



CBCS SCHEME

21CS741

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2026 Software Architecture and Design Patterns

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain the essential elements of design patterns. (10 Marks)
b. Illustrate the differences between design patterns and frameworks with examples. (10 Marks)

OR

- 2 a. Identify the importance of conceptual classes and their relationships in object oriented design. (10 Marks)
b. Explain a sequence diagram with suitable example, highlighting key components and interactions. (10 Marks)

Module-2

- 3 a. With a neat diagram, explain the structure of the proxy pattern. (10 Marks)
b. Describe the structure of the composite pattern. (10 Marks)

OR

- 4 a. Analyze the motivation and applicability of the decorator pattern. (10 Marks)
b. Define part-whole hierarchies and explain with an example. (10 Marks)

Module-3

- 5 a. Explain how the chain of responsibility patterns decouples senders and receivers. Illustrate with an example. (10 Marks)
b. Discuss the benefits and liabilities of the chain of responsibility pattern. (10 Marks)

OR

- 6 a. Explain how the iterator can support multiple traversals of an aggregate. (10 Marks)
b. Discuss the implementation challenges at the iterator pattern. (10 Marks)

Module-4

- 7 a. Describe the roles of the view and controller in the MVC pattern. (10 Marks)
b. Explain how MVC achieves separation of concerns in software design. (10 Marks)

OR

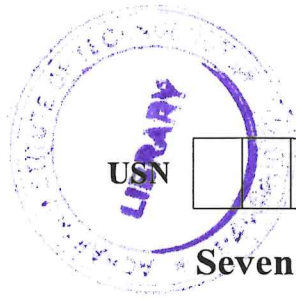
- 8 a. Explain how the bridge pattern is used to handle multiple UI technologies in MVC. (10 Marks)
b. Create a sequence diagram for saving and retrieving a drawing in an MVC-based application. (10 Marks)

Module-5

- 9 a. Explain the challenges of accessing remote objects in distributed systems. (10 Marks)
b. Describe the role of proxies in handling remote method calls in distributed systems. (10 Marks)

OR

- 10 a. Explain the role of HTML in web based distributed systems. (10 Marks)
b. Describe the use of Apache Tomcat for hosting servelets in a distributed system. (10 Marks)



CBCS SCHEME

21CS743

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2026 Deep Learning

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Using relevant diagrams, analyze and describe the components and functions of a deep learning model in detail. (08 Marks)
- b. Explain the reasons for increasing the size of the model and data set in deep learning detailing the impact on performance and accuracy. (06 Marks)
- c. Compare the difference between Supervised and Unsupervised learning algorithm. (06 Marks)

OR

- 2 a. Explain and analyze the principles and process of principle component analysis (PCA) in detail, highlighting its applications and significance. (07 Marks)
- b. Compare the contrast the k-means and k-nearest neighbors algorithms in detail. (05 Marks)
- c. Identify and describe the key components of learning algorithms explaining the role and importance of each component in the learning process. (08 Marks)

Module-2

- 3 a. Describe why the general back propagation algorithm is essential for training deep neural networks with necessary steps. (12 Marks)
- b. Demonstrate how back-propagation is applied to train a Multilayer Preceptron (MLP) with an example. (08 Marks)

OR

- 4 a. Describe parameter norm penalties and explain the concepts of L1 and L2 regularization. (10 Marks)
- b. Explain the early stopping meta algorithm and how it helps to determine the optimal training duration. What are the main steps involved? (10 Marks)

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.

Module-3

- 5 a. Illustrate a scenario where specific challenges arise in neural network optimization. How would you address these issues? (12 Marks)
- b. What is Stochastic Gradient Descent and how does it differ from standard gradient descent? (08 Marks)

OR

- 6 a. Demonstrate how an algorithm such as AdaGrad and RMSprop with an adaptive learning rate adjusts the learning rate during training. (09 Marks)
- b. What factors should be considered when choosing an right optimization for a deep learning model. (06 Marks)
- c. Describe Empirical Risk Minimization (ERM) and explain its role in minimizing average training error. (05 Marks)

Module-4

- 7 a. Demonstrate how the convolution operation is applied in a Convolution Neural Network (CNN). Provide an example with 2-D convolution without kernel-flipping. (10 Marks)
- b. Explain the purpose of pooling functions in convolutional neural networks. How do they modify the output of the layer they are applied to? (10 Marks)

OR

- 8 a. Explain the different variants of the basic convolution function. How do these variants enhance the capabilities of convolutional layers? (10 Marks)
- b. What types of data are commonly used with convolutional networks? (10 Marks)

Module-5

- 9 a. Analyze the role of different hardware and software components in supporting large scale deep learning initiatives. (10 Marks)
- b. Analyze the need for and the significance of speech recognition technology in the field of Natural Language Processing. (10 Marks)

OR

- 10 a. Describe the basic structure and components of recurrent neural networks and their role in sequence modeling. (10 Marks)
- b. Explain the structure and functionality of recursive neural networks with necessary diagram. (10 Marks)

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