**AI22 304**

EVEN 2025-26

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme : AIML**
**Course Title : Advanced Machine Learning**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

a. Define simple linear regression. **[CO1, L-R]**
b. Define loss function. **[CO1, L-R]**
c. Define R- squared ($R^2$). **[CO2, L-R]**
d. Define Bias- variance. **[CO3, L-R]**
e. Differentiate between parameter and hyper parameter.(any 2point) **[CO3, L-A]**
f. Define K-Nearest Neighbors (KNN). **[CO4, L-R]**
g. Define principal component analysis (PCA.) **[CO4, L-R]**
h. Define SVM. **[CO5, L-R]**
i. Define kernel trick **[CO5, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain Error function in linear regression. **[CO1, L-U]**
b. Explain ways to detect and remove data leakage. **[CO1, L-U]**
c. Explain confusion matrix with type I and type II errors. **[CO4, L-U]**
d. Explain univariate Vs multivariate imputation. **[CO5, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Explain Batch gradient descent Vs stochastic gradient descent. **[CO1, L-A]**
b. Explain Variance Inflation Factor (VIF) and its role in detecting multi collinearity. **[CO2, L-U]**
c. Explain types of feature selection methods.(filter, wrapper, Embedded) **[CO2, L-U]**
d. Explain KNN imputation with steps. **[CO5, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. State and explain any three differention rules.(e.g. product rule) **[CO1, L-U]**
b. Explain TSS,RSS and ESS. **[CO2, L-U]**
c. Differentiate between Inference and Prediction. (Any 3 point) **[CO2, L-A]**
d. Explain grid search CV. **[CO3, L-U]**
e. Explain decision boundary in KNN. **[CO4, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Write a Python program using scikit- learn to implement Ridge regression. **[CO3, L-A]**

b. Write a program to implement PCA using sklearn and visualize results. **[CO4, L-A]**

c. Write a python program using scikit learn to implement SVM classifier with RBF kernel. **[CO5, L-A]**

****End****

EVEN 2025-26 **AI22311**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AI & ML**
**Course Title** : **Data Warehousing with Mining Techniques**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

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***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. State the need of data warehousing. **[CO-2, L-R]**
b. State the difference between OLAP & OLTP (any two). **[CO-5, L-R]**
c. State the need of OLAP. **[CO-5, L-R]**
d. List different types of attributes in data mining. **[CO-1, L-R]**
e. List applications of clustering. **[CO-4, L-R]**
f. Define the terminologies : i) Item set ii) Association rule mining. **[CO-4, L-R]**
g. State the use of data marts. **[CO-2, L-R]**
h. List OLAP operations. **[CO-5, L-R]**
i. Draw architecture diagram of data warehouse. **[CO-2, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Describe ETL process in data warehouse. **[CO-2, L-U]**
b. Draw fact constellations schema for library management system. **[CO-5, L-U]**
c. Describe ROLAP server architecture. **[CO-5, L-U]**
d. Describe steps involved in knowledge discovery of database (KDD). **[CO-1, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Describe OLAP guidelines (any eight). **[CO-5, L-U]**
b. Describe data warehouse designing steps. **[CO-5, L-U]**
c. Describe the need of data preprocessing. **[CO-1, L-U]**
d. Describe requirements for cluster analysis. **[CO-4, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Describe the advantages of data cubes in OLAP. **[CO-5, L-R]**
b. Describe HOLAP server architecture. **[CO-5, L-R]**
c. Describe the kind of data that can be mined. **[CO-1, L-R]**
d. Describe DBSCAN algorithm with example. **[CO-4, L-A]**
e. Describe hierarchical clustering method. **[CO-4, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain MOLAP server architecture. **[CO-5, L-U]**

b. Explain major tasks involved in data preprocessing **[CO-1, L-U]**

c. Explain market-basket analysis algorithm with suitable example. **[CO-3, L-A]**

****End****

EVEN 2025-26

**AI22312**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AIML**
**Course Title** : **Advanced Deep Learning**

2:30 Hours/ 60 marks Enrolment No. | | | | | | | | | |

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***Instructions***:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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| | | |
|---|---|---|
| **Q.1** | **Attempt any SIX** | **12 Marks** |
| a. | List the advance activation functions. | **[CO-1, L-R]** |
| b. | Define layer normalization. | **[CO-1, L-R]** |
| c. | List word embeddings types. | **[CO-2, L-R]** |
| d. | Define RNN. | **[CO-2, L-R]** |
| e. | State concept of transfer learning. | **[CO-3, L-R]** |
| f. | Define BERT and GPT. | **[CO-3, L-R]** |
| g. | List applications of VAE. | **[CO-4, L-R]** |
| h. | Compare GANs and VAE. | **[CO-1, L-A]** |
| i. | List recent Trends in Deep learning. | **[CO-6, L-A]** |

| | | |
|---|---|---|
| **Q.2** | **Attempt any THREE** | **12 Marks** |
| a. | Explain Tokenization and Lemmatization. | **[CO-2, L-U]** |
| b. | Differentiate between scaled DOT- product attention and multi head attention. | **[CO-1, L-A]** |
| c. | Explain Advanced architecture of cycle GAN. | **[CO-4, L-U]** |
| d. | Explain sentiment analysis in NLP. | **[CO-5, L-U]** |

| | | |
|---|---|---|
| **Q. 3** | **Attempt any THREE** | **12 Marks** |
| a. | Explain swish, GELU, Maxout functions. | **[CO-1, L-U]** |
| b. | Explain text generation using GANs and VAEs. | **[CO-4, L-U]** |
| c. | Explain opinion mining with example. | **[CO-5, L-U]** |
| d. | Explain T5, RoBERTa, XLNet in Deep learning. | **[CO-6, L-U]** |

