

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Sixth Semester B.E. Degree Examinations, September/October 2024

MACHINE LEARNING WITH PYTHON

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.

2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
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Module-1

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|----|----|--|-----------|-------------|
| 1. | a. | List any four applications of classification. | 04 | (2:1:1.4.5) |
| | b. | With the help of block diagram explain the general steps involved in Pattern classification task. | 08 | (2:1:1.4.5) |
| | c. | Draw the histogram of four class for the following salary (in Thousands) data of a small company in thousands. | 08 | (3:1:1.4.5) |

24	25	25	27	27	29	30	35	35	35
35	36	38	38	39	40	40	40	45	45
45	45	47	52	52	58	59	61	61	67
68	68	70							

(OR)

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|----|----|---|-----------|-------------|
| 2. | a. | Discuss the role of machine learning in data mining and artificial intelligence. | 04 | (2:1:1.4.5) |
| | b. | Discuss the pilot project requirements to separate the salmon from the sea bass fish using optical sensing. | 08 | (2:1:1.4.5) |
| | c. | Draw the two dimension feature space diagram for the following data also an optimal decision boundary. | 08 | (3:1:1.4.5) |

Male	Height	73	68	74	71	69	67	68	68	67	63
	Weight	241	162	212	220	206	152	183	167	175	156
Female	Height	58	65	63	64	61	65	62	65	61	63
	Weight	102	141	131	128	129	156	114	165	111	104

Module-2

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|----|----|---|-----------|-------------|
| 3. | a. | Define machine learning with example. | 04 | (2:2:1.4.5) |
| | b. | Discuss the learning representation of the target function of checkers learning system. | 08 | (2:2:1.4.5) |
| | c. | Assuming $h(x) = c(x)$ for all X in D for the following table. Find distinct observations in X , distinct hypothesis H . Also determine semantic distinct hypothesis. | 08 | (3:2:1.4.5) |

ATTRIBUTES	VALUES
Sky	Sunny, Cloudy, Rainy
Air Temp	Warm, Cold
Humidity	Normal, High
Wind	Strong, Weak
Water	Warm, Cool
Forecast	Same, Change

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

(OR)

4. a. Define concept learning with an example. **04** (2:2:1.4.5)
b. Write the steps in Find's' algorithm, also mention key properties of Find's 'algorithm. **08** (2:2:1.4.5)
c. Implement Find S algorithm for given table. **08** (3:2:1.4.5)

EXAMPLE	SKY	AIRTEMP	HUMIDITY	WIND	WATER	FORECAST	ENJOYSPORT
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

Module-3

5. a. List the types of machine learning. **04** (2:3:1.4.5)
b. With the help of neat diagram, describe the supervised learning and unsupervised learning. **08** (2:3:1.4.5)
c. Differentiate supervised, unsupervised and reinforcement learning. **08** (3:3:1.4.5)

(OR)

6. a. Sketch the simple machine learning process diagram. **04** (2:3:1.4.5)
b. Discuss the linear regression with an example. **08** (2:3:1.4.5)
c. With the help of diagram describe process of reinforcement learning. **08** (3:3:1.4.5)

Module-4

7. a. Define Bayes' theorem and mention the each parameters. **04** (2:4:1.4.5)
b. On the basis of Bayes' theorem, discuss about discriminant function. **08** (2:4:1.4.5)
c. A certain disease affects 1 % of a population. A diagnostic test for this disease has a 90 % probability of correctly identifying someone with the disease (sensitivity) and an 80 % probability of correctly identifying someone without the disease (specificity). If a person tests positive, what is the probability that they actually have the disease? **08** (3:4:1.4.5)

(OR)

8. a. List the model selection procedure steps. **04** (2:4:1.4.5)
b. Derive an expression $r(d, \theta) = \text{var}(d) + (b_{\theta}(d))^2$. Describe the mean and variance using a diagram. **08** (2:4:1.4.5)
c. Discuss about bias variance dilemma detail. **08** (3:4:1.4.5)

Module-5

9. a. Define decision tree and target function. **04** (2:5:1.4.5)
b. Identify and explain any three characteristics of the problems suited for decision tree algorithm. **08** (2:5:1.4.5)

- c. **08** (3:5:1.4.5)

Day	Outlook	Temperatur	Humidity	Wind	Play Tennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Illustrate the operation ID3 algorithm for target function Play Tennis and construct the decision tree for the same.

(OR)

10. a. Draw the schematic diagram of typical biological neuron or nerve cell **04** (2:5:1.4.5)
- b. Discuss the Mcculloch pitts and perceptron neuron model. **08** (2:5:1.4.5)
- c. Explain the basic learning law of a neural network and also explain Hebb's law **08** (3:5:1.4.5)

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