Time: 3 Hours   **Max Marks: 80**

Instructions:
- Figures to the right indicate max marks.
- Draw appropriate diagram whenever applicable.
- Assume suitable data wherever applicable. State your assumptions clearly.
- **Question number 1 is compulsory.**
- Attempt **any Three** questions from remaining questions.

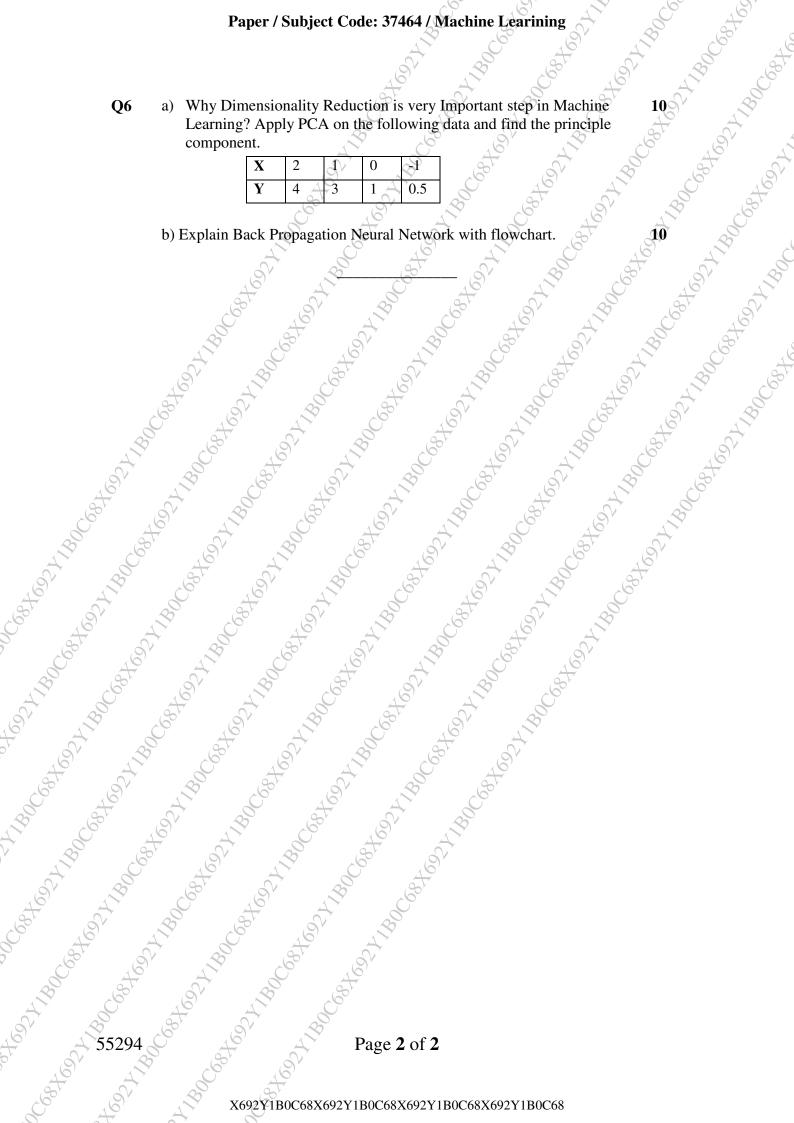|		
Q1	**Attempt Any Four from the following. (5 marks each)**	**20**
	a) Differentiate different Machine Learning approaches. What is Cross Validation? Discuss bias variance trade-off with suitable diagram.	
	b) Explain SVD and its applications.	
	c) Discuss Support Vector Machines.	
	d) Explain Eigen values and vectors.	
	e) Implement XOR function using McCulloch Pitts Model	

Q2 a) In the classification model, the values for the observations are as follows. True Negatives(TN) =300, True Positive(TP)=500, False Positive (FP) = 50, False Negatives (FN)=150.   **10**
Evaluate the performance of the model by finding values of Accuracy, Precision, Recall and F1-Score.

