Time: 2 ½ Hours **Total Marks: 60** 

**N.B:** 

<ul> <li>(2) Figures to the right indicate full marks.</li> <li>(3) Assume additional data if necessary but state the same clearly.</li> <li>(4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.</li> <li>(5) Use of calculators and statistical tables are allowed.</li> <li>(12) Beta are allowed.</li> <li>(12) Attempt any two of the following and tables are allowed.</li> <li>(5) Use of calculators and statistical tables are allowed.</li> <li>(6) Explain the role of a designer in the optimization process are designer in the optimization process.</li> <li>(6) Golden section search uses the golden ratio to approximate Fibonacci search. Thus, explain Fibonacci and golden section search on a unimodal function.</li> <li>(6) Give an example of a nontrivial function where quadratic fit search would identify the minimum correctly once the function values at three distinct points are available.</li> <li>(9) Attempt any two of the following and the following are averaged and follow</li></ul>	N.B:	(1)	All questions are compulsory.	
<ul> <li>(3) Assume additional data if necessary but state the same clearly.</li> <li>(4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.</li> <li>(5) Use of calculators and statistical tables are allowed.</li> <li>Q.1 Attempt any two of the following and Explain the role of a designer in the optimization process by What are critical points? Explain its importance to find local minimizer. 6</li> <li>Golden section search uses the golden ratio to approximate Fibonacci of search. Thus, explain Fibonacci and golden section search on a unimodal function.</li> <li>Give an example of a nontrivial function where quadratic fit search would identify the minimum correctly once the function values at three distinct points are available</li> <li>Q.2 Attempt any two of the following and Prove that d<sup>(k+1)</sup> and d<sup>(k)</sup> are orthogonal using gradient decent for explain Secant Method in detail.</li> <li>(a) When finding roots in one dimension, when would we use Newton's method instead of the bisection method?</li> <li>Q.3 Attempt any two of the following and Explain how to calculate pairwise distance between point in sampling plan.</li> <li>(b) What is the use of Quasi-Random Sequences? Thus state the quasi-Monte Carlo method's error convergence as compared to Monte Carlo integration.</li> <li>(c) What is the use of Holdout method? Explain for Explain how to calculate pairwise distance between point in sampling plan.</li> <li>(d) Explain how to calculate pairwise distance between point in sampling plan.</li> <li>(e) What is the use of Holdout method? Explain for the following and the linear models in detail.</li> <li>(f) Explain the linear models in detail.</li> <li>(g) What are different types of uncertainty explain any three.</li> <li>(h) Explain the linear models in detail.</li> <li>(h) Explain the linear models in detail.</li></ul>		(2)		
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C) What is the use of Holdout method? Explain d) Explain the linear models in detail.  Q.4 Attempt <u>any two</u> of the following What are different types of uncertainty explain any three. b) $f(z) \approx \hat{f}(z) = \sum_{i=1}^{k} \theta_i b_i(z)$ In the explain two inferences of the coefficients. Thus visualize the Orthogonal basis functions for uniform, exponential, and unit Gaussian distributions. c) What is dynamic programming? Explain d) Explain Ant Colony optimization as an optimal approach for solving  6		M	onte Carlo method's error convergence as compared to Monte Carlo	
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Thus visualize the Orthogonal basis functions for uniform, exponential, and unit Gaussian distributions.  c) What is dynamic programming? Explain  d) Explain Ant Colony optimization as an optimal approach for solving  6	b)	(2)	$f(z) \approx \hat{f}(z) = \sum_{i=1}^{K} \theta_{i} b_{i}(z)$	6
Thus visualize the Orthogonal basis functions for uniform, exponential, and unit Gaussian distributions.  c) What is dynamic programming? Explain  d) Explain Ant Colony optimization as an optimal approach for solving  6	7	In	the $i=1$ explain two inferences of the coefficients.	
and unit Gaussian distributions.  c) What is dynamic programming? Explain  d) Explain Ant Colony optimization as an optimal approach for solving  6		Th	nus visualize the Orthogonal basis functions for uniform, exponential,	
<ul> <li>What is dynamic programming? Explain</li> <li>Explain Ant Colony optimization as an optimal approach for solving</li> </ul>				
d) Explain Ant Colony optimization as an optimal approach for solving 6	c)			6
	d)			6
Travening salesman's problem			avelling salesman's problem	

Q.5	Attempt <u>any two</u> of the following (1	<b>(2</b> )
a)	What is Unimodality? Explain.	6
b)	Explain the working of, RMSProp. And thus explain its advantages over	6
	Adagrad.	
c)	Explain how Greedy local search and the exchange algorithm can be	6
	used to find a subset of points that maximally fill a space.	
d)	When would we use a more descriptive model, for example, with	6
	polynomial features, versus a simpler model like linear regression	

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