



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	OPTIMIZATION TECHNIQUES
Course Code	:	AHS012
Program	:	B.Tech
Semester	:	V
Branch	:	CSE/IT/EEE
Section	:	A/B/C/D
Academic Year	:	2019 – 2020
Course Faculty	:	Mr. R M Noorullah, Associate Professor, CSE

OBJECTIVES:

I	To help students to consider in depth the terminology and nomenclature used in the syllabus.
II	To focus on the meaning of new words / terminology/nomenclature

COURSE OBJECTIVES:

The course should enable the students to:

1. Learn fundamentals of linear programming through optimization.
2. Understand and apply optimization techniques to industrial applications.
3. Apply the dynamic programming and quadratic approximation to electrical and electronic problems and applications.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
UNIT-I						
1	What is objective function of O.R.?	The linear function of the variables which is to be maximize or minimize.	Remember	CO1	CLO1	AHS012.01
2	Which method is used to solve the linear programming problem involving only two variables?	Graphical Method or Simplex Method	Remember	CO1	CLO1	AHS012.01
3	What is unbounded solution?	If the value of the objective function z can be increased or decreased indefinitely is called unbounded solution.	Remember	CO1	CLO1	AHS012.01
4	Define operation research.	Operations research is the application of scientific methods to arrive at the optimal solutions to the problems.	Remember	CO1	CLO1	AHS012.01

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5	Define an artificial variable.	An artificial variable is used for equality constraints and for greater than or equal inequality constraints.	Remember	CO1	CLO2	AHS012.02
6	Define slack variable.	A slack variable is a variable that is added to an inequality constraint to transform it into an equality.	Remember	CO1	CLO2	AHS012.02
7	Define Surplus variable.	A surplus variable is a variable that is subtracted to an inequality constraint to transform it into an equality.	Remember	CO1	CLO2	AHS012.02
8	What are the different types of OR models?	1.Physical models 2.Mathematical model 3.By nature of extent 4.By the extent of generality	Remember	CO1	CLO1	AHS012.01
9	Define physical model.	Physical Model include all form of diagrams, graphs and charts. They are designed to tackle specific problems.	Remember	CO1	CLO1	AHS012.01
10	Define mathematical model.	Mathematical model employ a set of mathematical symbols to represent the decision variable of the system.	Remember	CO1	CLO1	AHS012.01
11	List out different types of physical models.	1. Iconic model 2. Analog model	Remember	CO1	CLO1	AHS012.01
12	Define an iconic model.	Iconic models are primarily images of objects or systems, represented on a smaller scale.	Remember	CO1	CLO1	AHS012.01
13	Define an Analog model.	Analog models are small physical systems having characteristics similar to the objects they represent, such as toys.	Remember	CO1	CLO1	AHS012.01
14	How many phases are there in OR to solve a problem?	6 phases.	Remember	CO1	CLO1	AHS012.01
15	List out the phases of OR.	1.Formulate the problem 2.Develop a model 3.Select appropriate data input 4.Solution of the model 5.Validation of the model 6.Implement the model.	Remember	CO1	CLO1	AHS012.01

UNIT-II

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
1	What is transportation problem?	It is a special type of linear programming model in which goods are shipped from various origins to different destinations. The objective is to find the best possible allocations of goods from various origins to different destinations such that the total transportation cost is minimum.	Remember	CO2	CLO4	AHS012.04
2	What is an unbalanced transportation problem?	A transportation problem is said to be unbalanced if the total supply is not equal to the total demand.	Remember	CO2	CLO4	AHS012.04
3	Define Feasible solution.	A set of non-negative values which satisfies the constraint equation is called a feasible solution.	Remember	CO2	CLO4	AHS012.04
4	Define Basic feasible solution.	A basic feasible solution is said to be basic, if the number of positive allocations are $m+n-1$.	Remember	CO2	CLO4	AHS012.04
5	Define Non degenerate solution	If the number of allocations are not equal to $m+n-1$, it is called non-degenerate basic feasible solution.	Remember	CO2	CLO4	AHS012.04
6	What is degeneracy in a transportation problem	If the number of occupied cells in a $m \times n$ transportation problem, is less than $(m+n-1)$, then the problem is said to be degenerate.	Remember	CO2	CLO4	AHS012.04
7	What is the purpose of MODI method ?	MODI method is the test procedure for optimality to get lowest possible transportation cost.	Remember	CO2	CLO4	AHS012.04
8	List any three approaches used with transportation problem for determining the initial basic feasible solution.	North – West corner rule Least cost entry method Vogel's approximations method.	Remember	CO2	CLO4	AHS012.04
9	How will you identify that transportation problem has got an alternate optimal solution?	While doing optimality test, if any empty cell evaluation ie $\Delta_{ij} = C_{ij} - (u_i + v_j) = 0$ then the problem is said to have an alternate optimal solution.	Remember	CO2	CLO4	AHS012.04
10	When do you say that the occupied cell is in independent position ?	When it is not possible to draw a closed loop from the allocations.	Remember	CO2	CLO4	AHS012.04
11	Write down the basic steps involved in solving a	To find the initial basic feasible solution To find an optimal solution	Remember	CO2	CLO4	AHS012.04