                                                                 10

b) What is the trace of a Matrix. What are its properties?.

Q3 a) Diagonalize the Matrix   **10**

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

b) Find Singular Value Decomposition of given matrix and indicate insights about linear transformations conveyed by this method.   **10**

$$A = \begin{bmatrix} 3 & -5 \\ 4 & 0 \end{bmatrix}$$

Q4 a) Discuss different activation functions used in Neural Networks. (Formula, Graph and Range).   **10**

b) Implement the **ANDNOT** logic functions using McCulloch Pitts Model.   **10**

Q5 a) Implement OR function (logic gate) using single layer perceptron. Assume initial values of weights and learning rate as follows w1=0.6, w2=1.1 learning rate = 0.5, Threshold =1   **10**

                                                                   10

b) Explain Multilayer perceptron with a neat diagram and its working with flowchart or algorithm.

Q6 a) Why Dimensionality Reduction is very Important step in Machine Learning? Apply PCA on the following data and find the principle component.   **10**

X	2	1	0	-1
Y	4	3	1	0.5

b) Explain Back Propagation Neural Network with flowchart.   **10**

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Time: 3 hours   **Max. Marks: 80**

N.B. (1) Question one is Compulsory.
    (2) Attempt any 3 questions out of the remaining.
    (3) Assume suitable data if required.

Q.1 Answer any 4
    (a) Define following terms.   05

      i.   Project
     ii.   Critical path
   iii.   Earned value
   iv.   Process
    v.   Scope

    (b) Compare Agile and traditional software development models   05
    (c) Explain cohesion and coupling.   05
    (d) What is the golden rule for User interface Design   05
    (e) Explain W5HH Principle.   05

Q.2 a) What is the importance of requirement analysis? Expain different Requirement
    engineering tasks.   10
    b) Identify any two Risks in online examination System. Perform risk assessment
    and prepare RMMM Plan for any one risk.   10

Q. 3 a) Prepare SRS for Railway Reservation System.   10
    b) Explain following testing strategies   10
      i.   Unit Testing
     ii.   Integration Testing
   iii.   Validation Testing
   iv.   System Testing

Q.4 a) Draw CFG and calculate cyclomatic complexity for the given PDL
    if(c1 or c2)
        do
           s1;
           s2;
      while (c3)
    else
      while(c4)   s3;
   s4;   10

    b) Explain Software Design concepts.   10

Q. 5 a) Explain with diagram CMM model   10

    b) Draw AON diagram and find the critical path. Find the total float time for each path and list down the critical and non-critical activities. Find the total duration of the project?

10

Activity	Predecessor activity	Duration(days)
A	None	2
B	A	4
C	A	3
D	B	2
E	C	3
F	D	6
G	D	5
H	F,G,E	4

Q.6 Write Short notes on any 4.   20
   i.   FTR
  ii.   PMBOK Knowledge Areas
 iii.   Scrum Model
 iv.   SCM Process
  v.   Software Reengineering

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(3 Hours)

(Total Marks: 80)

N.B.: **1. Question No. 1 is compulsory.**

2. Answer any three out of the remaining questions.

3. Assume suitable data if necessary.

4. Figures to the right indicate full marks.

Q1. **Attempt any FOUR** **[20]**

[A] List and explain different key roles for successful data analytics?

[B] What is Stepwise regression? Explain its types.

[C] Explain Term Frequency-Inverse Document Frequency (TF-IDF) with a suitable example.

[D] Difference between Matplotlib and Seaborn library.

[E] Explain components of time series?

Q2. **Attempt the following** **[20]**

[A] Explain different phases in data analytics lifecycle.

[B] Explain ARIMA model in detail. Also state its Pros and Cons.

Q3. **Attempt the following** **[20]**

[A] Explain in detail seven practice areas of text analytics.

[B] Explain different types of data visualisation in Python programming language.

