Reg.	No.
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VII SEMESTER B.TECH. (COMPUTER AND COMMUNICATION ENGINEERING)

MAKE UP EXAMINATIONS, JAN 2017

SUBJECT: PROGRAM ELECTIVE IV- MACHINE LEARNING (ICT 447)

(REVISED CREDIT SYSTEM)

(02/01/2017)

]	fIME: 3 HOURS MAX. MARKS: 5	50
	Instructions to candidates:	
	 Answer ANY FIVE FULL the questions Missing data may be suitably assumed 	
1A.	Explain back propagation algorithm and derive expressions for weight update relations.	5
1 B .	What is regularization? Mention the significance of regularization. Write the regularized normal equation for computing θ values.	3
1 C .	Differentiate Supervised and Unsupervised algorithms with proper examples.	2
2A.	Explain Support Vector Machine with kernel functions.	5
2B.	Perform Maximum likelihood estimation for (μ, σ) for Gaussian distribution.	3
2C.	What are the differences between K-means and K-medoids algorithms explain with proper example.	2
3A.	Consider a Bayesian belief network given in Figure Q.3A. Suppose it is observed that the grass is wet then are two possible causes for this: either it rained, or the sprinkler was on. Which one is more likely?	5
3B.	What is ensemble model? Explain Bagging and boosting algorithms.	3
3C.	Explain the concepts of under fitting and over fitting of models with graphical represen- tation.	2
4A.	Compute theta values for predicting the class label using logistic regression gradient de- scent function for the data given in Table Q.4A.	5
4B.	Explain the concept of factor analysis with its significance.	3
4C.	A neuron with 4 inputs has the weight vector $w = [1, 2, 3, 4]^T$ and a bias $\mu = 0$ (zero). The activation function is linear, where the constant of proportionality equals 2 that is, the activation function is given by $f(net) = 2$ *net. If the input vector is $x = [4, 8, 5, 6]^T$ then what will be the output of the neuron?	2
5A.	Construct the decision tree using CART algorithm for the data given in Table Q.5A.	5

5B.	What is Clustering? Given the set of points as shown in Figure Q.5B and start with two randon centroids as $C1(3,4)$ and $C2(7,4)$, find the updated centroids after first iteration of			
	K-means clustering algorithm.			
5C.	What are different performance metrics for classification and regression.	2		
6A.	What is Reinforcement learning (RL)? How is RL model represented? Write the repre- sentations of value function.	5		
6B.	Consider HMM with states S1, S2, S3 and observations A, B, C and parameters as shown in Figure Q.6B. If the observation sequence is AABC, then what is the probable state sequence from time t1 to t4?	3		
6C.	When can we say that algorithm is a weak learner according to PAC model? Explain.	2		

When can we say that algorithm is a weak learner according to PAC model? Explain. 6C.

Table Q.4A

Table Q.5A

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8

9

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7

Class cart_type id age x2 class x1 1 25 1 В 1 0 1 2 35 0 А 0 0 0 3 30 1 А 1 1 1 20 4 0 В 0 1 1 5 25 В 1 9 P(C=T) P(C=F) 0.50 0.50 8 **_**3 Cloudy 7 O ₁₀ 6 🔵
 C
 P(S=T)
 P(S=F)

 T
 0.10
 0.90

 F
 0.50
 0.50

 C
 P(R=T)
 P(R=F)

 T
 0.80
 0.20

 F
 0.20
 0.80
 5 Sprinkler Rain 4 C
 S
 R
 P(W=T)
 P(W=F)

 T
 T
 0.99
 0.01

 T
 F
 0.90
 0.10

 F
 T
 0.90
 0.10

 F
 F
 0.00
 1.00
 3 **2**L Wet Grass 3 4 5 6 Figure Q.3A Figure Q.5B

[$\pi_1 = 1$	$a_{11} = 1/2$	$a_{12} = 1/4$	$a_{13} = 1/4$	$b_1(A) = 1/2$	$b_1(B) = 1/2$	$b_1(C)=0$
-	$\pi_2 = 0$	$a_{21} = 0$	$a_{22} = 1/2$	$a_{23} = 1/2$	$b_2(A) = 1/2$	$b_2(B)=0$	$b_2(C) = 1/2$
	$\pi_3 = 0$	$a_{31} = 0$	$a_{32} = 0$	$a_{33} = 1$	$b_3(A)=0$	$b_3(B) = 1/2$	$b_3(C) = 1/2$

Figure Q.6B