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21CS61

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Software Engineering and Project Management

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are seven broad categories of computer software? (10 Marks)
- b. What are the elements of a software process, generic process framework? (10 Marks)

OR

- 2 a. List the types of prescriptive process models and explain waterfall model and incremental process models. (10 Marks)
- b. Explain spiral model and concurrent models. (10 Marks)

Module-2

- 3 a. Define requirements engineering and explain seven different tasks of requirements engineering. (10 Marks)
- b. Draw and explain UMC use case diagram for SafeHome home security function. (10 Marks)

OR

- 4 a. Identify different ways of requirements model. Explain scenario based. (10 Marks)
- b. Draw and explain activity diagram for access camera surveillance via the internet display camera views function. (10 Marks)

Module-3

- 5 a. Explain 12 agility principles to achieve agility. (10 Marks)
- b. Explain SCRUM and FDD. (10 Marks)

OR

- 6 a. Explain Core Principles. (10 Marks)
- b. Explain Construction principles. (10 Marks)

Module-4

- 7 a. Explain activities covered in software project management. (10 Marks)
- b. Explain ways of categorizing software projects. (10 Marks)

OR

- 8 a. Explain Project charter. (10 Marks)
- b. Explain setting objectives. (10 Marks)

Module-5

- 9 a. Explain place of software quality in project planning. (10 Marks)
- b. Explain Boehm's model. (10 Marks)

OR

- 10 a. Explain V – Process Model. (10 Marks)
- b. Explain software Reliability. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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21AD62

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Data Science and its Application

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is Data Science? Explain Matplotlib with bar chart, line chart and scatter plot. (10 Marks)
- b. Explain about linear algebra. (10 Marks)

OR

- 2 a. Explain probability with conditional probability and Baye's theorem. (10 Marks)
- b. Explain continuous distributions and normal distribution with code. (10 Marks)

Module-2

- 3 a. Explain statistical Hypothesis testing with example : flipping a coin. (10 Marks)
- b. What is gradient descent? Explain the idea behind gradient descent and estimating the gradient. (10 Marks)

OR

- 4 a. What are the different ways of reading files? Explain. (10 Marks)
- b. Explain how will you explore your data with one, two and many dimensions. (10 Marks)

Module-3

- 5 a. Define machine learning and explain with code:
i) Over-fitting
ii) Under fitting
iii) Correctness. (10 Marks)
- b. What is K-nearest Neighbors? Explain the model with example : Favorite Languages with code. (10 Marks)

OR

- 6 a. Explain Naïve Bayes with implementation and testing our model with code. (10 Marks)
- b. Explain the model of simple linear regression and using gradient descent with code. (10 Marks)

Module-4

- 7 a. What is a decision tree? Explain creating a decision tree and the entropy of a partition. (10 Marks)
- b. What is Neural networks? Explain :
i) Feed – Forward Neural Networks
ii) Back propagation. (10 Marks)

OR

- 8 a. Explain deep learning with tensor and Neural Networks as a sequence of Layers. (10 Marks)
- b. What is clustering? Explain the idea and clustering model with example : clustering colors. (10 Marks)

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Module-5

- 9 a. What is Natural language processing? Explain :
i) Word clouds
ii) n-Gram language models
iii) Grammars. (10 Marks)
b. Explain Eigenvector centrality with matrix multiplication and centrality with code. (10 Marks)

OR

- 10 a. What is recurrent neural networks with example using a character –level RNN, explain with code. (10 Marks)
b. Explain recommender systems with user – based collaborative filtering with code. (10 Marks)

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21AI63

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Machine Learning

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Machine Learning. Explain different types of Machine Learning. (10 Marks)
b. Write the Final Version Space for the below mentioned training example using candidate elimination algorithm.

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

OR

- 2 a. List and explain main challenges of Machine Learning. (06 Marks)
b. State the following problem with respect to task performance and experiences:
(i) A Checkers Learning problem (ii) A Robot driving learning problem (04 Marks)
c. Demonstrate Find-S algorithm for finding a maximally specific hypothesis on the given dataset.