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	transportation problem.	by making successive improvements from the initial basic feasible solution.				
12	What is an assignment problem ?	It is a special type of transportation problem in which the number of jobs allocated for different machines or operators.	Remember	CO2	CLO4	AHS012.05
13	Give two applications of Assignment problem ?	It is used in production environment It is used in traveling salesman.	Remember	CO2	CLO5	AHS012.05
14	What do you mean by an unbalanced assignment problem?	If the given problem is not a square matrix is called unbalanced assignment problem.	Remember	CO2	CLO5	AHS012.05
15	How do you convert the maximization problem in to a minimization one ?	To solve the maximization problem in to minimization assignment problem, first convert the given maximization matrix in to an equivalent minimization matrix form by multiplying – 1 in all the cost elements. Then the problem is a maximization one and can be solved by the usual assignment method.	Remember	CO2	CLO5	AHS012.05
16	Name the method used in getting optimal solution in assignment problem.	Hungarian method.	Remember	CO2	CLO5	AHS012.05
17	What is the indication of an alternate solution in an assignment problem ?	If the final cost matrix contains more than the required number of zero for assignment at independent position then it indicated that the problem has an alternate optimal solution.	Remember	CO2	CLO5	AHS012.05
18	What is traveling salesman problem?	In this model a salesman has to visit ' n ' cities. He has to start from a particular city, visit each city once and then return to his starting point.	Remember	CO2	CLO5	AHS012.06
19	What are the objectives of travelling salesman problem?	The main objective of a salesman is to select the best sequence in which he visited all cities in order to minimize the total distance traveled or minimize the total time.	Remember	CO2	CLO5	AHS012.06
20	Why assignment problem will always provide degeneracy ?	In assignment problem, the allocation is one to one basis therefore, the number of occupied cells in each row and each column will be exactly equal to 1. Hence assignment problem will always provide degeneracy.	Remember	CO2	CLO5	AHS012.05

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21	Why a transportation problem or LPP by simplex method cannot be used to solve an assignment problem?	The transportation technique or simplex method cannot be used to solve the assignment problem because of degeneracy	Remember	CO2	CLO4	AHS012.04
22	Expand NWCR.	North-West Corner Method	Remember	CO2	CLO4	AHS012.04
23	Expand VAM.	Vogel's Approximation Method	Remember	CO2	CLO4	AHS012.04
24	Expand LCEM.	Least Cost Entry Method	Remember	CO2	CLO4	AHS012.04
25	Expand MODI	Modified Distribution	Remember	CO2	CLO5	AHS012.04
UNIT-III						
1	What is job shop scheduling?	Job shop scheduling is basically an optimization process in which ideal jobs are assigned to resources at particular times.	Remember	CO3	CLO7	AHS012.07
2	What is pure strategy?	A pure strategy is an unconditional, defined choice that a person makes in a situation or game.	Remember	CO3	CLO7	AHS012.07
3	Define Sequencing.	It is the selection of an appropriate order in which a number of jobs (Operations) can be assigned to a finite number of service facilities (Machines or equipments) so as to optimize the outputs in terms of time, cost or profit.	Remember	CO3	CLO7	AHS012.07
4	List out types of sequencing problems.	1.n jobs one machine 2.n jobs two machines 3.n jobs three machines 4.n jobs many machines	Remember	CO3	CLO8	AHS012.08
5	Define Johnson's rule?	It is a technique for minimizing completion time for a group of jobs to be processed on two machines or at two work centers.	Remember	CO3	CLO8	AHS012.08
6	Expand term SPT	Shortest Processing Time	Remember	CO3	CLO8	AHS012.08
7	Expand term WSPT	Weighed Processing Time	Remember	CO3	CLO9	AHS012.08
8	What conditions to be checked for converting n jobs through 3 machines to n jobs to 2 machines?	Minimum time on machine A \geq maximum time on machine B Minimum time on machine C \geq maximum time on machine B.	Remember	CO3	CLO8	AHS012.08
9	Which method is used for processing of two jobs through m machines?	By Graphical method	Remember	CO3	CLO9	AHS012.09
10	Mention any two optimal criteria considered while solving sequencing problems?	Minimizing total elapsed time Minimizing idle time of machines	Remember	CO3	CLO7	AHS012.07