| | | |
|---|---|---|
| **Q. 4** | **Attempt any FOUR** | **12 Marks** |
| a. | Explain Dropout variants and weight Normalization. | **[CO-1, L-U]** |
| b. | Explain LSTM and GRU for sequence modeling. | **[CO-2, L-U]** |
| c. | Explain Pre-training and fine-tuning. | **[CO-3, L-U]** |
| d. | Explain ethical considerations in NLP. | **[CO-6, L-U]** |
| e. | Explain application chat bots and voice assistants. | **[CO-6, L-U]** |

| | | |
|---|---|---|
| **Q. 5** | **Attempt any TWO** | **12 Marks** |
| a. | Explain attention mechanism. | **[CO-2, L-U]** |
| b. | Explain applications in Text generation. | **[CO-3, L-A]** |
| c. | Differentiate between Extractive and Abstractive techniques. | **[CO-5, L-U]** |

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EVEN 2025-26

**AI22501**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme : Artificial Intelligence & Machine Learning**
**Course Title : Database Management System**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

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***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. State the role of Database Administrator.(any four) **[CO-1, L-R]**
b. Enlist DML Commands. (any four) **[CO-4, L-R]**
c. Define joins in SQL, and also list the types of joins. **[CO-4, L-R]**
d. State view in SQL. Give one example. **[CO-4, L-R]**
e. Define Triggers in SQL. List its types. **[CO-4, L-R]**
f. Define Transaction. Give one example. **[CO-6, L-R]**
g. State views Serializability. **[CO-6, L-R]**
h. State log based recovery. **[CO-6, L-R]**
i. Explain Deadlock. **[CO-6, L-U]**

**Q.2 Attempt any THREE** **12 Marks**

a. Differentiate between generalization and specialization. (Any 4 points). **[CO-2, L-U]**
b. Design relation schema for student database, also explain super-keys in database. **[CO-3, L-A]**
c. State pitfalls in relation database designs. **[CO-5, L-R]**
d. Explain ACID properties. **[CO-6, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Explain different types of attributes with example. **[CO-2, L-U]**
b. Describe primary key & foreign key in relational table. **[CO-3, L-U]**
c. Explain the function dependencies. **[CO-5, L-U]**
d. Describe Transaction states in details. **[CO-6, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain DBMS system architecture.( 3 level architecture) **[CO-1, L-U]**
b. Explain data definition language (DDL) commands. **[CO-4, L-U]**
c. Explain Aggregate functions.(any 3) **[CO-4, L-U]**
d. Describe check constraint and unique constraint with example. **[CO-4, L-U,A]**
e. Describe Transaction control commands with example. (any 3) **[CO-6, L-U,A]**

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**Q. 5 Attempt any TWO** **12 Marks**

a. Draw and explain EER model for library management system. **[CO-2, L-A]**

b. Explain relational algebra operators with example. **[CO-3, L-U]**

c. Describe the concept of normalization with its types. **[CO-5, L-U]**

****End****

EVEN 2025-26 **AI22206**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AIML**
**Course Title** : **Introduction to Machine Learning**

2:30 Hours/ 60 marks Enrolment No. | | | | | | | | | |

*Instructions*:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

a. Define Machine Learning. **[CO-1, L-R]**
b. State cost function with respect to logistic regression. **[CO-2, L-U]**
c. Define support vector machine (SVM). **[CO-4, L-U]**
d. State any two types of classification algorithms. **[CO-3, L-R]**
e. State the neeed of feature selection in Random forest. **[CO-5, L-U]**
f. State expectation maximization algorithm. **[CO-6, L-U]**
g. State the types of Naive Bayes model. **[CO-4, L-R]**
h. Define Clustering. **[CO-6, L-R]**
i. State any two performance metrics for regression problems. **[CO-1, L-U]**

**Q.2 Attempt any THREE** **12 Marks**

a. Differeniate between supervised and unsupervised learning. (any 4 points) **[CO-1, L-A]**
b. Explain the concept of linear regression in detail. **[CO-2, L-U]**
c. Explain the concept of Density based clustering (DBSCAN). **[CO-6, L-U]**
d. Explain the architecture of neural network with neat labelled diagram. **[CO-3, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Differentiate between linear and logistic regression. **[CO-2, L-A]**
b. Explain regression using random forest. **[CO-5, L-U]**
c. Describe multi-class classification in detail. **[CO-4, L-U]**
d. Explain Mc culloch – Pitts neural model in detail. **[CO-3, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. State & justify fundamentals of artificial neural network. **[CO-3, L-U]**
b. State any three application of machine learning. **[CO-1, L-R]**
c. Explain K- means clustering algorithm. **[CO-6, L-U]**
d. State the concept of stumping in ensembles. **[CO-5, L-U]**
e. Give syntax for following using python.
1) To install matplotlib library

2) To read dataset from csv file
3) To Install skipy library [CO-1, L-A]

**Q. 5 Attempt any TWO** **12 Marks**

a. Write the program to implement ID3 decision tree algorithm. Perform following oprations (assume suitable data)
1) read dataset from csv file.
2) provide corresponding expression of class.
3) demonstrate calculations of ID3 algorithms. **[CO-2, L-A]**

b. Explain K-Nearest Neighbours in details. **[CO-4, L-U]**

c. Differentiate between bagging ane boosting with respect to Random forest. **[CO-5, L-A]**

