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**GIET UNIVERSITY, GUNUPUR – 765022**  
 M. Tech ( Third Semester – Regular) Examinations, December – 2020  
**MPEEC 3012 – Pattern Recognition and Machine Learning**  
**(ECE)**

Time: 2 hrs

Maximum: 50 Marks

**The figures in the right hand margin indicate marks.**

**PART – A (2 x 10 = 20 Marks)**

Q.1. Answer ALL questions

- a. Write the different activation functions used in neural network.
- b. What are the different diagnostic tests performed to validate a regression model?
- c. What is a confusion matrix with respect to a classification problem? How ROC is plotted for a two class example?
- d. What is sensitivity? Why it is used in Back propagation algorithm?
- e. What is gradient Descent? Write the Gradient Descent rule for minimizing a function.
- f. What is generalization and over fitting with respect to machine learning?
- g. Prove that the entropy is maximum when instances are equiprobable.
- h. Explain nearest neighbour clustering with an example.
- i. Why in most cases unknown density function is assumed to be Gaussian?
- j. Explain different criterion functions used in clustering.

**PART – B (6 x 5 = 30 Marks)**

Answer ANY FIVE questions

Marks

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| 2. What is a loss function? Derive the expression for conditional risk.  | (6) |
| 3. Given $\omega_1, \omega_2 : P(\omega_1) = P(\omega_2), P(x \omega_1) = N(\mu_1, \Sigma), P(x \omega_2) = N(\mu_2, \Sigma)$<br>$\mu_1 = [1 \ 1]^T, \mu_2 = [4 \ 4]^T, \Sigma = [2 \ 0; 0 \ 2]$ , classify the vector $x = [1 \ 2]^T$ using Bayes classifier. | (6) |
| 4. Explain the different components of a Pattern Recognition System using a suitable diagram.  | (6) |
| 5. Apply K-means algorithm on the given data for k=2. Use C1=16, C2=22 as initial cluster centres. Given Data Set:<br>15,15,16,19,19,20,20,21,22,28,35,40,41,42,43,44,60,61,65.  | (6) |
| 6. Explain Deep learning. How it is different from machine learning? How MLP is different from a deep architecture?  | (6) |
| 7. Derive the Ho-Kashyap Procedure.  | (6) |
| 8. How a support vector machine can be used to create a linear decision boundary? Find the optimum hyperplane which can be used to classify linearly separable samples.  | (6) |
| 9. Explain the conditions in which Gradient Decent is applied? Distinguish between Gradient Descent and Stochastic gradient Descent.   | (6) |

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