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1	What is mixed strategy?	A mixed strategy is an assignment of probability to all choices in the strategy set.	Remember	CO3	CLO10	AHS012.10
2	What is zero sum game?	Zero-sum is a situation in game theory in which one person's gain is equivalent to another's loss.	Remember	CO3	CL10	AHS012.10
3	What is dominance principle?	The principle of dominance in Game Theory states that if one strategy of a player dominates over the other strategy in all conditions then the later strategy can be ignored.	Remember	CO3	CLO12	AHS012.12
4	List out the principles for game theory.	The principles are: <ul style="list-style-type: none"> · Each player makes the best possible move. · Each player knows that his or her opponent is also making the best possible move. 	Remember	CO3	CLO10	AHS012.10
5	What is saddle point?	A saddle point is a payoff that is simultaneously a row minimum and a column maximum.	Remember	CO3	CLO12	AHS012.12
6	What is game?	A competitive activity involving skill, chance, or endurance on the part of two or more persons who play according to a set of rules, usually for their own amusement or for that of spectators	Remember	CO3	CLO10	AHS012.10
7	Define player?	A competitive activity involving skill, chance, or endurance on the part of two or more persons who play according to a set of rules, usually for their own amusement or for that of spectators	Remember	CO3	CLO10	AHS012.10
8	Define strategy?	A complete plan of action a player will take given the set of circumstances that might arise within the game.	Remember	CO3	CLO11	AHS012.11
9	Define Game theory?	Game theory is the process of modeling the strategic interaction between two or more players in a situation containing set rules and outcomes.	Remember	CO3	CLO11	AHS012.11
10	When we will get solution by method of sub games in mX2 game problems?	When we can reduce the given payoff matrix to 2×3 or 3×2	Remember	CO3	CLO11	AHS012.11

UNIT-IV

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
1	What is Dynamic Programming?	Dynamic programming is a technique for getting solutions for multistage decision problems.	Remember	CO4	CLO 14	AHS012.14
2	Define multistage decision problems?	A problem, in which the decision has to be made at successive stages, is called a multistage decision problem.	Understand	CO4	CLO 15	AHS012.15
3	Define States?	A specific measurable condition of the system.	Understand	CO4	CLO 15	AHS012.15
4	What are state variables?	The variables, which specify the condition of the decision process, i.e. describes the status of the system at a particular stage are called state variables.	Remember	CO4	CLO 14	AHS012.14
5	What is Bellman's principle of optimality?	An optimal policy has the property that whatever the initial state and initial decision are, the remaining decisions must constitute an optimal policy with regard to the state resulting from the first decision.	Understand	CO4	CLO 13	AHS012.13
6	Define Stage?	Division of sequence of a system into various sub parts is called stages.	Remember	CO4	CLO 14	AHS012.14
7	What is a Stage decision?	At each stage there are a number of alternatives, and the best out of those is called stage decision.	Understand	CO4	CLO 15	AHS012.15
8	What is forward computational procedure?	If there are 'n' stages, and recursive equations for each stage is f_1, f_2, \dots, f_n and if they are solved in the order f_1 to f_n and optimal return for f_1 is r_1 and that of f_2 is r_2 and so on, then the method of calculation is known as forward computational procedure.	Understand	CO4	CLO 16	AHS012.16
9	What is backward computational procedure?	If they are solved in the order from f_n, f_{n-1}, \dots, f_1 , then the method is termed as backward computational procedure.	Understand	CO4	CLO 16	AHS012.16
10	What are Deterministic models?	A single solution describing the outcome of some "experiment" given appropriate inputs.	Remember	CO4	CLO 16	AHS012.16
11	What is Stochastic model?	Stochastic modeling is a form of a financial model that is used to help make investment decisions. This type of modeling forecasts the probability of various outcomes under different conditions, using random variables.	Remember	CO4	CLO 16	AHS012.16
12	Define dynamic programming	The shortest path problem is the problem of finding	Remember	CO4	CLO 17	AHS012.17