****End****

EVEN 2025-26 **AI22310**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AI & ML**
**Course Title** : **Deep Learning – I**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
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6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

a. Define Mc-Culloch pitts Neuron. **[CO-1, L-R]**
b. List loss functions of deep learning. **[CO-2, L-R]**
c. Define RMSProp. **[CO-2, L-R]**
d. Describe GoogleNet in modern deep learning. **[CO-3, L-R]**
e. List the different layer of a convolutional neural network. **[CO-3, L-R]**
f. Describe recurrent neural network. **[CO-3, L-R]**
g. Describe regularization in autoencoders. **[CO-4, L-R]**
h. Define linear autoencoder. **[CO-4, L-R]**
i. Define image compression. **[CO-5, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain activation functions in DNN. **[CO-2, L-U]**
b. Explain vanishing and exploding gradients. **[CO-3, L-U]**
c. Differentiate between under complete autoencoder and over complete auto encoder. (any four points) **[CO-4, L-U]**
d. Explain GAN and its models. **[CO-5, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. List and explain three classes of deep learning. **[CO-1, L-U]**
b. Explain bias variance tradeoff regularization methods. **[CO-2, L-U]**
c. Explain modern deep learning architectures. **[CO-3, L-U]**
d. Explain long short term memory. **[CO-3, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain batch normalization and weight decay. **[CO-2, L-U]**
b. Explain stochastic and mini batch GD. **[CO-2, L-U]**
c. Explain backpropagation as convolution with inverted filter in CNN. **[CO-3, L-U]**
d. Is RNN supervised or unsupervised? Justify your answer. **[CO-3, L-U]**
e. Explain three applications of GAN architecture. **[CO-5, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain multilayer perceptron. Differentiate between linearly separable and linearly non-separable classes. **[CO-1, L-U]**

b. Explain basic structure of a convolutional nural network with diagram. **[CO-2, L-U]**

c. Explain denoising, sparse and contractive autoencoders. **[CO-4, L-U]**

****End****

EVEN 2025-26

AI22309

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme : AIML**
**Course Title : Cloud Computing**

2:30 Hours/ 60 marks Enrolment No. | | | | | | | | | |

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*Instructions*:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
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6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. Define virtualization. **[CO-2, L-R]**
b. Explain I/O virtualization. **[CO-2, L-U]**
c. Enlist benefits of virtualization. **[CO-2, L-R]**
d. Enlist different cloud computing services. **[CO-3, L-R]**
e. State the advantages of AWS. **[CO-3, L-R]**
f. Define storage-as-a-service. **[CO-3, L-U]**
g. Define Database-as-a-service. **[CO-3, L-U]**
h. Enlist scientific applications of cloud. **[CO-6, L-R]**
i. State features of multimedia cloud. **[CO-6, L-U]**

**Q.2 Attempt any THREE** **12 Marks**

a. State & explain characteristics of cloud computing. **[CO-1, L-R]**
b. Compare full & para virtualization with compiler support. **[CO-2, L-U]**
c. Explain features of openstack. **[CO-4, L-U]**
d. Explain following terms.
i) Disaster recovery in clouds.
ii) Virtual machine security. **[CO-5, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Explain advantages and disadvantages of cloud computing (Any 4 points each). **[CO-1, L-U]**
b. Explain following cloud computing services. i) Saas ii) Paas. **[CO-3, L-U]**
c. Describe mode of operations of openstack. **[CO-4, L-U]**
d. State & explain cloud security challenges & risks. **[CO-5, L-R]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain VMM. **[CO-2, L-U]**
b. State function of hypervisor II. **[CO-2, L-R]**
c. Explain Iaas with example. **[CO-3, L-U]**
d. State use of anything-as-a-service. **[CO-3, L-R]**
e. Explain Energy aware cloud computing. **[CO-6, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain different cloud deployment models. **[CO-1, L-U]**

b. Explain components of Eucalyptus. **[CO-4, L-U]**

c. Explain AAA model in detail. **[CO-5, L-A]**

****End****

EVEN 2025-26

**AI22209**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : AIML
**Course Title** : Theory of Computation

2:30 Hours/ 60 marks Enrolment No. | | | | | | | | | |

*Instructions*:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

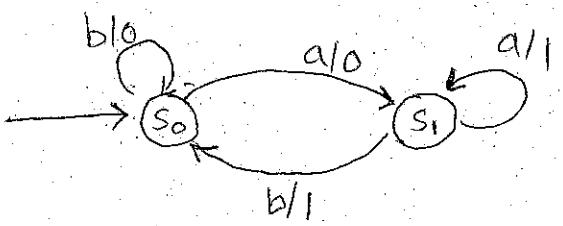
a. Define Deterministic finite Automata. **[CO-1, L-R]**
b. Define Mealy machine with example. **[CO-1, L-R]**
c. State closure properties of Regular set. **[CO-2, L-R]**
d. Give the regular expression for the set of all strings ending in 00. **[CO-2, L-R]**
e. Define CFG with example. **[CO-3, L-R]**
f. Define turning machine. **[CO-3, L-R]**
g. State concept of left factoring? **[CO-4, L-R]**
h. Define S – attributed definition with example. **[CO-4, L-R]**
i. Define copy propagation. **[CO-5, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain the model of the turning machine. **[CO-3, L-U]**
b. Explain logical phases of complier. **[CO-4, L-U]**
c. Explain left recursion and left factoring. **[CO-4, L-U]**
d. Translate the following expression to quadruple, triple and indirect triple (a+b) – (c+d) * (a+b+c) **[CO-5, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Convert the following mealy machine to Moore machine. **[CO-1, L-U]**