Origin	Manufacture	Color	Year	Type	Class
Japan	Honda	Blue	1980	Economy	Yes
Japan	Toyota	Green	1970	Sport	No
Japan	Toyota	Blue	1990	Economy	Yes
USA	Audi	Red	1980	Economy	No
Japan	Honda	White	1980	Economy	Yes
Japan	Toyota	Green	1980	Economy	Yes
Japan	Honda	Red	1980	Economy	No

(10 Marks)

Module-2

- 3 a. Explain the following :
(i) Root Mean Square-Error (RMSE) (ii) Mean Absolute Error (MAE) (04 Marks)
b. In context to prepare the data for machine learning algorithm. Write a short note on
(i) Data Cleaning (ii) Handling text and categorical attribute (06 Marks)
c. With the code snippets show how grid search and randomized search helps in fine tuning a model. (10 Marks)

OR

- 4 a. Using the code snippets, outline the concepts involved in :
(i) Measuring accuracy using cross-validation
(ii) Confusion Matrix
(iii) Precision and Recall. (10 Marks)

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- b. Explain the following :
- (i) Multiclass classification
 - (ii) Multilabel classification
 - (iii) Multioutput classification
 - (iv) Confusion Matrix

(10 Marks)

Module-3

- 5 a. What is gradient Descent Algorithm and discuss its various types. (10 Marks)
 b. In Regularized linear models illustrate the three different methods to constrain the weights. (10 Marks)

OR

- 6 a. With respect to nonlinear SVM classification, explain polynomial kernel, Gaussian RBF kernel along with code snippet. (10 Marks)
 b. Show that how SVM's make predictions using quadratic programming and kernelized SVM. (10 Marks)

Module-4

- 7 a. With an example dataset examine how Decision Tree are used in making predictions. (10 Marks)
 b. Explain the CART training algorithm. (06 Marks)
 c. Explain the features of regression and instability with respect to decision trees. (04 Marks)

OR

- 8 a. In context to Ensemble methods determine the concept of :
 (i) Bagging and pasting (ii) Voting classifiers (10 Marks)
 b. Explain the following boosting methods along with code snippets:
 (i) Ada.Boost (ii) Gradient Boosting (10 Marks)

Module-5

- 9 a. Write Bayes theorem. Identify the relationship between Bayes theorem and the problem of concept learning. (10 Marks)
 b. How maximum likelihood hypothesis is helpful for predicting probabilities. (10 Marks)

OR

- 10 a. Construct Naive Bayes classifier with an example. (10 Marks)
 b. Derive the EM algorithm in detail. (10 Marks)

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21AI641

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Business Intelligence

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain four step decision making process adopted by managers. (06 Marks)
- b. Describe why to use computerized Decision Support Systems (DSS). (07 Marks)
- c. Define Business Intelligence (BI) and with a diagram discuss a High-Level Architecture of BI along with its components. (07 Marks)

OR

- 2 a. Explain a decision support framework by Gory and Scott-Morten. (06 Marks)
- b. Discuss computer support for structured, unstructured and semi-structured decisions. (07 Marks)
- c. Define Decision Support Systems (DSS) and with a diagram discuss a High Level Architecture of DSS along with its components. (07 Marks)

Module-2

- 3 a. Define Decision Making and describe characteristics of Decision Making. (04 Marks)
- b. Define Model and illustrate the four Decision-Making Models and benefits of models. (08 Marks)
- c. Explain Simon's Four Phases of Decision Making. (08 Marks)

OR

- 4 a. With neat diagram, illustrate the components of Decision Support Mathematical Models. (06 Marks)
- b. In the context of Decision Making, discuss multiple goals, sensitivity analysis, what-if analysis, and goal seeking. (06 Marks)
- c. With a diagram, explain decision-making modeling process. (08 Marks)

Module-3

- 5 a. Define data warehouse and discuss characteristics of data warehousing. (06 Marks)
- b. With diagrams, in brief illustrate data warehousing architectures. (06 Marks)
- c. With neat diagram, illustrate data warehouse framework and views. (08 Marks)

OR

- 6 a. Explain the Inmon and the Kimball models for data warehouse development approaches. (08 Marks)
- b. Describe Extraction, Transformation and Load (ETL) Process with diagram. (08 Marks)
- c. Distinguish between Data Mart, Operational Data Stores (ODS) and Enterprise Data Warehouses (EDW). (04 Marks)

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Module-4

- 7 a. Define knowledge and with diagram depict relationships among data, information and knowledge. Also discuss characteristics of knowledge. (08 Marks)
b. Distinguish between explicit knowledge and tacit knowledge. (04 Marks)
c. Explain the two fundamental approaches to knowledge management. (08 Marks)

OR

- 8 a. Explain Knowledge Management System (KMS) cycle with neat diagram. (08 Marks)
b. Describe how AI and intelligent agents support knowledge management. (06 Marks)
c. Write a note on knowledge management systems implementation. (06 Marks)