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	shortest path problem?	a path between two vertices (or nodes) in a graph such that the sum of the weights of its constituent edges is minimized.				
13	What is recursive equation?	At every stage in dynamic programming the decision rule is determined by evaluate an objective function is called recursive equation.	Remember	CO4	CLO 17	AHS012.17
14	What is optimal substructure in dynamic programming?	A problem is said to have optimal substructure if an optimal solution can be constructed from optimal solutions of its subproblems.	Understand	CO4	CLO 15	AHS012.15
15	What is the difference between dynamic and linear programming?	Dynamic programming is making one decision at a time and whereas in linear programming is making all the decisions up front.	Understand	CO4	CLO 16	AHS012.16
UNIT-V						
1	What is Single variable function?	A function with one independent variable is a single variable function, ex : $y = f(x)$	Remember	CO5	CLO 18	AHS012.18
2	Define Non Linear programming problem.	LP problems is a class of optimization problems in which constraints of system can be expressed as linear equations/inequalities and objective functions is also linear function of variables	Remember	CO5	CLO 18	AHS012.18
3.	Define linear approximation.	Suppose f is a function that is differentiable on an interval I containing the point a . The linear approximation to f at a is the linear function $L(x) = f(a) + f'(a)(x - a)$, for x in I .	Remember	CO5	CLO 18	AHS012.18
3	Define Quadratic programming .	Quadratic programming maximizes or minimizes a quadratic objective function subject to one or more constraints of linear function.	Remember	CO5	CLO 19	AHS012.19
4	What is Gradient?	The gradient stores all the partial derivative information of a multivariable function. The gradient of a function f , denoted as ∇f , is the collection of all its partial derivatives into a vector.	Remember	CO5	CLO 19	AHS012.19
5	Define Tangent plane of graph of two variable function.	A tangent plane to a two-variable function $f(x,y)$ is, well, a plane that's tangent to its graph and is denoted by $T(x,y) = f(x_0,y_0) + f_x(x_0,y_0)(x-x_0) + f_y(x_0,y_0)(y-y_0)$	Remember	CO5	CLO 19	AHS012.19

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
6	What is Hessian matrix?	The Hessian is a matrix which organizes all the second partial derivatives of a function.	Remember	CO5	CLO 19	AHS012.19
7	What is quadratic approximation?	Quadratic approximations extend the notion of a local linearization, giving an even closer approximation of a function using second partial derivatives.	Remember	CO5	CLO 20	AHS012.20
7	Define Lagrangian function.	The relationship between the gradient of the function and gradients of the constraints rather naturally leads to a reformulation of the original problem, known as the Lagrangian function .	Remember	CO5	CLO 21	AHS012.21
8	What are langrange multiplier?	The Lagrange multiplier technique used to find the maximum or minimum of a multivariable function $f(x, y, \dots)$ when there is some constraint on the input values are allowed to use.	Remember	CO5	CLO 21	AHS012.21
9	What is constrained optimization?	A function with constraints having minimize/maximize objective function is constrained optimization.	Remember	CO5	CLO 22	AHS012.22
10	List basic parameters to identify differences between GRG and CVM strategies	Order of derivative (first order and second order), order of matrix used for calculation ($N \times N$ and $N-K \times N-K$) and type of function used (objective and penalty).	Understand	CO5	CLO 22	AHS012.22

Signature of the Faculty

Signature of HOD