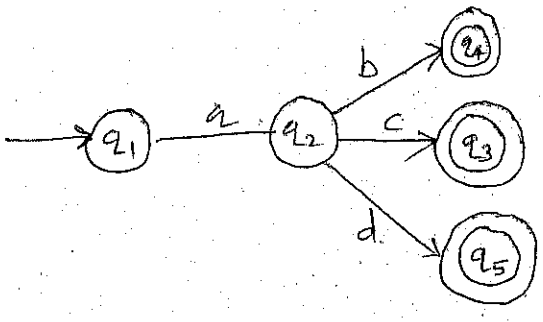



b. Convert the following regular expression to NFA. **[CO-2, L-U]**
$(a+b)^*.aa^+.(aa+b)^+$
c. Differentiate between top down parsing and bottom up parsing. **[CO-4, L-U]**
d. Explain code optimization. **[CO-5, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain operations of regular expression. **[CO-2, L-U]**

b. Convert the following DFA to regular expression. **[CO-2, L-U]**




c. Explain Chomsky normal form. **[CO-3, L-U]**

d. Difference between DFA and NFA. **[CO-1, L-U]**

e. Convert the given regular expression into DFA and minimize $(a/b)^*abb$ **[CO-1, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain minimization of DFA with the help of example or diagram. **[CO-1, L-A]**

b. Explain with the help of example : **[CO-2, L-A]**

**(i)** Regular expression

**(ii)** Regular language

**(iii)** Regular grammer

c. Define Context Free Grammer (CFG). Explain the three different ways to simplify a context free grammer. **[CO-3, L-A]**

****End****

EVEN 2025-26

AI23103

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AIML**
**Course Title** : **Advanced Python Programming**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

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*Instructions*:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. Define Class and Object. **[CO-1, L-R]**
b. Define Class diagram. **[CO-1, L-R]**
c. Define Lambda function. **[CO-2, L-R]**
d. State concept of Broadcasting in Numpy. **[CO-3, L-R]**
e. State reason to use MultiIndex object. **[CO-4, L-R]**
f. State functions of Dash. **[CO-5, L-R]**
g. Define Plotly & state its applications. **[CO-5, L-R]**
h. Write a python statement to create a data frame for the following: **[CO-4, L-R]**

| Name | Age |
|---|---|
| Rajiv | 20 |
| Sameer | 35 |

i. State use of Fillna ( ) and Dropna ( ). **[CO-3, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain Farcy and Bootean indexing with the help of example. **[CO-3, L-U]**
b. Explain Iterator. Write down difference between Yield and Return. **[CO-2, L-U]**
c. Explain Multiple Inheritance. Write a Python program to implement it. **[CO-1, L-U]**
d. Define : a) Encapsulation
b) Aggregation
c) Self **[CO-1, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Define comprehensions. List types of comprehension. Explain list comprehensions. **[CO-2, L-U]**
b. Explain Mathematical operations in Numpy with the help of example. **[CO-3, L-U]**
c. Explain Boxplot with the help of example. **[CO-5, L-U]**
d. Explain Vectorized String operations. **[CO-4, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Write a program to create class Employee with it's ID & Name. Display its contents. **[CO-1, L-U]**

b. Differentiate between Series and Dataframe. **[CO-4, L-U]**

c. Define Histogram with the help of example. **[CO-5, L-U]**

d. Explain 3D plots with the help of example. **[CO-5, L-U]**

e. Explain Constructor with the help of example. **[CO-1, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain pandas concat & merge method with the help of example. **[CO-3, L-A]**

b. Explain pivot table and Agg function with help of syntanx example. **[CO-4, L-A]**

c. Write down advantages of Seaborn over Matplotlib. Write code for KDE and distribution plot. **[CO-5, L-A]**

****End****

EVEN 2025-26

**AI23503**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme : AI & ML**
**Course Title : Engineering Mathematics**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

a. Prove that: $\Delta = E - 1$ **[CO-1, L-R]**

b. Find $\Delta^2 e^x$ take h = 1 **[CO-1, L-U]**

c. Construct the forward difference table for the following data. Find $\Delta^2 f(10)$.

| x | 0 | 5 | 10 | 15 | 20 | 25 |
|---|---|---|---|---|---|---|
| f(x) | 7 | 11 | 14 | 18 | 24 | 32 |

[CO-1, L-U]

d. Write the formula Trapezoidal and Simpson's $\frac{1}{3}$rd rule. **[CO-2, L-R]**

e. The coefficient of correlation between two variables X and Y is 0.48. The covariance is 36. The variance of X is 16. Find the standard deviation of Y. **[CO-3, L-U]**

f. The Regression lines of a sample are x + 6y = 6 & 3x +2y = 10. Find the sample mean $\bar{x}$ & $\bar{y}$. **[CO-3, L-A]**

g. Find the eigen value of matrix A $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ **[CO-4, L-A]**

h. Find the rank of the matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$ **[CO-4, L-A]**

i. Verify Cayley – Hamilton theorem for matrix **[CO-4, L-U]**

$$A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$$

**Q.2 Attempt any THREE** **12 Marks**

a. Apply Lagrange's formula to find f (5). Given that f (1) = 2, f (2) =4, f (3) =8, f (4) =16, f(7)= 28. **[CO-1, L-A]**

