bayesian classifier and Bayesian belief networks is |
| Option A: | The joint conditional probability distributions are considered in Bayesian Belief networks |
| Option B: | The joint conditional probability distribution is not considered in Bayesian Belief networks |
| Option C: | Class conditional independence is always considered in Bayesian Belief networks |
| Option D: | Class conditional independence is sometimes considered in Bayesian Belief Networks |
| 15. | <p>Today's weather Tomorrow's weather Initial Probability values</p> <p>Sunny 0.25 Rainy 0.75 Foggy 0.30</p> <pre> graph TD Sunny((Sunny)) -- 0.8 --> Sunny Sunny -- 0.2 --> Rainy((Rainy)) Rainy -- 0.6 --> Rainy Rainy -- 0.05 --> Sunny Rainy -- 0.3 --> Foggy((Foggy)) Foggy -- 0.5 --> Foggy Foggy -- 0.2 --> Sunny Foggy -- 0.15 --> Sunny </pre> <p>Given that today is sunny what is the probability that tomorrow is sunny and the day after is rainy</p> |
| Option A: | 0.01 |
| Option B: | 0.004 |
| Option C: | 0.04 |
| Option D: | 0.32 |

| | |
|-----------|---|
| 16. | <p>What is true about Markov Property</p> <p>I. Markov Property is very useful for explaining events, and it cannot be the true model of the underlying situation in most cases.</p> <p>II. The state of the system at time $t+1$ depends only on the state of the system at time t</p> <p>III. The advantages of Markov property are complexity and forecasting accuracy.</p> <p>IV. Markov property is used to forecast the value of a variable whose predicted value is influenced only by its current state</p> |
| Option A: | i and ii |
| Option B: | ii and iii |
| Option C: | ii and iv |
| Option D: | iii and iv |
| 17. | <p>A square matrix is _____ if all eigen values are _____</p> <p>Positive definite, Positive</p> <p>Negative definite, Negative</p> <p>Positive definite, Negative</p> <p>Negative definite, positive</p> |
| Option A: | Both ii and i are correct |
| Option B: | Both iii and iv are correct |
| Option C: | All four options are wrong |
| Option D: | Either iii or iv is right |
| 18. | <p>Identify the correct options regarding Principal Component Analysis</p> <p>(a) Principal component analysis (PCA) can be used with variables of any mathematical types: quantitative, qualitative, or a mixture of these types</p> <p>(b) The major principal component axis has dimensions having the maximum variance.</p> <p>(c) The major principal component axis has dimensions having the minimum variance</p> <p>(d) The most information is retained among the top few principal axes.</p> |
| Option A: | Both a and b |
| Option B: | Both b and d |
| Option C: | Both a and d |
| Option D: | Both c and d |

| | |
|-----------|--|
| 19. | Compute the eigen values for matrix $A = \begin{bmatrix} 7 & 3 \\ 3 & -1 \end{bmatrix}$ |
| Option A: | $\lambda_1 = 8; \lambda_2 = -2$ |
| Option B: | $\lambda_1 = -8; \lambda_2 = 2$ |
| Option C: | $\lambda_1 = 4; \lambda_2 = -4$ |
| Option D: | $\lambda_1 = -4; \lambda_2 = 4$ |
| 20. |  <p>In the graphs 1, 2 and 3 which is best fitted and which is overfitted?</p> |
| Option A: | 2 is best-fitted and 1 is over-fitted |
| Option B: | 1 is best-fitted and 2 is over-fitted |
| Option C: | 2 is best-fitted and 3 is over-fitted |
| Option D: | 1 is best-fitted and 3 is over-fitted |