Q4. **Attempt the following** **[20]**

[A] The number of bacterial cells (y) per unit volume in a culture at different hours (x) is given below:

x	0	1	2	3	4	5	6	7	8	9
y	43	46	82	98	123	167	199	213	245	272

Fit lines of regression of y on x and x on y. Also, estimate the number of bacterial cells after 15 hours.

[B] How Exploratory Data Analysis (EDA) is performed in R?

Q5. **Attempt the following** [20]

[A] Enlist and explain the steps of text analysis.

[B] What is Logistic Regression? What are the similarities and differences between linear regression and logistic regression?

Q6. **Write short notes on:** [20]

[A] Box-Jenkins Methodology

[B] Generalized Linear Model

[C] Pandas library

[D] Data import and export in R

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Time: 3 Hrs   **Marks: 80.**

Note:

1. **Question 1 is compulsory.**

2. **Attempt any 3 questions out of the remaining questions.**

Q1. Attempt **any Four.**

a. Define the security Mechanisms and attacks for OSI security architecture.   05
b. List various types of security that are applied on database.   05

c. Define wed security. Explain the role of cookies.   05
d. Explain the different types of firewalls and layer in which   it operate.   05

e. Explain the different modes of block ciphers.   05

f. Differentiate between Digital signature and digital certificate.   05

Q2.

a. Explain various authentication protocols detail.   10
b. List and explain in detail security features of operating system.   10

Q3.

a. Explain the role of SSH. What is the difference between HTTP and HTTPS?   10
b. List different poly-alphabetic substitution ciphers. Use Hill cipher to encrypt
    the text "short". The key to be used is "hill".   10

Q4.

a. Define digital signature.
    P =7 and Q=17 are two prime numbers. If E=5 as public key,
    find the cipher text for 5. Also decrypt the cipher text back to get plain text.   10
b. Explain MD-5 hash function. Compare with SHA 256.   10

Q5.

a. Explain Penetration testing in detail.   10
b. Explain Needham Schroeder Authentication protocol.   10

Q6. Attempt **any Four.**

a. List and explain security requirements of a website   10

b. Explain DES algorithms in detail.   10

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(3 Hours) [Total Marks: 80]

N.B.: (1) Question No. **1** is **compulsory.**
     (2) Solve any **three** questions out of remaining **five.**
     (3) Figures to **right** indicate **full** marks.
     (4) Assume suitable **data** where **necessary.**

1.

(a)	Define hackers, crackers and Phreakers.		**[5]**
(b)	Discuss in detail the challenges in handling digital evidences.		**[5]**
(c)	What volatile data can be obtained from the investigation of routers.		**[5]**
(d)	Describe the staircase digital investigation process model.		**[5]**

2	(a)	Explain the role of the following tools in digital forensics: i) netstat ii) psloggedon iii) tcptrace iv) netcat v) cryptcat	**[10]**
	(b)	Explain process of live data collection from Windows system in detail.	**[10]**
3	(a)	What is an incident response (IR)? Describe phases of IR process in detail.	**[10]**
	(b)	Describe the various types of network monitoring techniques for data and evidence collection.	**[10]**
4	(a)	What is Mobile Forensics? What are different Mobile Forensic tools? Explain	**[10]**
	(b)	What is the significance of command-line utility dd in unix? Enumerate the steps for Simple Forensics imaging with dd,	**[10]**
5	(a)	What is network forensics? What is the standard procedure used for network forensics.	**[10]**
	(b)	Explain guidelines for incident report writing. Give one report-writing example.	**[10]**

6   **Write short notes on (any 4)**

(a)	Incident response methodology.	**[5]**
(b)	Preventive measures for cybercrime.	**[5]**
(c)	Digital Forensic Methodology.	**[5]**
(d)	Role of Windows registry in collecting forensic evidence.	**[5]**
(e)	E-mail forensic investigation methods.	**[5]**

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