b. Find $y'(0)$ & $y''(0)$ from the following data. **[CO-2, L-U]**

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 3 | 15 | 43 | 93 |

c. Calculate the correlation coefficient between x & y using the following data **[CO-3, L-A]**

| x | 2 | 4 | 5 | 6 | 8 | 11 |
|---|---|---|---|---|---|---|
| y | 18 | 12 | 10 | 8 | 7 | 5 |

d. Fit a straight line to the following data. **[CO-3, L-U]**

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 1.8 | 3.3 | 4.5 | 6.3 |

**Q. 3 Attempt any THREE** **12 Marks**

a. Using Newton's forward difference interpolation formula estimate f (8) **[CO-3, L-U]**

| x | 5 | 10 | 15 | 20 |
|---|---|---|---|---|
| f (x) | 50 | 70 | 100 | 145 |

b. Given **[CO-1, L-A]**

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| y | 1 | 3 | 7 | 13 | 21 | 31 |

Find $y'(5)$ and $y''(5)$

c. Find the eigen values & eigen vector of the matrix **[CO-4, L-U]**

$$A = \begin{bmatrix} 7 & 3 \\ 3 & -1 \end{bmatrix}$$

**d.** A toy manufacturer produces bicycles and tricycles, each of which must be processed through two machine A & B. Machine A has maximum of 120 hours available & machine B has a maximum of 180 hours available. Manufacturing a bicycle requires 4 hours on machine A & 10 hours on machine B. Manufacturing a tricycle required 6 hours on machine A & 3 hours on machine B. If profift are Rs. 65 for a bicycle & Rs. 45 for a tricycle. Formulate L. P. P. to have maximum profit. **[CO-5, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Find the missing term in the following table **[CO-1, L-A]**

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 3 | 9 | - | 81 |

b. Evaluate $\int_2^7 \frac{1}{x}\,dx$, by using Trapezoidal rule& Dividing the interval [2, 7] into 5 equal sub intervals. **[CO-2, L-A]**

c. Ten participants in a contest are ranked by two judges as follows. **[CO-3, L-A]**

| x | 1 | 3 | 7 | 5 | 4 | 6 | 2 | 10 | 9 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| y | 3 | 1 | 4 | 5 | 6 | 9 | 7 | 8 | 10 | 2 |

Calculate the rank correlation coefficient.

d. Find the eigen values **[CO-4, L-A]**

$$A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$$

e. Apply Cayley – Hamilton theorem to $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ & deduce that $A^8 = 625\ I$ **[CO-4, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Evaluate $\int_0^4 e^x\,dx$, using Simpson's $\frac{1}{3}^{rd}$ rule by dividing the interval [0, 4] into four equal sub intervals. **[CO-2, L-A]**

b. Find (i) The line of regression (ii) Coefficient of correlation for the following data. **[CO-3, L-A]**

| x | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 |
|---|---|---|---|---|---|---|---|---|
| y | 67 | 68 | 65 | 66 | 72 | 72 | 69 | 71 |

c. Solve the following L. P. P. using graphical method. **[CO-5, L-A]**

Maximize $Z = 12x_1 + 16\,x_2$

Subject to $10x_1 + 20x_2 \leq 120$

$8x_1 + 8x_2 \leq 80$

$x_1$ and $x_2 \geq 0$

****End****

EVEN 2025-26 **AI23115**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme : AIML**
**Course Title : Deep learning**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

*Instructions*:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

a. List two applications of Deep Learning. **[CO-1, L-R]**
b. Define CNN and RNN **[CO-5, L-R]**
c. Define Tensor PyTorch. **[CO-2, L-R]**
d. Define gradient Descent. **[CO-4, L-R]**
e. Define Adam optimizer. **[CO-5, L-R]**
f. List two activation functions. **[CO-3, L-R]**
g. Define Machine Learning. **[CO-1, L-R]**
h. List two applications of RNN. **[CO-5, L-R]**
i. List key differences between Machine Learning and Deep Learning. **[CO-1, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain Data loader and dataset in PyTorch with example. **[CO-2, L-U]**
b. Explain architecture of a simple Deep Neural Network. **[CO-1, L-A]**
c. Explain architecture of CNN with layers. **[CO-5, L-U]**
d. Explain concept of Back propagation in Neural Network. **[CO-4, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Explain Adam and RMSProp optimizer in Gradient Descent. **[CO-4, L-A]**
b. Differentiate between AI, ML and DL. **[CO-1, L-U]**
c. Explain working of Recurrent Neural Network (RNN). **[CO-5, L-U]**
d. Explain architecture of perceptron Model. **[CO-3, L-A]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain an activation function and how does it work in neural networks. **[CO-3, L-U]**
b. Explain types of Deep learning models. **[CO-1, L-U]**
c. Explain vanishing and exploding Gradient problem. **[CO-5, L-U]**
d. Explain structure of Tensor flow framework **[CO-2, L-A]**
e. Explain feed forward Neural Networks. **[CO-3, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain step by step implementation of Gradient Descent using PyTorch. **[CO-4, L-A]**

b. State and explain different layers in Neural Network. **[CO-3, L-U]**

c. Explain steps to build a Neural Network in PyTorch. **[CO-2, L-A]**

****End****

EVEN 2025-26 **AI23105**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme : AIML**
**Course Title : Artificial Intelligence**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