Module-5

- 9 a. Define Expert Systems (ES) and explain the features of ES. (06 Marks)
b. List applications of Expert Systems (ES). (06 Marks)
c. With a neat diagram, illustrate structure/architecture of an expert system. (08 Marks)

OR

- 10 a. Define knowledge engineering. Discuss five major activities in knowledge engineering. (06 Marks)
b. Write a note on problem areas suitable for expert systems. (06 Marks)
c. Describe the critical success factors of Expert Systems (ES). (08 Marks)

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21CS651

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Introduction to Data Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define an array. Explain declaration and initialization of two dimensional array with syntax and example. (08 Marks)
- b. Define a pointer. Explain how pointer variable is declared and initialized. (06 Marks)
- c. Develop a C program using an array to find sum of n real numbers. (06 Marks)

OR

- 2 a. Differentiate between static and dynamic memory allocations. Discuss four dynamic memory allocation functions with syntax and example. (08 Marks)
- b. Differentiate between structure and union with syntax and example. (06 Marks)
- c. Develop a C program to maintain record of ' n ' students detail using array of structures with four fields (Rno, name, marks, grade). Each field is an appropriate data type. Print the marks of student name is given. (06 Marks)

Module-2

- 3 a. Define Data structures. Explain the classification of data structures with example. (06 Marks)
- b. Define stack. Write a menu driven C program for the following operations on STACK of integers:
 - i) Push an element on to stack.
 - ii) Pop an element from the stack.
 - iii) Display the contents of stack.
 - iv) Exit.(08 Marks)
- c. Convert the following infix expression into postfix expression using stack:
 $A + (B * C - (D/E^F) * G) * H$ (06 Marks)

OR

- 4 a. Define a queue. Write C functions for `qinsert()` and `qdelete()` routines of a queue. (06 Marks)
- b. What is the advantage of circular queue over ordinary queue? Write a C program to simulate the working of circular queue of integers using array. Provide the following operations:
 - i) insert
 - ii) delete
 - iii) Display(08 Marks)
- c. Discuss the following :
 - i) Double ended queue
 - ii) Priority Queue(06 Marks)

Module-3

- 5 a. What is a linked list? Explain the different types of linked list with neat diagram. (07 Marks)
- b. Write C functions of the following operations on singly linked list:
 - i) Insert a node at the front
 - ii) Delete a node from the end(08 Marks)
- c. With suitable example, discuss self referential structures. (05 Marks)

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OR

- 6 a. Write a C function to perform the following operations on circular singly linked list:
 i) Insert a node at the end ii) Delete a node from the front (08 Marks)
 b. Briefly explain the applications of linked list. (07 Marks)
 c. Write a C function for the concatenation of two single linked lists. (05 Marks)

Module-4

- 7 a. What is a binary tree? With suitable example, define :
 i) Root node ii) Ancestors iii) Descendants iv) Leaf node (08 Marks)
 b. Write C recursive routine to traverse the given binary tree using inorder, preorder and post order. (06 Marks)
 c. Given the following traversal, draw a binary tree:
 Post order : 4, 2, 5, 1, 6, 7, 3, 8
 Inorder : 4, 5, 2, 6, 7, 8, 3, 1 (06 Marks)

OR

- 8 a. Define binary search tree. Draw the BST for the following input.
 14, 15, 4, 9, 7, 18, 3, 5, 16, 20, 17 (07 Marks)
 b. Define an expression tree. Draw a binary tree for the following expression
 $((6 + (3 - 2) * 5)^2 + 3)$ (07 Marks)
 c. With suitable examples, explain strictly binary tree and complete binary tree. (06 Marks)

Module-5

- 9 a. Define sorting. Develop a C program to sort a given list of elements in ascending order using the selection sort technique. (10 Marks)
 b. Write a C function to implement the bubble sort technique. Apply this function to sort the given elements:
 77, 33, 44, 11, 88, 22, 65, 55
 Also, mention its time complexity. (10 Marks)

OR

- 10 a. Define searching. Develop a C program to search for a given element in a list of elements using the binary search technique. (08 Marks)
 b. Write a C function to implement the insertion sort technique. Apply this function to sort the given elements:
 77, 33, 44, 11, 88, 22, 65, 55
 Also, mention the time complexity of the algorithm. (06 Marks)
 c. Write a C function to implement the linear search technique. Apply this function to find the key element 60 in the following list of elements:
 10, 20, 30, 40, 50, 60.
 Also, mention the time complexity of the algorithm. (06 Marks)

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