| Q2 (20 Marks Each) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------------------|--------------|------------------|--------------|----------|------------|---|-----|------|------|-----|----|---|-----|------|------|------|----|---|------|------|------|-----|-----|---|--------|--------|------|-----|-----|---|--------|-----|-----|-----|----|---|--------|-----|-----|------|-----|---|------|-----|-----|------|-----|---|-----|--------|------|-----|----|---|-----|-----|-----|-----|----|----|--------|--------|-----|-----|----|----|-----|--------|-----|------|-----|----|------|--------|------|------|-----|
| A | Solve any Two 5 marks each | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| i. | Why is the Support Vector Machine(SVM) called the maximum margin classifier? Explain mathematically the formulation of margin. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ii. | What is a saddle point? Minimize $f(x) = x_1^2 + x_2^2 + 2x_1x_2$, with starting initial point X_0 is $[0.5, -0.1]$ (Perform 2 iteration only) using the steepest descent method | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| iii. | What are the steps in designing a Machine Learning Application | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | Solve any One 10 marks each | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| i. | <p><i>Two questions of 10 marks each have to be asked</i></p> <p>For the following data, to construct the decision tree calculate Gini indexes and determine which attribute is the root attribute. (4)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sr. No</th> <th>Income</th> <th>Defaulting Level</th> <th>Credit Score</th> <th>Location</th> <th>Give Loan?</th> </tr> </thead> <tbody> <tr><td>1</td><td>low</td><td>high</td><td>high</td><td>bad</td><td>no</td></tr> <tr><td>2</td><td>low</td><td>high</td><td>high</td><td>good</td><td>no</td></tr> <tr><td>3</td><td>high</td><td>high</td><td>high</td><td>bad</td><td>yes</td></tr> <tr><td>4</td><td>medium</td><td>medium</td><td>high</td><td>bad</td><td>yes</td></tr> <tr><td>5</td><td>medium</td><td>low</td><td>low</td><td>bad</td><td>no</td></tr> <tr><td>6</td><td>medium</td><td>low</td><td>low</td><td>good</td><td>yes</td></tr> <tr><td>7</td><td>high</td><td>low</td><td>low</td><td>good</td><td>yes</td></tr> <tr><td>8</td><td>low</td><td>medium</td><td>high</td><td>bad</td><td>no</td></tr> <tr><td>9</td><td>low</td><td>low</td><td>low</td><td>bad</td><td>no</td></tr> <tr><td>10</td><td>medium</td><td>medium</td><td>low</td><td>bad</td><td>no</td></tr> <tr><td>11</td><td>low</td><td>medium</td><td>low</td><td>good</td><td>yes</td></tr> <tr><td>12</td><td>high</td><td>medium</td><td>high</td><td>good</td><td>yes</td></tr> </tbody> </table> | Sr. No | Income | Defaulting Level | Credit Score | Location | Give Loan? | 1 | low | high | high | bad | no | 2 | low | high | high | good | no | 3 | high | high | high | bad | yes | 4 | medium | medium | high | bad | yes | 5 | medium | low | low | bad | no | 6 | medium | low | low | good | yes | 7 | high | low | low | good | yes | 8 | low | medium | high | bad | no | 9 | low | low | low | bad | no | 10 | medium | medium | low | bad | no | 11 | low | medium | low | good | yes | 12 | high | medium | high | good | yes |
| Sr. No | Income | Defaulting Level | Credit Score | Location | Give Loan? | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | low | high | high | bad | no | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | low | high | high | good | no | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | high | high | high | bad | yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | medium | medium | high | bad | yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | medium | low | low | bad | no | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | medium | low | low | good | yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | high | low | low | good | yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | low | medium | high | bad | no | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | low | low | low | bad | no | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | medium | medium | low | bad | no | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | low | medium | low | good | yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | high | medium | high | good | yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | |
|-----|---|----|--------|--------|------|------|-----|--|
| | | 13 | high | high | low | bad | no | |
| | | 14 | medium | medium | high | good | yes | |
| ii. | <p>List down the steps of PCA Using PCA compute the transformed matrix of A Where A is</p> $\begin{bmatrix} 1 & 2 \\ 0.5 & 1.5 \\ 0 & 0.5 \\ -0.5 & 0.25 \end{bmatrix}$ | | | | | | | |

| | |
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| Q3. (20 Marks Each) | |
| A | Solve any Two 5 marks each |
| i. | Define logit function. Explain the importance of logit function in logistic regression with appropriate example |
| ii. | <p>Given</p>  $X = [3, 5] \quad W = \begin{bmatrix} 1 & 2 \\ 4 & -2 \end{bmatrix} \quad Y = [1, -5] \quad c = 1$ <p>Compute output Z using binary bipolar activation function. Also compute the new weights $y_1, y_2, w_{11}, w_{12}, w_{21}, w_{22}$</p> |
| iii. | Define covariance ? For the given dataset, compute the covariance matrix |

| | |
|----------|--|
| | X_1 X_2 2.5 2.4 0.5 0.7 2.2 2.9 1.9 2.2 3.1 3.0 2.3 2.7 2.0 1.6 1.0 1.1 1.5 1.6 1.2 0.9 |
| B | Solve any One 10 marks each |
| ii. | Explain Linear Separability problem? (2) Solve a linearly separable problem (AND Gate) Solve a linearly non separable problem (XOR gate) both using McCulloch Pitt Model ? |
| ii. | What is the role of radial basis function in separating nonlinear patterns? Explain with XOR Example. |