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***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. Draw the diagram of Goal-based agent. **[CO-2, L-U]**
b. Define heuristic function. **[CO-3, L-R]**
c. State characteristics of Intelligent Agents. ( Any four ) **[CO-2, L-R]**
d. State properties of knowledge representation system. ( Any four) **[CO-4, L-R]**
e. A jar contains 4 red marbles, 3 blue marbles and 2 yellow marbles. Calculate probability of red marble is selected and then blue one " without and with" replacement **[CO-5, L-A]**
f. List components of expert system. **[CO-6, L-R]**
g. Explain prolog in short **[CO-4, L-R]**
h. Define uncertainty. **[CO-5, L-R]**
i. List type of planning with suitable example ( Any two ) **[CO-6, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain applications of AI **[CO-1, L-R]**
b. Differentiate between informed search and uninformed search techniques. ( Any four points ) **[CO-3, L-U]**
c. Explain backward chaining with suitable example. **[CO-4, L-U]**
d. Explain general model of learning agent with suitable example. **[CO-6, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Describe ethics in AI. **[CO-1, L-R]**
b. Explain model-based agent with neat diagram. **[CO-2, L-U]**
c. Explain A * search algorithm with suitable example. **[CO-3, L-U]**
d. Draw and explain Bayesian Belief Network with suitable example and probability tables. **[CO-5, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Describe utility-based agent with neat diagram. **[CO-2, L-R]**

b. Explain Genetic algorithm with suitable example. **[CO-3, L-U]**

c. Explain following with examples.
   i) Syntax
   ii) Semantics **[CO-4, L-U]**

d. Formulate state space search problem for vaccum world cleaner. **[CO-3, L-A]**

e. Write a prolog program for family information system **[CO-4, L-A]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain alpha-beta pruning algorithm with suitable example. **[CO-3, L-U]**

b. Consider the following sentences
   i) Vertebrates drink water.
   ii) Man is mortal.
   iii) Man is vertebrates
   iv) Marcus is man using Resolution.
   Prove Marcus is man using resolution. **[CO-4, L-A]**

c. Describe following.
   i) Reinforcement Learning
   ii) Ensemble Learning **[CO-6, L-R]**

****End****

EVEN 2025-26 **AI23502**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AIML**
**Course Title** : **Mathematics Foundation for AIML**

2:30 Hours/ 60 marks Enrolment No. | | | | | | | | | |

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***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. Evaluate : $\int \frac{x^2-3x+4}{x} dx$ **[CO-1, L-R]**

b. Evaluate : $\int_0^1 \sqrt{1-x^2}\, dx$ **[CO-2, L-A]**

c. Evaluate : $\int_2^4 \frac{dx}{2x+3}$ **[CO-2, L-A]**

d. For frequency distribution lower quartile is 35 and median is 40. If the distribution is symmetric in Skb, find upper quartile. **[CO-3, L-U]**

e. The heights (in cm) of 10 students are given below : 148,171,158,151,154,159,152,163,171,145 find Q2. **[CO-3, L-A]**

f. Find $\vec{a} \times \vec{b}$ if $\vec{a} = 3\vec{\imath} - \vec{\jmath} + \vec{k}$ and $\vec{b} = \vec{\imath} + \vec{\jmath} + \vec{k}$ **[CO-4, L-R]**

g. Show that $\vec{a} = \frac{2}{7}\vec{\imath} + \frac{3}{7}\vec{\jmath} + \frac{6}{7}\vec{k}$ is a unit vector. **[CO-4, L-A]**

h. If a random variable has a Poisson distribution such that P(2) = P(3) find mean. **[CO-5, L-U]**

i. An unbiased coin is tossed 5 times find probability of getting 4 tails. **[CO-5, L-U]**

**Q.2 Attempt any THREE** **12 Marks**

a. Evaluate : $\int \frac{1}{4+5\sin 2x} dx$ **[CO-2, L-A]**

b. Evaluate : $I = \int_0^{\pi/2} \frac{1}{1+tanx} dx$ **[CO-2, L-A]**

c. Calculate 3rd decile and 70th percentile for following data : 841,289,325,225,784,729,625,400,324,169 **[CO-3, L-U]**

d. Find vector of magnitude 7 units and perpendicular to both $2\vec{\imath} + \vec{\jmath} - 3\vec{k}$ *and* $\vec{\imath} - 2\vec{\jmath} + \vec{k}$ **[CO-4, L-A]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Evaluate : $\int \frac{dx}{3-2sin^2x}$ **[CO-1, L-U]**

b. For the following frequency distribution value of Q2 is 22. Find the missing term. **[CO-3, L-A]**

| Class | 0.5-9.5 | 10.5-19.5 | 20.5-29.5 | 30.5-39.5 | 40.5-49.5 |
|---|---|---|---|---|---|
| fi | 5 | 8 | --- | 4 | 3 |

c. Find cosine angle between $\vec{\imath} - 2\vec{\jmath} + \vec{k}$ *and* $2\vec{\imath} - \vec{\jmath} + 2\vec{k}$ **[CO-4, L-A]**

d. If 20% of bolts produced by a machine are defective, determine the probability that out of 4 bolts drawn at the most bolts are defective. **[CO-5, L-A]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Evaluate : $\int \frac{x+1}{x(x^2-4)} dx$ **[CO-1, L-U]**

b. Find area of the circle $x^2 + y^2 = 36$ by using integration. **[CO-2, L-A]**

c. Evaluate : $\int_{-1}^{1} \frac{x^2}{1+x^2} dx$ **[CO-2, L-U]**

d. Find projection of $\vec{b}$ *on* $\vec{a}$ where $\vec{a} = 2\vec{\imath} - \vec{\jmath} - \vec{k}$ *and* $\vec{b} = \vec{\imath} + \vec{\jmath} - \vec{k}$ **[CO-4, L-U]**

e. If the probability of bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction. **[CO-5, L-A]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Find area bounded by the parabolas $y^2 = 9x$ *and* $x^2 = 9y$ **[CO-2, L-A]**

b. Calculate $D_4$ and $P_{21}$ from the following data : **[CO-3, L-A]**

| C.I. | 0-5 | 05-10 | 10-15 | 15-20 | 20-25 |
|---|---|---|---|---|---|
| fi | 7 | 18 | 25 | 30 | 20 |

c. In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming distribution is to be normal. Find (a) How many students score between 12 and 15? (b) How many student score above 18?
Give A (0.8) = 0.2881
A (0.4) = 0.1554
A (1.6) = 0.4452 **[CO-5, L-A]**

****End****

EVEN 2025-26 **AI23101**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AIML**
**Course Title** : **Basic of python programing**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

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***Instructions***:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. Enlist features of python **[CO-1, L-R]**
b. Define variable. Give one example. **[CO-1, L-R]**
c. Write syntax of else if statement. **[CO-2, L-R]**
d. State membership operator **[CO-2, L-R]**
e. State package in python. **[CO-3, L-R]**
f. Enlist types of databases used with python. **[CO-4, L-R]**
g. State Raise keyword. **[CO-5, L-R]**
h. Enlist file & directory related standard functions. **[CO-5, L-R]**
i. Enlist data types in NumPy. **[CO-6, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Differentiate between local & Global variables. **[CO-3, L-R]**
b. Write syntax for MySQL database connectivity with python & explain it. **[CO-4, L-U]**
c. Explain different file opening modes. **[CO-5, L-U]**
d. Explain different data types of data strictures in Pandas. **[CO-6, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Differentiate between list & tuple. **[CO-1, L-U]**
b. Explain for loop with syntax & example. **[CO-2, L-U]**
c. Explain any four turtle methods. **[CO-4, L-R]**
d. Describe user defined exception. **[CO-5, L-R]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain Input & output command in python with suitable example. **[CO-1, L-U]**
b. Explain break & continue statement with example. **[CO-2, L-U]**
c. Explain Built in Math functions ( Any two ). **[CO-3, L-U]**
d. Explain following database operations :
i) Insert ii) update iii) Delete **[CO-4, L-U]**
e. Explain Indexing with example. **[CO-6, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Write a simple python program using arithmetic, Relational & Bitwise operators. **[CO-2, L-A]**

b. Explain Function & Modules in detail with examples. **[CO-3, L-U]**

c. Write a program in python to use try except statement. **[CO-5, L-A]**

****End****

EVEN 2025-26

AI23106

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **AI & ML**
**Course Title** : **Machine Learning I**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

*Instructions*:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

a. Define machine learning. **[CO-1, L-R]**
b. List the performance measures of model (any four). **[CO-1, L-R]**
c. Define norms. **[CO-2, L-R]**
d. Define MAE. **[CO-3, L-R]**
e. Define MSE. **[CO-3, L-R]**
f. State hebbian learning rule. **[CO-4, L-R]**
g. State the significance of EM algorithm. **[CO-4, L-R]**
h. Define Biological Neuron. **[CO-5, L-R]**
i. Enlist limitations of perceptron. **[CO-5, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain supervised learning with examples. **[CO-1, L-U]**
b. Explain SVM with example. **[CO-3, L-U]**
c. Explain delta learning rule with example. **[CO-5, L-U]**
d. Explain feature selection and feature extraction. **[CO-6, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Explain confusion matrix with neat example. **[CO-1, L-U]**
b. Explain least squares method with example. **[CO-3, L-U]**
c. Write a simple program to implement EM algorithm. **[CO-4, L-A]**
d. Explain error back propagation algorithm. **[CO-5, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain three applications of machine learning. **[CO-1, L-U]**
b. Explain system of linear equation with example. **[CO-2, L-U]**
c. Explain regularized regression. **[CO-3, L-U]**
d. Explain evaluation of neural network. **[CO-5, L-U]**
e. Explain perception model with bias. **[CO-5, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Calculate the inner product (dot product) of the following vectors
X = [ 1, 3] & Y = [ 4, 2]
A = [-1,2,5] & B = [ 3, 0, 4]
P = [ 3, 6, -2] & Q = [ 2, 5, 1] **[CO-2, L-A]**

b. Write a simple program to implement logistic regression. **[CO-5, L-A]**

c. Write a simple program to implement principal component analysis. **[CO-6, L-A]**

****End****

EVEN 2025-26 **AI23110**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : **Artificial Intelligence & Machine Learning**
**Course Title** : **Computer Architecture and Operating System**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

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***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. State instruction cycle. **[CO4, L-R]**
b. List basic components of processor. **[CO4, L-R]**
c. State the function of ALU unit. **[CO3, L-R]**
d. Perform floating point addition on $(1.5\times10^2) + (2.25\times10^1)$ **[CO3, L-A]**
e. List different file allocation methods. **[CO6, L-U]**
f. Describe file system structure. **[CO6, L-R]**
g. State directory structure of file system. **[CO6, L-R]**
h. State the file access methods. **[CO6, L-R]**
i. Define virtual memory. **[CO6, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain architecture of computers. **[CO1, L-U]**
b. Explain programmed and interrupt – driven I/O. **[CO2, L-U]**
c. Explain how numbers are represented in floating point format. **[CO3, L-U]**
d. Define system calls and describe different types of system calls of OS. **[CO5, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Describe bus interconnection structure in computers. **[CO1, L-U]**
b. Explain direct memory access. (DMA) **[CO2, L-U]**
c. Explain register organization. **[CO4, L-U]**
d. Describe inter process communication in detail. **[CO5, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain machine instruction. **[CO1, L-U]**
b. List external devices of a computer. **[CO2, L-R]**
c. Define mantissa and exponent. **[CO3, L-R]**
d. Explain structure of page table. **[CO6, L-U]**
e. Compare paging and segmentation. **[CO6, L-U]**

Q. 5 **Attempt any TWO** **12 Marks**

a. Describe different types of operations in computer. **[CO1, L-U]**

b. Explain services of operating system in detail. **[CO5, L-U]**

c. State the function of page replacement algorithm and explain any one page replacement algorithm with example. **[CO6, L-U]**

****End****

EVEN 2025-26

AI23102

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme : AIML**
**Course Title : Computer Fundamentals.**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

*Instructions*:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

**Q.1 Attempt any SIX** **12 Marks**

a. Define Computer. **[CO-1, L-R]**
b. Enlist different types of printers. **[CO-1, L-R]**
c. State the use of BIOS. **[CO-2, L-U]**
d. State the function of motherboard. **[CO-2, L-U]**
e. Define software. **[CO-3, L-R]**
f. State the functionality of Task bar. **[CO-3, L-R]**
g. Enlist search engines available in market. **[CO-4, L-R]**
h. Define ISP. **[CO-4, L-R]**
i. Define Email. **[CO-5, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain characteristics of computer. **[CO-1, L-U]**
b. Explain applications of Internet. **[CO-4, L-A]**
c. Write the steps to create an email account. **[CO-5, L-A]**
d. Enlist & explain diagnostic software for troubleshooting Pc's. **[CO-6, L-U]**

**Q. 3 Attempt any THREE** **12 Marks**

a. Explain different types of processors. **[CO-2, L-U]**
b. Write the steps for Adding & removing icons. **[CO-3, L-R]**
c. Write the procedure to collaborate documents using email. **[CO-5, L-A]**
d. Explain diagnostic tools for PC maintenance. **[CO-6, L-U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Draw & Describe block diagram of computer. **[CO-1, L-U]**
b. Explain the importance of SMPS. **[CO-2, L-U]**
c. Differentiate between LAN & WAN. **[CO-4, L-U]**
d. Write the steps to send an email. **[CO-5, L-R]**
e. State the importance of preventive maintenance. **[CO-6, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain following terms
   i) System software
   ii) Application software
   iii) Uitility software **[CO-3, L-U]**

b. Explain following terms & give one example of each.
   i) IP Address
   ii) Domain
   iii) URL **[CO-4, L-A]**

c. Explain preventive maintenance procedures of PC. **[CO-6, L-U]**

****End****

EVEN 2025-26 **AI23107**

# GOVERNMENT POLYTECHNIC MUMBAI
## TERM END EXAMINATION

**Programme** : AIML
**Course Title** : Database Management System – I

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

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***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

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**Q.1 Attempt any SIX** **12 Marks**

a. List DCL commands. **[CO-4, L-R]**
b. Define normalization and list its types. **[CO-5, L-R]**
c. List any two relational algebra operators with its use. **[CO-3, L-R]**
d. Define data abstraction. **[CO-1, L-R]**
e. Define following terms : (i) Entity (ii) Relation. **[CO-2, L-R]**
f. Enlist four aggregate functions. **[CO-4, L-R]**
g. State any two advantages of DBMS over file processing system. **[CO-1, L-R]**
h. List any four string functions. **[CO-4, L-R]**
i. Define database with its characteristics. **[CO-1, L-R]**

**Q.2 Attempt any THREE** **12 Marks**

a. Explain time stamp based protocol of concurrency control. **[CO-6, L-U]**
b. Explain functional dependencies with example. **[CO-5, L-U]**
c. Explain strong and weak entry set with example. **[CO-2, L-U]**
d. Write relational algebra queries for following schema : **[CO-3, L-A]**
emp (fname, mname, lname, salary, dept)
(i) Find the fname and lname of all employees.
(ii) Find the fname and lname of employees that earn greater than 50000.

**Q. 3 Attempt any THREE** **12 Marks**

a. Draw an ER diagram for library management system. (use books, publisher and member entities) **[CO-3, L-A]**
b. Explain state of transaction with help of diagram. **[CO-6, L-U]**
c. Explain multivalued and derived attributes with example. **[CO-2, L-U]**
d. Define relational model. Explain its components with example. **[CO-3, L-R/U]**

**Q. 4 Attempt any FOUR** **12 Marks**

a. Explain check constraints with example. **[CO-4, L-U]**
b. Explain lock-based concurrency control protocol. **[CO-6, L-U]**
c. Explain generalization with example. **[CO-2, L-U]**
d. Draw and explain symbols used in ER model. **[CO-2, L-U]**
e. Explain ACID properties of transaction. **[CO-6, L-U]**

**Q. 5 Attempt any TWO** **12 Marks**

a. Explain conflict and view serializability. **[CO-6, L-U]**

b. Normalize database upto 3NF employee (emp_id, emp_name, phone, skill, salary, dept_no, dept_name, job_no, job_title) **[CO-5, L-A]**

c. Write SQL query for following table : **[CO-4, L-A]**

(i) Display employees name and number in an increasing order of salary.

(ii) Display employee name and employee number department wise.

(iii) Display total salary of all employees.

(iv) Display department wise number of employees.

(v) Display employee name having experience more than 3 years.

(vi) Display employee name who are working in department no.1002.

****END****